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Learning, Wellbeing and Trust Track

Investigating the effectiveness of teaching grammar through the context of writing

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Abstract

This study examines the impact of teaching grammar through the context of writing on improving students' performance in English. The rationale for doing this study is that teaching grammar to Arab students is important to improve their interlanguage and help them identify how English language works in a meaningful context. Students need to learn the grammatical system of English and recognize the environment in which the linguistic forms function. To achieve the purpose of this study, a qualitative research is conducted on a group of university students studying an English course. The literature review sheds light on the main theories related to grammar and writing which are learner's interlanguage, functional grammar, and the process- oriented approach to writing.

The data consists of students' written performance collected at different stages of the course. The research instruments include a benchmark test conducted at the beginning of the course and an exam conducted at the end of the course. In both tests, students are asked to write a paragraph about different topics. Moreover, throughout the course, students are doing a writing task related to the grammar topics taught such as tenses and punctuation. Also, through using the writing process approach, students study the basics of writing grammatically correct, well-structured, and meaningful paragraphs. Data analysis comprises comparing students' writing in the benchmark test to their writing in the end-of-course exam using rubric.

The results of data analysis prove the positive outcomes of the study by indicating a progress in students' performance in English. The findings will be used to provide recommendations on how to enhance teaching grammar through the context of writing to adapt to learners' needs and levels. These recommendations may inspire teachers to adopt effective teaching techniques to overcome the difficulties Arab students face while studying grammar, particularly third-person singular and consistency in using tenses. In addition, instructors are advised to use the process approach while teaching writing especially writing assignments and projects to enable students to identify their mistakes and correct them.

Keywords: process-oriented approach, English skills, Arab learners, punctuation, tenses, rubric, and context

1. Introduction

English is considered one of the most important languages that students need to learn and achieve a good level of accuracy and fluency when using it. English becomes essential when they get to the university since the language of instruction at most universities is English. Teaching grammar as a part of learning English language is central to improve students' interlanguage and help them identify how English language works in a meaningful context. Azar (2007) explains that "one important aspect of grammar teaching is that it helps learners discover the nature of language, i.e., that language consists of predictable patterns that make what we say, read, hear, and write intelligibly" (p.2). Hinkel and Fotos (2008) refer to engage students in communicative tasks while learning grammar. They indicate that "noticing linguistic forms and the environments in which they occur often lead to learners' increased abilities to identify the grammatical systems of the second and foreign language" (p.14).

On the other hand, writing represents one of the vital skills in the English language learning process. Flower and Hayes (1980, p. 40) conceptualize writing as a "strategic action where writers employ strategies to juggle with the constraints of composing". It is considered by researchers (White & Arndt, 1991) as a means of communication because through writing people share ideas and defend their opinions. For second language learners, writing is the most difficult English skill since as described by Tangpermpoon (2008) learners should have "a certain amount of L2 background knowledge about the rhetorical organization, appropriate language use or specific lexicon with which they want to communicate to their readers" (p. 1)."

The purpose of the study is to investigate the impact of teaching grammar through the context of writing. Richards (2002) explores the usefulness of grammar learning when engaged in communicative tasks. He highlights the fact that "although learners' exposure to language increases when they work with certain types of tasks, task work needs to be focused and carefully designed in order to lead to the acquisition of grammar" cited in Hinkel and Fotos (2008, p.14).

Despite the fact that reading and vocabulary are necessary to understand what they study, learners need to write grammatically correct assignments not only to pass the English course but also to do tasks related to other subjects. The study aims to assess the effectiveness and suitability of teaching grammar topics, such as tenses, subject-verb agreement, and passive voice through the context of writing to adapt to students' needs. To achieve the purpose of the study, a literature review of the functional theory of grammar, learner's interlanguage, and the writing process will be discussed. The data consists of students' written performance collected from a group of university students studying an English course. The samples will be gathered at different stages of the course to monitor the progress in students' levels in both grammar and writing. The results of analyzing the data will be used to provide recommendations on how to enhance teaching grammar through the context of writing to adapt to learners' needs and levels.

2. Literature review

The theoretical framework includes a hybrid of the functional theory of grammar, learner's interlanguage, and the writing process approach.

2.1 Functional Grammar
Of all the theories developed about grammar, this study focuses on functional grammar theory since it examines the grammatical structure of language and entire communicative situation. Functional grammar is a model developed by Halliday in the 1960s. The reason behind choosing functional grammar theory is that it contributes to the functional paradigm of language. Hengeveld (1997) defines functional grammar theory as explaining "the rules underlying the construction of linguistic expressions in terms of their functionality with respect to the ways in which these expressions are used" (p. 3). Similarly, Feng (2013) states that functional grammar theory focuses on how language works in different social situations "it is very useful in showing how texts work beyond the level of the sentence, how different texts are structured, and how language varies to suit the purpose of the users" (p. 86).

The importance of the knowledge of second language grammar comes from the fact that learners need not only to comprehend but also to produce understandable output consistent with target language norms (Ellis, 1997). Since target language norms are complicated and include many features, language instructors should be selective when deciding the norms that achieve intermediate and advanced linguistic skills and increase their interactional experience in the target language. Hinkel and Fotos (2008) refer to the point that "many classroom teachers believe that participating in interactions and activities that lead to increased output contributes to learner internalization of L2 knowledge" (p. 7).

According to Halliday (1994), functional grammar is a natural grammar in which everything can be explained by relating it to how language is used. He believes that language consists of three components called meta-functions. These components include the ideational meaning (to understand the environment), the interpersonal (to act on the others in it), and the textual meaning. Thompson (1996) illuminates the three components of functional grammar as follows:

> 1) We use language to talk about our experience of the world, including the world in our minds, to describe events and states and the entities involved in them.

> 2) We also use language to interact with other people, to establish and maintain relation with them, to influence their behavior, to express our own viewpoint on things in the world, and to elicit or change theirs. 3) Finally, in using language, we organize our messages in ways which indicate how they fit in with the other messages around them and with the wider context in which we are talking or writing (cited in Feng, 2013, p.87).

For the purpose of our study, the concepts of functional grammar will be used as the theoretical framework that helps us evaluate the effectiveness of the grammar topics in the course and the teaching strategies adopted in teaching these topics in improving learners' English language skills.

2.2. Interlanguage

The Interlanguage theory focuses on a language created by learners of a second language. It assumes that "an active and independent learning mind makes its own generalizations upon grappling with a new language" (Frith, 1977, p.155). Selinker has introduced the term interlanguage since 1972 as the first attempt to explain second language learning process from a cognitive point of view. Interlanguage refers to "the interim grammars which learners build on their way to full target language competence" (Ellis, 1994, p.30). Learner's interlanguage is affected by five central cognitive processes which are rules and items transferred from the first language, transfer of training, strategies of language learning resulting from the approaches used when teaching the material, strategies of second language communication, and overgeneralization of semantic features and grammar rules of the target language (Grauberg, 1997, p.78).

Learning strategies represent an important part in the process of forming interlanguage since they embrace learners' approach to the material to be learnt and the communication strategies used while teaching language. Selinker et al. (2000) define learning strategies as a way to "help learners

develop a mental grammar of the L2. It is these strategies that support a definite systematicity in the interlanguage" (Takac, 2008, pp.31-32).

The concept of interlanguage has been studied by many researchers. Urdaneta (2011) examined the influence of Spanish structure on English writing and focused on the instances of literal translations from Spanish to English during writing. The aim of the study was to show that grammar classes are important to learn English writing, and that the more students are exposed to English, the more language acquisition will be enhanced. To achieve the purpose of the study, he used several instruments to collect data from twenty four students studying at UNICA University. The results of data analysis indicated that the influence of first language can obstruct English writing processes. In addition, there were four main mistakes traced in the written products which were word order, missing of verb to be, implicit subject, and the incorrect use of the definite article "the".

Another study was conducted by Elkilic (2012) to examine the inter-lingual errors on the composition papers of Turkish university students. The study referred to the difficulties that Turkish students faced while writing such as proper word choice, grammatical structures, and other aspects of language resulting from the differences between Turkish and English. To achieve the purpose of the study, the researcher used participants from two different learning levels which were intermediate and upper intermediate level students. The results of data analysis indicated that the interference errors were word for word translation, misusing the prepositions, misusing uncountable nouns, omitting the indefinite article, subject-verb agreement and number, quantifier, and noun agreement.

Moreover, Alduais (2012) carried out a contrastive mixed-methods study between the simple sentence structure in the form of statement of both Standard Arabic and Standard English depending on the contrastive analysis hypothesis as developed by Lado (1957). In data collection, 500 simple sentences in both languages were selected randomly as samples from published academic sources. The results of data analysis revealed that standard Arabic showed a free-word-order system in simple sentence structure which contrasted to Standard English that exhibited a fixed-word-order. Also, Arab learners faced problems with subject verb agreement in English and may produce ungrammatical, ill-formed, and unacceptable written sentences due to the influence of their first language.

2.3. The process-oriented approach to writing
The process-oriented approach to writing has been developed to focus on how writing takes place as opposed to the product-oriented approach which focuses on the written task as a product. Smith and Andrews (2011) describe the writing process as "a recursive, idiosyncratic, situation-dependent set of activities we engage in to produce a piece of writing. These activities are embedded within broader categories or phases, the hallmark of the writing process: pre-writing, writing, and revising" (p.64).

The theory underlying the process-oriented approach is the cognitive theory. Selvester and Summers (2015) elaborate that the recursive activities include planning, translating, and reviewing. The writing process theory advocates integrating writing with other skills and adding a critical literacy perspective. In this way, "writing becomes a critical learning tool for exploring, questioning, reflecting, critiquing, and ultimately communicating thoughts and ideas that give adolescents greater ownership and control of their understanding of and opinions about a topic"

(Selvester and Summers, 2015, p.142). According to Kroll (2003), in second language writing classrooms, the writing process approach prompts creative strategies, multiple drafts, and formative feedback.

3. Methodology

The following sections will include the research questions designed to serve the purpose of this study, the participants involved in the study, the research instruments used to collect data, the procedures followed in collecting data, and the rubric used to analyze data.

3.1. Research questions
This study aims to answer the main research question:
To what extent would teaching grammar through the context of writing improve English language skills?
Sub-questions are
1. To what extent would teaching grammar enhance learners' interlanguage?
2. To what extent would the writing process approach improve learners' ability to produce coherent output congruent with target language grammar?

3.2. Participants
The participants involved in this study include a group of university students studying an English course. The students are selected randomly.

3.3. Research Instruments
To achieve the purpose of the study, qualitative research instruments are used. The instruments consist of samples of written performance collected from the benchmark test conducted at the beginning of the course, learners' assignments, and paragraphs from the end-of-course exam. In all samples, students are asked to write a paragraph about different topics. The purpose of using written samples at different phases to collect data investigating the same issue is to confirm the validity and reliability of the results and to give a fuller picture of the issue under discussion.

To analyze data, a rubric is used to evaluate students' writing (see Appendix 2 for the rubric). The rubric consists of four sections which are Content / Production, Organization and Coherence, Word Choice, and Language (mechanics and structure). The content section evaluates students' ability to write a well-developed topic sentence, supporting details with strong evidence (logos, ethos, and pathos), and a concluding sentence.

The organization and coherence section evaluates students' use of a variety of transition words while introducing reasons and evidence to achieve cohesion and coherence in the text. The word choice section evaluates students' ability to use vivid words and expressions that relate to the topic, look natural, and accurate.

Finally, the language section focuses on tracing errors in capitalization, punctuation marks (period, comma, exclamation mark, and question mark), spelling, grammar such as subject-verb agreement,

pronoun antecedent, consistency in tenses, and sentences structure (complete sentences). There are two reasons behind choosing this rubric. The first one is that it assesses most of the aspects that students need to master in order to articulate well-organized paragraphs using different types of sentence patterns. The second reason is that this rubric includes the topics that are taught in the course such as punctuation and grammar. By analyzing language mechanics and structure, students' writing should reflect their ability to use their knowledge of Basic English grammar rules in writing grammatically correct sentences.

3.4. Procedures of collecting data
The procedures of collecting data for this study include the following steps: in week three of the English course, students took the Benchmark test as a diagnostic test to assess their levels. The questions included paragraph writing, summary writing, conditional sentences, passive voice, perfect and present tense. (See Appendix 1 for the complete questions of the Benchmark test). Throughout the course, students were taught grammar topics which were parts of speech (verbs, nouns, adjectives, and adverbs). tenses (present, past, perfect, and future), subject-verb agreement (indefinite pronouns, compound subject, phrases between the subject and the verb, collective nouns, plural nouns, there is / there are, and don't / doesn't), active /passive voice, parallel structure, punctuation marks, fragment, run-on, wordy, and stringy snetences. For each of the previous grammar topics, there was a writing task. Students were asked to write a reflection, a short story, descriptive and expository paragraphs. Samples of students' assignments and projects were also collected.

The purpose of these writing tasks is to enable students to see how language works in a meaningful context. While writing assignments and projects, the writing process was used to enhance their writing by giving them the chance to check content and language. After writing the draft, students revised the unity of ideas, their use of cohesive devices, language mechanics and the appropriate punctuation marks. By the end of the course, an exam was conducted and students were asked to write paragraphs about various topics.

4. Data analysis

The samples that will be presented and analyzed in this section are related to four students selected randomly. The process of analyzing data includes interpreting the evaluation process conducted using the rubric. The analysis will focus on language mechanics mainly punctuation and capitalization, structure of sentence such as using complete sentences (no fragment or run-on sentences), third person singular, different types of sentences (simple, compound, and complex), and subject-verb agreement (singular subject takes singular verb and plural subject takes plural verb).

Since the benchmark test is conducted at the beginning of the course, students depend on their background knowledge of grammar to write their paragraphs. In addition, students have no idea about the structure of the paragraph which consists of topic sentence, supporting detail, and a concluding sentence. This is clear in the samples of the benchmark test which show a very short text with punctuation and capitalization mistakes.

Samples of Benchmark Test

Student 1
The advantages of english language are many such as it can be used as a main language in an organization through which communication can become easy as in an organization people are from different backgrounds and speak different languages. Secondly, it also helps in the education system as it becomes more easy for student to communicate and make a sentence, paragraph, summary as well as helps in higher education.

Student 2
English became one of the most important langane of the communites, It is the way we communicate with with the person so learning English is very important to all ages .In our life now we see that 80% of our kids can speak English because of the high knowlage The advantage s of learning English is to communicate

Student 3:
The advantage of learning English is that its the most common language known in the middle east, it connect people to understand each other and its a well known language around the world. amount of data in a relatively small space. Because of this, offices need less storage space to store equipment such as file cabinets and supply closets.

Student 4:
Learning a new language always have a great impact on the learner. And learning English is like opening a door to the future, were English is considered to be the most spoken language around the world. As it is the language used to communicate worldwide. The vast majority of companies require English as a very important factor for choosing their employees , were as an example in a company e-mails are usually in English. Most universities use English in their curriculum to easily attract students from many different places. Furthermore , in most countries English is taken as a second language beside the mother one. Overall, the one who is lucky is the one who take into consideration improving English, because in our era to be an ignorant is directly connected with being not able to use English!

The above samples of the benchmark test display the following errors in subject-verb agreement, structure of sentence, word choice, spelling, and word choice as in the following examples:
Student 1: sentence structure and capitalization: The advantages of english language are many such as it can be used as a main language in an organization through which communication can become easy as in an organization people are from different backgrounds and speak different languages.

Comparative form of adjective: "as it becomes more easy for student" instead of "as it becomes easier for student"
Student 3: word choice: "its the most common language" instead of "it is the most common.."

Student 4: subject-verb agreement: "Learning a new language always have a great impact" instead of "Learning a new language always has …"the one who take into consideration" instead of "the one who takes …".
Word choice "were English is considered" instead of "where English is considered"

Samples of end-of-course exam:

Student 1:

There are several benefits of doing exercises. Firstly, it can help in controlling weight. Obesity has become a major problems in many countries and it is one of the leading causes of death. for example, countries such as America have a population of above 50% that are over-weight. In addition, it is such a big problem that countries are introducing fitness programs so that their eating habits can be controlled and proper exercises are given to them so that they stay healthy and in shape. For instance, in Dubai, Fitness First launched a program where people are provided with the essential tools and schedule. Secondly, exercise lessens [reduces] the rate of diseases and heart related problems. for example, it was found by a research that many people who were not focusing on exercise or their body had heart attacks, cancer, breast cancer, Asthma, strokes and other diseases at an early age. Moreover, the implementation of exercise showed great difference in the death rate of people where people lived up to the age of 70 whereas before their death rate was 50. Thirdly, exercise helps people in quitting their bad habits. For instance, a health organization conducted a research where they observed that the rate at which alcohol people, or smoking people are dying were much faster, so they decided to improve their health by adding little exercise to their schedule and planned on increasing their exercise schedule every three to four days, simultaneously they tried to limit

their smoking or drinking alcohol day by day and it was seen that people were finding interest in exercising which made it easier for them to leave their bad habits. Moreover, it was seen that as the people's bad habits went, which was accomplished by exercise their family relation grew stronger. For example, many families were surveyed and their main response was that the person quit their bad activities and engaged in good activities like exercising was because he/she had greatly loved his/her family and did not want them to leave. Exercising showed that it has a handful of advantages.

Student 2:

"The benefits of doing exercises"

Health is very important in our life, to be healthy you should follow a lot of rules which includes, exercises. First of all, it is very important to know what is the right wight for you, becaus, your hight and wight should be matching and to know which exercises you will need. Example, My friend Sarah her wight is 50kg and hight is 170 m this case she must do lifing and eat more. Second, Nowadays, the young people are used to fast food without doing any exercises which make them oppres that will cose a lot of health promblems for exmple, sugr, being lazy, hard to breath so we really need to make the exercises part of our life and also part of the young people's life becaus it will make them be more active and having suger. At last, the benefits of doing exercises will make us look in a good shape, be more active and happy in our life, Never feel lazy to do exercises at least walking every day one hour is usefull.

Student 3:

"The benefits of doing exercises"

As people habitat is ~~Moving~~ movement, doing exercise has many benefits in humans, It can emprove there poschter and body Strucher, And it will ~~effect the~~ increse there ~~ste~~ stemina.
The hart ~~ready~~ works hard when ~~doing causse exercise~~ exercising. ~~And for that,~~ The pattern of ~~Betes~~ ♡ beats increses as the harder you go. The body also heats up as the ~~blo~~ blood circutes around the body.
~~Theese~~ also for, there is a Soical benefit ~~wen~~ when exercising, people tend to meet other people due of exercise. And ~~Many all Sport people tend be~~ also May Start exercising together. It is one of the ~~meg~~ major places where people tend to meet each other. In Concluding, exercies is a benefit to your health ~~and~~ look ~~amas~~ well as your Soical life.

Student 4:

No one can deny the importance of exercising on our overall health, and general wellbeing. First, exercising can prevent many types of diseases. For example, diabetes type 2, is a medical condition that can be prevented, if the people who are at a high risk of developing such condition, do regular exercises on a regular basis. Second, exercising helps us to maintain a healthy weight by burning extra fat. Moreover, burning fat will also avoid many mental and physical illnesses that could affect obese people. Furthermore, exercising always reflects positively on the person's mood, where it enhances the production of many hormones that are responsible of the individual's happiness. For instance, health professionals always advice people who are experiencing depression, to try to do different sports activities, to get out of their stressful mode and give their bodies the opportunity to help them release the "Happy" hormones. Researchers always compare between both types of people, who are physically active and not active. Results always show that active people tend to live longer and with little risk of developing diseases. While, on the other hand, sportless people are always at high risk of developing disease. To conclude, exercising is fun and should be a regular attitude followed by people to maintain a healthy and happy community.

After teaching students grammar topics such as tenses, types of sentences, the structure of the paragraph, and punctuation, students' writing started improving. As the samples from the end-of course exam show, learners become able to write extended paragraphs with different types of sentences. However, there are still mistakes in subject-verb agreement, punctuation, and capitalization.

Samples of assignments:

Student 1:
There are many different ways in which the UAE promotes and guides the Emirati women. Firstly**,** excessive preference is given to teaching more and more Emirati women and attention is given on broadening their proficiency rate. This was accomplished by executing free learning for them in public schools, colleges and institutes. They even proposed a law (Article 17 of the UAE's constitution) that fixates on providing obligatory education at the fundamental stages. They began to comprehend the buildup this brought in the economy and in the literacy rate and subsequently proposed a new law which made it mandatory for Emirati children to start schooling at the age of 6 and remain in school until they have completed grade 12 or reach the age of 18 whichever comes first. One aforesaid program was initiated by H.H Sheikh Mohammad with the desire to make the UAE amid the most innovative nations in the world which was the UAE National innovation strategy that was initiated as it was perceived that innovation was a keystone for social and economic accumulation, this strategy concentrated on seven sectors one of which was education. For example, with the help of this law UAE women have achieved outstanding progress accounting for over 70 percent of university graduates. Moreover, 77% of Emirati women enroll in higher education after secondary school and make up 70% of all university graduates in the UAE and 56% of UAE government university graduates in science, technology, engineering and mathematics (STEM) are women and the literacy rate of women in the UAE is 95.8%. Secondly**,** the UAE also commends the performance of Emirati women by celebrating Emirati women's day under the theme "women emulating Zayed" which wishes to hail the efforts of Emirati women who play different roles as well as celebrate international women's day and as well as decided to host the women's economic empowerment global summit (WEEGS) in order to extend their legitimate acknowledgement and indebtedness to women in all locations and fields for their evident contributions to the renewal and development of the nation. There are numerous ways in which the UAE aids and associates the Emirati women.

Student 2:
For a long time, the UAE was a melting pot of cultures with more than 200 nationalities, which they now refer to as their homeland. Due to this variation of cultures in the UAE, it is known to have a diverse society. The heritage of the UAE is reflected in the customs and traditions handed down from generation to generation. Sports in UAE are an actively promoted pursuit for the love of the game not only because of its health benefits but also because of its additional roles as an entertainer and cultural connection among people. First, Falcon is the most popular sport in the UAE. It represents courage and strength that are two essential elements of Emirati culture and all that it represents. It had grown so strong over the years. Due to its importance in the culture of the UAE, two specialist hospitals to take care of these magnificent birds are available that includes; Dubai Falcon Hospital and Abu Dhabi Falcon Hospital. Falcon is used for hunting in the desert and the growth of a noble sport. With the sport's increasing popularity, Falcons can cost between Dhs 2,000 and Dhs 50,000. They even need their passport to travel outside the country. Second, Camels are one of the important parts of the culture of the Emirates dating back to its roots. Camels are said to be God's gifts to Bedouin in the past because these animals often made life in the desert possible and provided everything including; transportation, clothing, and even food. Camels are today a symbol of local culture; the UAE now has extensive camel racing tracks, with a total of 15 different tracks across the country. Many of these tracks are large and fully

equipped facilities including; Al Wathba that is located in Abu Dhabi, the Camel Racing Club located in Dubai, Ras Al Khaimah, Sharjah, and Umm Al Quwain are also situated in camel racing grounds. Third, The Arabian horse for its rich bloodline is recognizable all over the world and is one of the oldest breeds of horses. Horse racing is, therefore, an essential part of Arabian life. There are various tournaments and courses for learners. Equipment for horseman sports can be found in all clubs where sport can take a form of leisure activity.

Being a dry land, sport in the UAE is associated with desert sand, where camels, horses, and falcon are being the most important sports in the UAE. Not forgetting football and beach soccer that is being practiced everywhere in the UAE.

Student 3:
Customer-supplier relationship is a business relation that businesses have with their customers and suppliers. Customers and suppliers play an important part in the success of a business. The purpose of a business is to provide products or services for its customers. And the way a business succeeds is by getting customers, maintaining customers and growing customers. It can be seen as simple as no customers, no business. So, it is important for businesses to focus on their relationship with their customers and make sure they are satisfied and develop loyalty with them. This will help companies to fulfil their business goals and grow. In Japanese, quality is translated to "okyakusama", which means customer or an honorable guest in English. This shows how much businesses around the world value their customers and work on meeting and exceeding their customers' expectations. And for a business to provide goods to their customers, they need materials and other resources to produce them. This is why it important for a business to focus on the quality of their relationship with the supplier. Having a good relationship with suppliers can help a business in many ways like getting better quality materials and receiving materials at discounted prices. This makes the quality of relationship with suppliers directly linked to the quality of a business' goods and services, which affects the quality that the customers receive. A business must always develop their products and services with the customer's needs in mind, which is vital to keep and grow customers. And by having a strong relationship with suppliers, businesses can easily communicate with providers when customers' demands change.

Student 4:
Life without the Internet is nearly impossible to imagine. It has been the world's most powerful tool. All our daily tasks either directly or indirectly heavily rely on the access to the Internet. It is with the help of the internet that there has been a revolutionary change in the development of the society. Its impact has been manifested through the advancements made in the fields of education, medicine, business, law, health, entertainment along with the economic, global and political changes in the economy. Education has become online with the grace of virtual teaching platforms that brings the students and the teachers closer regardless of their geographical location different and we are able to access the internet for many informative contents and blogs in our daily life. Hospitals can now keep digital version of their patient's records and medical history. It has also helped doctors connect to their patients and to each other and provide instant resolutions to important matters regarding the health of the patients e.g., The Cleveland Clinic in Abu Dhabi provides its staff with wireless microphone connection so that every nurse and doctor in the hospital are connected no matter far they are from each other. Also, heartbeat and fitness trackers are available on smart

phones along with help apps for addicts. Governments have launched many initiatives for the common welfare of the society and that includes providing social services and introducing the smart government, citizens now can report accidents online, and pay their speeding violations and road penalty bills online e.g. Dubai has launched the Dubai Police App that helps making all transactions 100% digitized. The internet has also played a major role in connecting us to our family, friends, colleagues in our daily life and has provided instant exchange of news and keeping up to their updates with the invention of smart phones and social media platforms i.e. Instagram, Snapchat, WhatsApp etc. It has also expanded our social circle by providing easy access to anyone's digital profiles and seeking for jobs etc. through LinkedIn. Entertainment is another important feature that has been enhanced with the internet e.g. Children can watch online cartoons while parents surf on Netflix and gamers find their new passion and music lovers download new playlists, the internet has variety of things for different tastes of people and they can either utilize their time on the internet in a productive manner or vice versa. Internet surfing can sometimes turn into an obsession for some segments of the society however keeping a balance is a must requirement in order to lead a healthy and unsophisticated life. In conclusion, it can be said that the internet casts a large influence on the behavior of the individuals in a society and has played a vital role in the growth of the economy.

The assignments demonstrate a better understanding of the grammar topics and the structure of paragraph. Using the process-approach helps students plan, write, revise, and edit their work to ensure no grammar or punctuation mistakes.

5. The results

The following section will present the results of data analysis through relating to the research questions and the literature review addressed earlier in this study.

To what extent would teaching grammar through the context of writing improve English language skills?
Sub-questions are
1. To what extent would teaching grammar enhance learners' interlanguage?
2. To what extent would the writing process approach improve learners' ability to produce coherent output congruent with target language grammar?

Research question 1:
To what extent would teaching grammar enhance learners' interlanguage?
This question will be addressed by comparing the results of analyzing the benchmark test samples with the end-of-course assessment samples. The results of data analysis assert that teaching particular grammar topics accommodated to students' needs and providing them with communicative practices of these topics enhance to a large extent learner's interlanguage. The analysis shows that students use different types of sentences in the end-of-course in comparison to their sentences in the benchmark test. This demonstrates students' mastering of the types of

sentences and their function. Concerning subject-verb agreement concept as represented by using the third person singular, it is clear that errors are available in the benchmark test as well as in the end-of-course samples where learners wrote extended paragraphs. Finally, in relation to consistency between tenses, students shifted smoothly between present and past tense while writing their paragraphs.

The results of analyzing our data can be related to the theoretical framework discussed earlier. As stated in the literature section, learner's interlanguage is affected by different cognitive processes (Grauberg, 1997), and one of them is related to the strategies of language learning and the approaches used when teaching the material. During the course, learners were involved in communicative activities to boost their understanding of the grammar topics and improve their abilities to use them in a meaningful context as stated earlier by Takac (2008, pp.31-32) "grammar learning strategies, i.e. learning strategies that help learners to develop a mental grammar of the L2. It is these strategies that support a definite systematicity in the interlanguage".

Also, the results of data analysis relate to the functional grammar theory discussed in the literature review. Students' samples show their understanding of how language works (Feng, 2013), and how paragraphs are structured. Learners write texts not only for the English course but also for other subjects, and in the case of other subjects they write extended texts. The results of our data analysis can be explained by the words of Azar (2007) who states that "along with an understanding of the nature of language, one of the principal benefits of GBT is that it helps students gain an understanding of grammar concepts" (pp.1-2).

However, samples from both assessments show errors in punctuation and capitalization. Despite the fact that leaners study these two topics at school and later in the English course at the university, they still need to concentrate more on using appropriate punctuation marks in their writing. The results in our study match to some extent the results of the study conducted by Urdaneta (2011) which assert that grammar classes are important to learn English writing and that the more students are exposed to English, the more language acquisition will be enhanced.

Research question 2:
To what extent would the writing process approach improve learners' ability to produce coherent output congruent with target language grammar?

This research question will be answered by comparing the samples of exams with the samples of the assignments. The results of analyzing students' written performance indicate that the process approach increases learners' abilities to produce well-organized and grammatically correct paragraphs in comparison to the paragraphs written in both tests. After writing the draft, students receive constructive feedback and are given the chance to check their language. This is related to what Kroll (2003) has proved in his study that in second language writing classrooms, the writing process approach prompts creative strategies, multiple drafts, and formative feedback.

The analysis of learners' assignments demonstrates a deeper understanding of the usage of different types of sentences, subject-verb agreement, third person singular, punctuation marks, and capitalization. This is justified by the fact that students followed the process-oriented approach. They brainstormed ideas, wrote their outlines, completed the draft, and then received the feedback. The process of writing, revising, and editing enables learners to identify their errors and correct

them. Also, this process clarifies the points of weakness that students need to overcome and find suitable solutions. Whether students work in groups or as individuals, the feedback focuses on the organization of ideas, sentence structure, and tenses.

The main question: **To what extent would teaching grammar through the context of writing improve English language skills?**

The answer of this question relates to the three dimensions of the theoretical framework introduced earlier which are functional grammar theory, learners' interlanguage, and the process-oriented approach. In the functional grammar theory, Thompson (1996) illuminates the three components of functional grammar, and one of these components is using language where learners "organize messages in ways which indicate how they fit in with the other messages around them and with the wider context in which we are talking or writing (cited in Feng, 2013, p.87). The results of analyzing samples of the assignments and end-of-course writing reflect the benefits of using functional grammar theory as a teaching strategy while delivering the material. Moreover, the results imply that teaching students the assigned grammar topics for this course and backing each topic with a writing task would enhance students' interlanguage and show students how language works in a meaningful context.

As for the last dimension of the theoretical framework, it is obvious that integrating teaching grammar with the writing process approach enables students to improve their written performance. Learners revise and edit both content and language. This was evident in samples of assignments more than tests' samples, since the mechanics and structure mistakes were less in the assignments than in the exam samples. This means that teaching grammar through the context of writing was effective, but it would be more beneficial if teaching grammar was mingled with the writing process approach.

6. Implications on learning and teaching English

As indicated in the previous section, the results of data analysis prove the positive outcomes of the study by exhibiting a progress in students' performance in English. The findings can be used to provide recommendations on how to enhance teaching grammar through the context of writing to adapt to learners' needs and levels. These recommendations may inspire teachers to adopt effective teaching techniques to overcome the difficulties Arab students face while studying grammar, particularly third-person singular and consistency in using tenses.

In addition, instructors are advised to use the process approach while teaching writing especially writing assignments and projects to enable students to identify their mistakes and correct them. One aspect of improving learners' English language is data analysis. Teachers could utilize analyzing students' writings to recognize the problems that they face in learning English, and then work to find solutions for these problems during prepared classroom activities.

The call for authentic materials to be used in classroom for the different skills of English has proved its effectiveness in enriching the learning material as Berwald (1987, p.1) states that they "contain current language on all topics imaginable and provide constant reinforcement of grammatical forms learned in the classroom. In addition to containing traditional vocabulary learned in the early stages

of language instruction, they may contain neologism as well as extensive vocabulary for sports, politics, cooking, music and other topical areas."

7. Conclusion

This study focuses on evaluating the effectiveness of teaching grammar through the context of writing. The data gathered to answer the research questions consists of samples of written performance collected at different stages of the course and includes samples of benchmark test, end-of-course test, and assignments. The analysis of students' written performance reveals the positive effects of teaching grammar through the context of writing especially if mingled with the process oriented approach. The study recommends that instructors use the process approach in writing assignments and projects to enable students to identify their mistakes and correct them.

8. Limitations of the study

This study is limited to the data collected from a particular number of students. The study concentrates mainly on evaluating the effectiveness of teaching grammar through the context of writing. Particular grammar topics are assigned for this course to suit students' needs since they study different subjects. As a result, other grammar topics may not be useful and practical to accommodate to students' levels and needs.

9. Future research

It is recommended that a longitudinal further research is conducted on the effectiveness of teaching grammar through the context of writing to enhance learners' English language. A wider range of written performance samples might be collected and analyzed to enable the researcher to generate further recommendations to improve English teaching strategies and the learning process.

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Appendix 1: Questions of the benchmark test

1) Paragraph Writing: Write a short paragraph about the following topic:
The advantages of learning English

2) Summary: Summarize the following passage:
Computers have become a necessity for both small and large businesses today. It takes a computer less than a second to retrieve information that takes a person several hours to obtain. It is for this reason that banks, airlines, and fast food restaurants rely so heavily on them. In addition, computers can store large amounts of data in a relatively small space. Because of this, offices need less storage space equipment such as file cabinets and supply closets.

3) Conditional
Complete the following sentence with the suitable form of verb between brackets.
If you had told me about your problem, I _____(help) you.

4) Passive Voice
Complete the following sentence with the correct form of verb between brackets. Use passive voice.
The car _____(steal) before the police had arrived.

5) Passive Voice
Complete the following sentence with the correct form of verb between brackets. Use passive voice.
The car _____(steal) before the police had arrived.

6) Perfect Tense
Complete the following sentence with the correct form of verb between brackets. Use perfect tense.
Salim _____(work) in London for 10 years.

7) Present Tense
Complete the following sentence with the suitable form of verb between brackets.
Ahmad or his brother _____ (play) tennis every day.

Appendix 2: Rubrics for Paragraph Writing

Criteria	Exemplary	Meeting	Approaching	Insufficient	Score
Content / Production	Take a clear position and supports it consistently with well-focused topic sentence, well-developed specific details and a concluding sentence, persuasive techniques logos, ethos, and pathos are all present and powerful, each appeal is used throughout the content effectively	Take a clear position and support it with clear topic sentence, mostly specific details and a concluding sentence, persuasive techniques logos, ethos, and pathos are present but are not effectively used	Take a position and provide with a topic sentence, general supporting details, and a conclusion that does not restate the topic, only one rhetorical appeal is used	Attempts to take a position but not clear, provide minimal supporting details, no concluding sentence, and no persuasive techniques are used	2
Organization and Coherence	The writer has a variety of transition words or phrases effectively introduce reasons and evidence within the paragraph.	The writer has three or more transition words or phrases, introduce reasons and evidence within the paragraph.	The writer has one or two transition words or phrases, introduce reasons and evidence within the paragraph.	The writer needs transition words or phrases.	1
Word choice	The author uses vivid words and phrases. The choice and placement of words seems accurate, natural, and not forced.	The author uses vivid words and phrases. The choice and placement of words is inaccurate at times and/or seems overdone.	The author uses words that communicate clearly, but the writing lacks variety.	The writer uses a limited vocabulary. Jargon or clichés may be present and detract from the meaning.	1
Language (mechanics and structure)	The writer has few if any errors in capitalization, usage, punctuation, spelling or grammar. Errors do not interfere with readability.	The writer has some errors in capitalization, usage, punctuation, spelling or grammar. Errors do not interfere with readability.	The writer has many errors in capitalization, usage, punctuation, spelling or grammar. Errors interfere somewhat with readability.	The writer has significant errors in capitalization, usage, punctuation, spelling or grammar. Errors interfere significantly with readability.	1
Total					**5**

An Assessment Management System for Multiple Choice Questions in an Integrated Medical Curriculum

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Abstract

Background: Assessment management systems for integrated medical curricula must contain several key features in order to allow medical educators and assessors to develop, maintain, conduct and evaluate assessments properly. We have developed an Assessment Management System (AMS) to manage and maintain its question bank as well as create, conduct and evaluate its assessments. Requirement analysis was conducted to determine key features needed to develop, maintain, conduct and evaluate Multiple-Choice Question (MCQ) assessments in an integrated medical curriculum.

Results: Requirements analysis revealed that user-friendly, security, and user access control are top priority. Key features include collecting tagged questions in a question bank, standard setting assessments, linking questions to learning outcomes, conducting assessments, collating and disseminating results including question psychometrics, giving feedback to students and question writers, and generating assessments using the question bank and examination blueprints. The AMS has been developed in-house based on this requirements analysis using a web-based, database-driven platform.

Discussion: The system has been used at the college for over 2,000 MCQ-type assessments from 2010 to 2019. The question bank is utilized by faculty to create assessments, standard set, map questions to course outcomes, and analyze results using psychometrics. A Team-Based Learning and Assessment module has also been added.

Conclusion: Keeping in mind that reliable information gathering and interaction with eventual users is vital to the effective design of the system, it is possible to develop a secure and customizable online assessment management system for medical schools that is earnestly used and accepted, satisfies the needs of assessment management, and conforms to medical education and assessment principles.

Take-home message: Tagging of questions, standard setting, linking of question to learning outcomes, and generating examinations based on blueprints are some of the priorities in an integrated medical curriculum assessment system.

Breast Self-Examination: The Knowledge, Attitude and Practices among Female University students residing in Abuja

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Acknowledgements

Executive Summary

Background: The occurrence of breast cancer is expanding and its diagnosis is unfortunately usually done in our condition with prognosis at levels which are lower that what are considered to be standard. Breast self-assessment (BSE) stays a significant tool in diagnosis for the early detection of breast cancer in a community that is constrained of resources. Female university students in Abuja, the federal capital of Nigeria, are in a position to be well educated on the benefits of the tool if they are not already aware and they may also serve as ambassadors of the movement. BSE is a relatively simple diagnostic method that requires no financial commitment, no need for special tools and is also non-invasive.

Objectives: This research paper explores the knowledge, attitudes and believes surrounding BSE among female university students residing in Abuja with respect to the number that actively practice BSE, method used and the frequency of BSE.

Materials and Methods: The examination is a case-study investigation of female university students residing in Abuja and are utilizing BSE. The research can be framed as a survey research. Respondents were chosen by means of the implementation of stratified random sampling. The data collected were on socio-demographic profile, information, disposition and practice of BSE. The connections between these elements were considered.

Results: All the female university students examined know about BSE, with some of them actually putting it into practice. There is poor information on its timing, frequency and method. Only about half of the respondents practice BSE month to month, and none of the respondents can precisely depict the method used in carrying out BSE. The rate at which BSE is practiced is very low even with those exposed to knowledge about it.

Conclusion: There is a widespread sense of awareness among the female university students to the BSE, with inauspicious consciousness of its motivation, method, timing, and frequency among them being examined. In any case, there is a great deal of excitement to urge others to do it. In this way, female university students should be likewise additionally trained and taught about the system. The hypothesis is disproven because female university students have the knowledge but have negative attitudes towards it which result from fear and a lack of practice resulting from a lack of comfort.

Introduction

Breast cancer is a noteworthy public health concern in both developing and developed countries. Breast cancer is a threatening tumor that starts from the cells of the breast. It happens for the most part in women, however men can likewise be affected. The occurrence of breast cancer is expanding in the developing countries because of increment in life expectancy, increment in urbanization and appropriation of western lifestyles. Albeit some risk decrease may be accomplished with counteractive action, these methodologies can't dispose of most of breast cancers that develop in low-and middle income countries where breast cancer is found in late stages (WHO, 2011). In this way, early detection so as to improve breast cancer result and survival remains the foundation of breast cancer control.

Breast cancer normally creates no symptoms when the tumor is little and most effectively treated, which is the reason screening is significant for early detection. The most normal physical sign is an easy protuberance. Now and then breast cancer spreads to underarm lymph nodes and causes a protuberance or swelling, even before the first breast tumor is huge enough to be felt. Less basic signs and symptoms incorporate breast pain or increased weight; persevering changes, for example, swelling, thickening, or redness of the skin; and areola or nipple anomalies, for example, unconstrained discharge (particularly bloody), disintegration, or withdrawal (American Cancer Society, 2017). Any determined change in the breast ought to be assessed by a doctor at the earliest opportunity.

University students, by the idea that they are of higher intellect than their less educated pairs assume a novel job in being ambassadors of positive attitudes and believes especially in areas that have to do with their wellbeing and health. This includes the early detection of breast cancer, risk factors

and accessible screening methods and practices (Demirkiran, et al., 2007). Additionally, the knowledge and practice of BSE will improve early detection in themselves and the society at large (Doshi, Reddy, Kulkarni, & Karunakar, 2017).

Literature review

Knowledge of breast-self examination

Information of cancer in Africa is woefully deficient , and epidemiological information with respect to the occurrence of cancer in sub-Saharan Africa, particularly, are inadequate (Parkin, et al., 1986). In the past, cancers and other communicable illnesses were believed to be irrelevant public health issues in developing countries, similar to Ghana, as a result of the extremely high prevalence of transmittable illnesses (Wiredu & Armah, 2006). The past examinations have concentrated on cancer morbidity information from the few built up cancer libraries in Africa, with not very many providing details regarding cancer mortality information.

In Nigeria, a cross-sectional study was done by Bassey, Irurhe, Olowoyeye, Adeyomoye, and Onajole in 2011 to survey level of knowledge, attitude and practice of mind with regards to breast self-examination (BSE) among nursing students of Lagos University Teaching Hospital. This study showed that the respondent's knowledge of breast cancer and breast self-examination was high (97.3%; 85.6%) had knowledge on the proper procedure of carrying out a breast self-examination effectively (Bassey, Olowoyeye, Adeyomoye, & Onajole, 2011). It was found that a larger part, 58.6%, acquired their information from TV/radio. The mentality of respondents to breast self-examination was great, the larger part of the respondents, 98.5%, thought breast self-examination was fundamental and 84.3% professed to have completed breast self-examination previously. Respondents' routine with regards to breast self-examination was additionally great with 80.2% of the respondents professing to do breast self-examination consistently.

The degree of consciousness of breast cancer and breast self-examination was high among nursing students of the Lagos University Teaching Hospital. Results demonstrated that larger part of the respondents, 40.7% were from the age bracket of 21-22 which were sampled from first to 6th year medicinal students. 97.3% had known about breast cancer and breast self-examination. 54.8% of the respondents knew about breast cancer from TV/radio. The vast majority of the respondents, 85.8% know how to perform breast self-examination effectively. Just 65.4% of the respondents felt that breast self-examination was essential. 43.5% of the respondents said that the last time they performed breast self-examination was less than a year prior. A dominant part of the respondents, 69.6% liked to perform breast self-examination in the morning while 47.7% of the respondents liked to complete breast self-test before the mirror.

Breast cancer data and information

Malignant neoplasms represented 914 (2.6%) of every one of the 34,598 confirmations, and 141 (5.6%) of each of the 2,501 deaths at the Korle-Bu Teaching Hospital (KBTH) in the year 1996 and the case casualty risk from malignancies was in this way 15.4% (Biritwum, Gulaid, & Amaning, 2000). A survey of the cancer register in the Department of Child Health, KBTH, over a 40-month time frame uncovered that malignancies represented 1.67% all things considered, with

lymphomas (for the most part Burkitt's lymphomas) being the most common tumor (67%),followed by retinoblastoma (8.6%), leukemia (8.2%) and Wilm's tumor (7.8%) (Welbeck & Hesse, 1998). The above cancer morbidity pattern in the Ghanaian pediatric populace is like the image found in West Africa and other developing African countries , except for Namibia (Wessels & Hesseling, 1997).

Albeit some risk decrease may be accomplished with prevention, these systems can't dispose of most of breast cancers that develop in low-and middle income countries. Accordingly, early detection so as to improve breast cancer result and survival remains the foundation of breast cancer control (Andersen, et al., 2008).

The WHO has listed two early detection strategies which are:
- early detection to early signs and symptoms in symptomatic populaces so as to encourage determination and early treatment, and
- screening that is the deliberate utilization of a screening test in an apparently asymptomatic populace. It expects to distinguish people with a variation from the norm suggestive of cancer.

Independent of the early detection strategy utilized, fundamental to the accomplishment of populace based early detection are cautious arranging and an efficient and reasonable program that objectives the correct populace gathering and guarantees coordination, progression and nature of activities over the entire continuum of consideration. Focusing on an inappropriate age group, could cause a lower number of breast cancers discovered per woman screened and along these lines diminish its cost-viability. What's more, focusing on more youthful i.e. younger women would prompt more assessment of favorable tumors, which causes superfluous over-burden of health care offices because of the utilization of expansion demonstrative assets (Yip, et al., 2008).

Practice of breast-self examination

Better reporting women's knowledge and practices on breast cancer and breast self-test (BSE) would be helpful in the plan of intercessions planned for counteracting breast cancer. An examination led in Haramaya University, Ethiopia, had demonstrated that larger part of the understudies (77%) had never performed BSE, despite the fact that they had great information of BSE, and their purposes behind this were as per the following: nonattendance of signs or symptoms (28.8%), carelessness (17%), dread of recognizing some variation from the norm (16.4%), and absence of protection (15.4%) (AFCRN Ethiopia- Addis Ababa city cancer registry., 2019).

As to of beginning for BSE, 41.37% of the investigation respondents began to perform BSE at 20 years old years. Of the 23% of understudies who had done BSE, 16 (55.1%) did not actually recall how regularly they have done it, eight (27.5%) rehearsed it yearly, one responder (3.44%) has done BSE under multiple times in most recent a year, four (13.79%) performed BSE multiple occasions in the last 12 months (Ameer, Abdulie, & Pal, 2014).

Attitudes of breast-self examination

It tends to be said that women's' frame of mind i.e. attitudes have been influenced by their level of education and that of their spouses. Then again, more extensive information prompts better frame of mind i.e. attitudes towards literacy (UNESCO) (Pilehvarzadeh, Rezie, RezaAflatoonian, Rafeti, & Mashayekhi, 2015). UNESCO knows education plays a significant role in changing individuals' frame of mind and procedures towards wellbeing and health principles (Frotan, 2002). Culture and attitudes may have a job in performing wellbeing focused practices like BSE. The target trainings should be focused on the improvement of fitting solutions for caution against health and wellbeing dangers, focusing on the structure of women's attitudes and utilizing health focused screening approach are usually recommended (Lamyian, Heidarnia, Ahmadi, Faghihzade, & Aguilar, 2008).

In a study carried out in Buea, it was found that around 6 out of 10 (59%) of the respondents were in accord that they can do a self-breast examination without anyone else's input or help. Half (51.4%) conceded that they were not scared to find breast cancer, in the interim 26.5% were apprehensive and scared of finding anything in the process. It was found that in a dominant party (88%) of the respondents, BSE was significant and helpful in the early detection of breast cancer. A dominant party (81.9%) of the respondents referred to that they were inspired by adverts and health promotion campaigns to perform BSE. Around 8 out of 10 (77.1%) of the respondents didn't consider BSE as a practice that is embarrassing. Different markers used to assess the frame of mind (attitudes) of the respondents also found that 34.3% of the respondents were exceptionally in support of BSE, 63.3% modestly in support, and just 2.4% were not in support (Nde, Assob, Kwenti, Njunda, & Tainenbe, 2015).

Knowledge, Attitudes and Practice of performing BSE

Previous studies performed among women in Buea, which has a similar setting with Abuja, had likewise uncovered that women didn't perform BSE routinely (Suh, Julius, Fuh, & Eta, 2012). The principle factor that could be credited to this is the absence of information or knowledge on BSE which was commonly seen to be unacceptable, with just 9.6% of the respondents significantly knowledgeable of BSE as a method. Absence of information has additionally been embroiled as the principle explanation behind the poor practice of BSE in comparable investigations performed in other places. About 88.6% of the respondents in this examination saw BSE as a significant strategy in the early detection of breast cancer, yet just 9% realized how to perform it, and just 13.9% knew what to look for while performing BSE (Nde, Assob, Kwenti, Njunda, & Tainenbe, 2015). Comparable perceptions have been accounted for somewhere else in previous studies. The principle source of data on BSE as shown by the respondents in this examination was TV which isn't unique in relation to what has been seen in contemplates performed somewhere else (Norliza, 2010). This discovering shows that the media particularly TV can be utilized to sharpen women on the significance of BSE, just as educate women on the best way to perform BSE (Nde, Assob, Kwenti, Njunda, & Tainenbe, 2015).

This study is significant in giving data towards BSE practice among female university students. Better recording the BSE practice of the students would be helpful to the government administration and non-governmental associations in the structure of interventions used for viable

counteractive action of breast cancer, and it might likewise empower different analysts and policy-makers to do an increasingly broad research in this specific issue being as standard/ baseline data. This study is likewise viewed as imperative since BSE can be a basic methods through which early detection of a breast disease could be made. So evaluating BSE practice will be useful over rare diagnostic services.

Methodology Design

Aim of the study

The study is aimed at finding out the knowledge, attitudes and practices of breast self-examinations among female university students residing in Abuja.

Objectives of the study

1.   To determine the knowledge, attitude and practices of breast self-examinations among female university students residing in Abuja.
2.   To determine the relationship of the knowledge on Breast self-examination and the demographic variables

Research questions

What are the knowledge, attitudes and practices of breast self-examinations among female university students residing in Abuja?

What are the relationships of the knowledge on Breast self-examination and the demographic variables?

Research hypothesis

Female university students do not engage in breast self-examination due to poor knowledge and adverse attitudes towards said behavior

Variables

Independent variables: age, academic year, family history, type of academic institution. Dependent variables: knowledge, attitudes, and practices of BSE.

Study design

The examination is a case-study investigation of female university students residing in Abuja and are utilizing BSE. The research can be framed as a survey research.

Study setting

The study was conducted in Abuja, Nigeria.

Study period

   The study was conducted from September, 2019 to December, 2019.

Study sample

Respondents were selected with the use of a stratified random sampling is a method that envelops dividing the population into smaller groups, i.e. strata; these groups are made based on specific attributes or characteristics common to all members. For this situation, the strata would just incorporate female university students that reside in Abuja. When the strata have been set up, a sample size of 50 subjects will be made.

Inclusion criteria

Female :
- Currently enrolled in university.
- Residing in Abuja.
- Willing to participate in the study.

Tool of the study

For the collection of data, a questionnaire (self-administered) was used to survey the sociodemographic data which comprised of the objective group. The questionnaire comprised of twenty quantitative questions on breast cancer, and breast- self assessment. Scoring codes of the participants was done as pursues: each question had a set of answer focuses, five (5) for strongly agree, four (4) for agree, three (3) for uncertain, two (2) for disagree and one (1) for strongly disagree. A reverse score is given for the negative items. Three interviews were also conducted.

Validity and reliability of the study

The questionnaire was revised and validated by work colleagues which are experts in the field of public health and social behavior change.

Pilot study

A pilot study was conducted with five students to determine the clarity of the questions, time used, and success of the questionnaire tool.

Questionnaire response rate

A high response rate of 100% was reached.

Data analysis

The quantitative data was entered and analyzed using excel. The demographics and other parameters were analyzed using frequency, percentages and bar charts. The hypothesis was tested.

Data Collection

Data collection method: Questionnaires

The questionnaires were personally administered and carried 20 questions given to 50 respondents. It carried both close and open ended questions. It also had both positively and negatively worded questions. Scoring codes of the participants was done as pursues: each question had a set of answer focuses, five (5) for strongly disagree, four (4) for disagree, three (3) for uncertain, two (2) for agree and one (1) for strongly agree. A reverse score is given for the negative items. The questionnaires were printed and were handed to the respondents in person. The questionnaires were confidential.

Data collection method: interviews

The qualitative aspect of the research were interviews carried out with 3 experts in the field. The first being Maryam Shehu, a social behavior change expert at the Aliko Dangote Foundation. The second was Mr. Wale Falade, a monitoring evaluation and learning (MEAL) expert at the USAID. And the last was Dr. Azeez Oseni, a projects specialist at Malaria consortium.

The interviews were structured in nature as pre-prepared questions were ready before the interviews commenced.

These interviews were carried out in person i.e. physically.

Assessment of knowledge on knowledge, attitudes and practice of BSE

The 20 questions in the questionnaire were all focused on measuring the knowledge, attitudes and practice ensued by the female university students residing in Abuja with regards to BSE.

Following suit, the 15 interview questions were also carried out in the same fashion simply to assess the knowledge, attitudes and practices of the BSE by the chosen sample.

Analysis

Quantitative data

Table 1: assessment of the baseline characteristics of the study sample

parameters		number
age	below 20	28
	above 20	22
academic level or year	first year	19
	second year	12

	third year	12
	fourth year	7
	other	0
family history	yes	11
	no	39
information of BSE	yes	31
	no	19
gained from	study/education	13
	personal experience	37
knowledge	poor knowledge	7
	fair knowledge	28
	good knowledge	15

Table 2: quantitative parameters

Items	strongly disagree	disagree	uncertain	agree	strongly agree
Do you feel performing breast self-examination is a waste of time?	20	16	4	7	3
Breast Self-Examination makes me feel so funny	28	11	7	4	0
I find breast self-examination embarrassing	18	10	11	9	2
I find performing breast self-examination to be Unpleasant	16	11	9	9	5
I would rather get treatment from a traditional healer if I find an abnormality	29	11	4	4	2
I do not feel comfortable and can't do Breast Self-Examination once in a month	5	12	15	17	1

I think all women should do breast self-examination	1	1	7	9	32
I avoid breast self-examination because I worry about having breast cancer	3	8	5	14	20
I am interested in doing breast self-examination	5	3	18	18	11
Always search for information regarding breast self- examination from the internet, magazine, and Newspaper	10	8	14	8	10
I perform a breast self-examination once a month	7	5	1	20	17
I have learnt the correct method of breast self-examination	6	9	1	16	17
I have been taught breast self-examination by health staff or qualified personnel	5	11	1	14	19
If notice any breast abnormality, I will directly go to public health care	7	5	1	9	28

Following the pattern of a Likert scale, data of the qualitative
analysis with: 1 = strongly disagree
2 = disagree
3 = uncertain
4 = agree
5 = strongly agree
For negative questions, a reverse scoring is done

parameters		N	Mean	Std. Deviation	Mode	Median	nterquartile range
age	below 20	28	17.04	1.43	17	17	2
	above 20	22	23.86	3.95	23	23	2.25

Figure 1: analysis of baseline characteristic – age
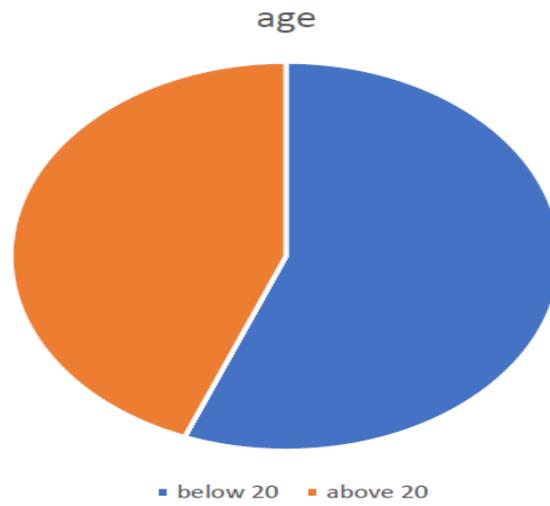
Figure 2: analysis of students' attitudes of BSE
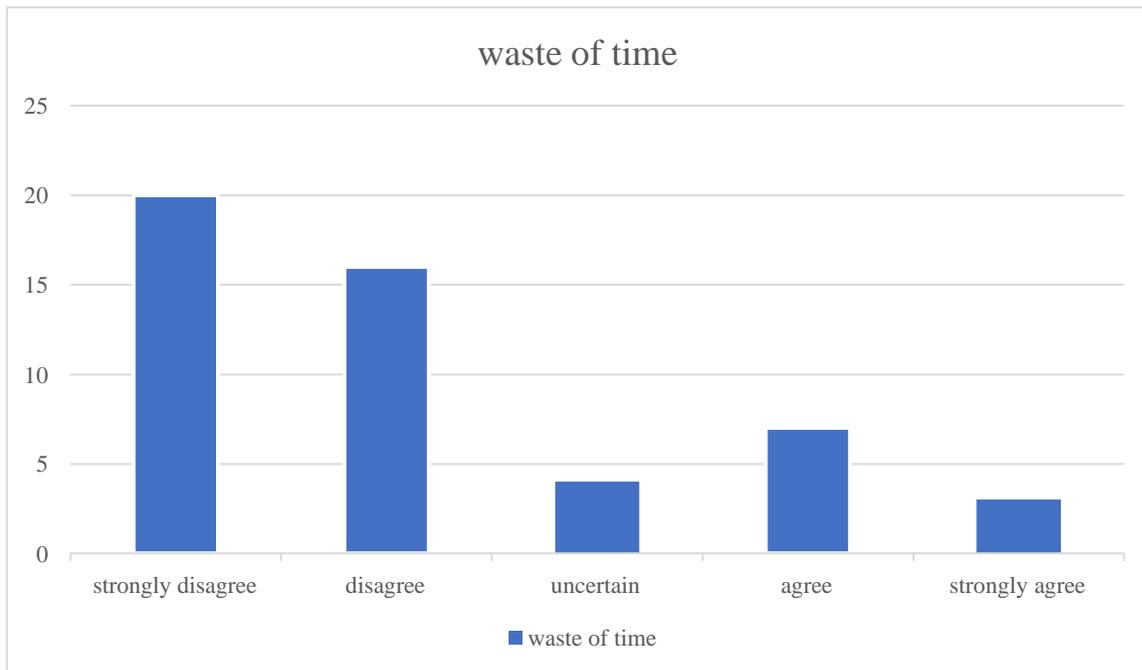
Figure 3: analysis of students attitudes for BSE

BSE is Embarrasing to me

■ strongly disagree   ■ disagree   ■ uncertain   ■ agree   ■ atrongly agree
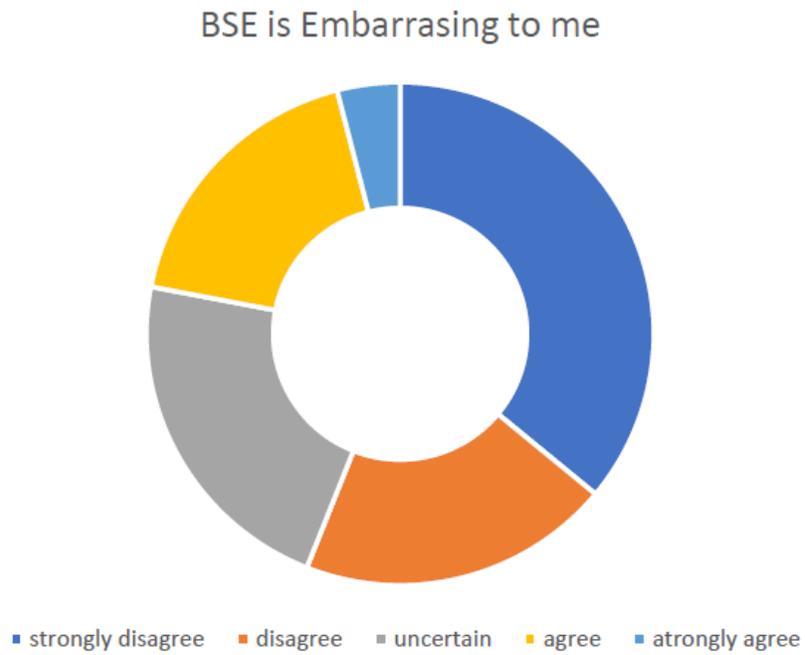
Figure 4: analysis of students practice of BSE

I perform BSE once a
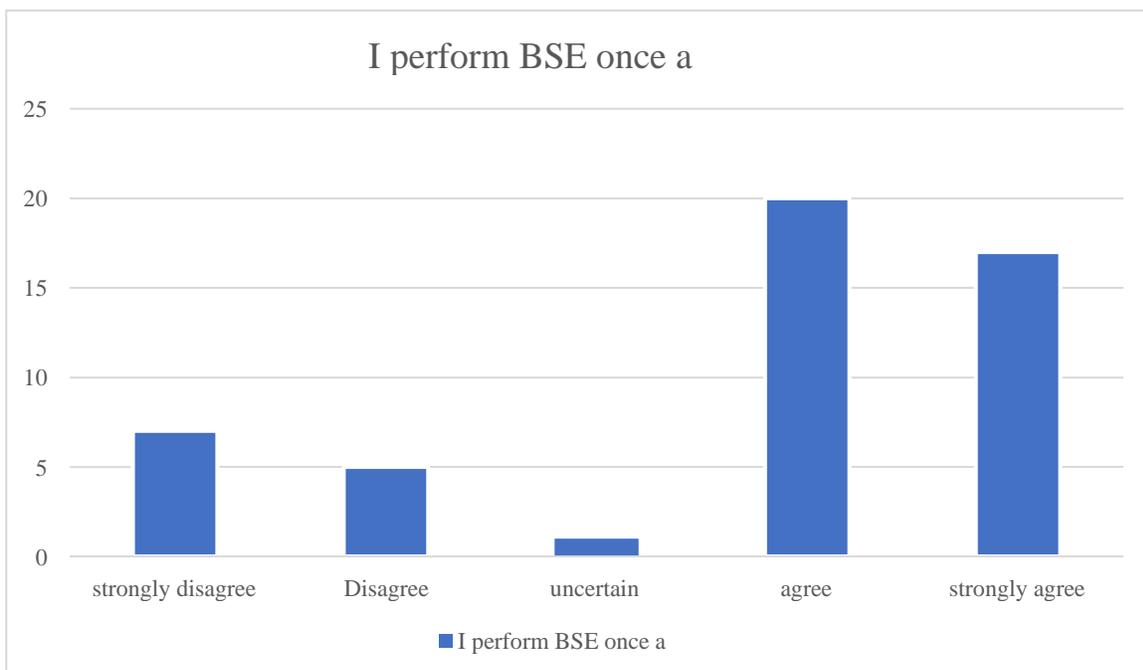
Figure 5: analysis of the students practice of BSE

taught BSE by health staff

■ Strongly disagree   ■ disagree   ■ uncertain   ■ agree   ■ strongly agree
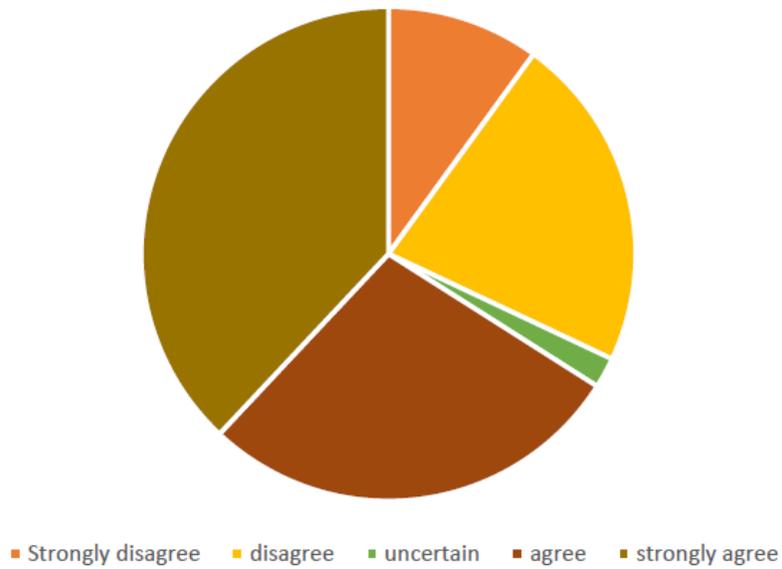
Figure 6: analysis of students' practice of BSE

Learning the correct method of

■ Learning the correct method of BSE
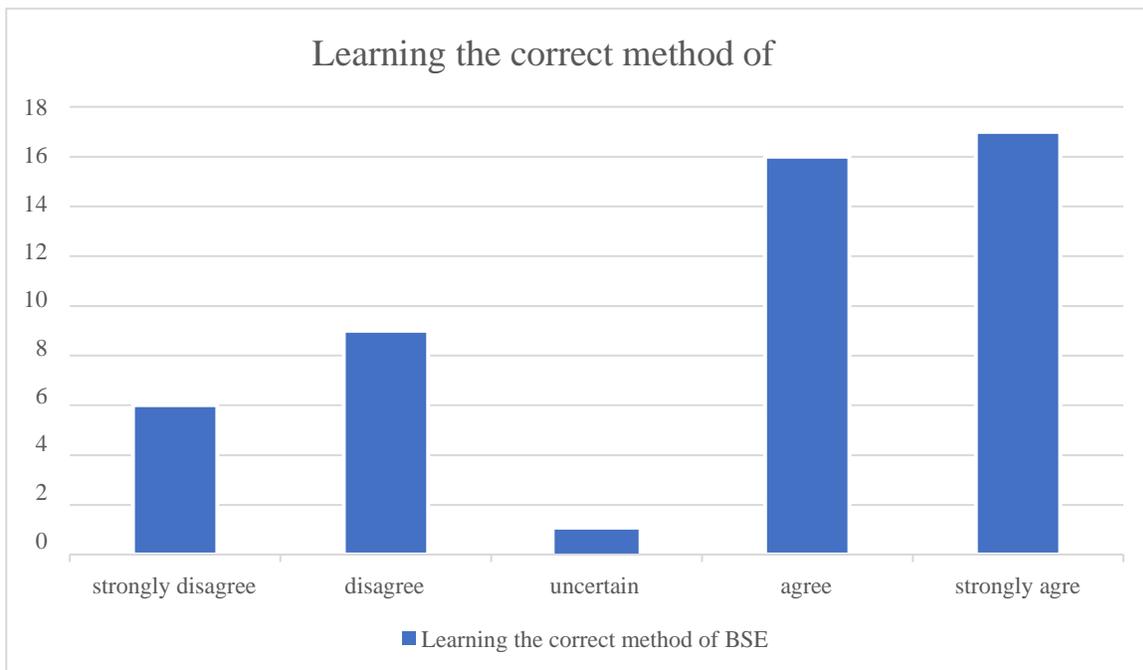
Figure 7: analysis of students' attitude of BSE
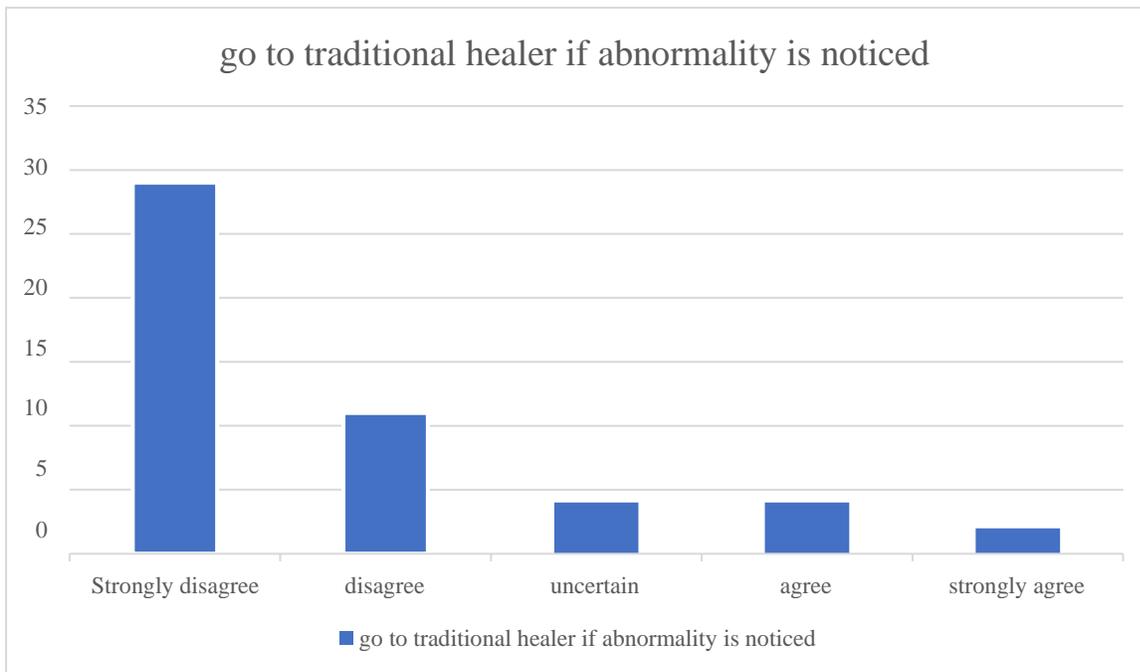
Figure 8: analysis of students' practice of BSE
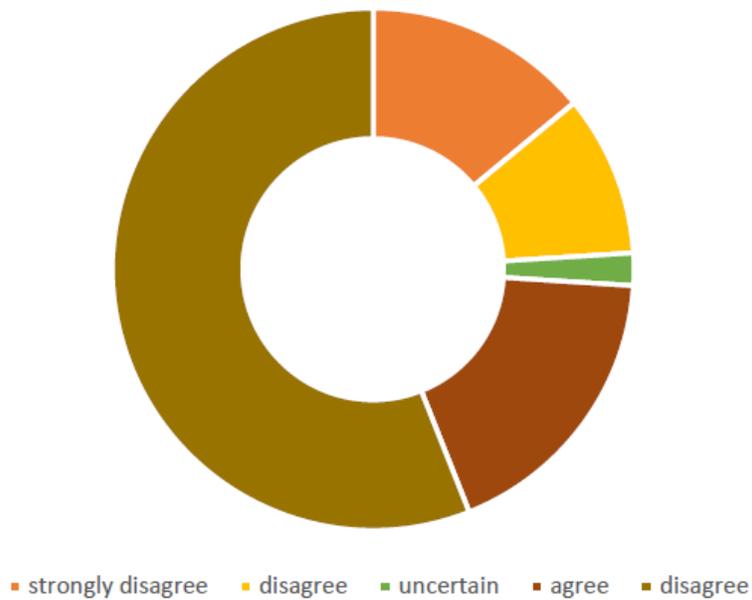
Qualitative data

Figure 9: qualitative coding

Elements to be coded	Codes
Knowledge	Abnormali ty Detection Availability
Attitudes	Ri sk Fe ar Encouragement
Practice	Clinical exam Frequency
Breast cancer	Lum ps Histo ry

Interviews

The qualitative aspect of the research were interviews carried out with 3 experts in the field. The first being Maryam Shehu, a social behavior change expert at the Aliko Dangote Foundation. The second was Mr. Wale Falade, a monitoring evaluation and learning (MEAL) expert at the USAID. And the last was Dr. Azeez Oseni, a projects specialist at Malaria consortium.
The interviews were structured in nature as pre-prepared questions were ready before the interviews commenced.

These interviews were carried out in person i.e. physically.
Note: The questions asked during the interview will be affixed to the appendix.

Knowledge

The three interviews conducted with experts in the field showed that knowledge is vital in the success of breast self-examinations. Mr. Wale noted that with detection, the BSE is the first step and should always be followed by a clinical exam if any abnormality is found. A clinical exam also needs to be done based on routine checks for individuals, usually women, above the age of 45 via a mammogram. He also went ahead to say that early detection gives individuals a higher chance of surviving breast cancer.

To find out more from the clinical aspect of things, Dr. Azeez was asked questions about the steps needed for performing a breast self-exam and he said "carefully observing and palpating on the breasts" and any lumps, skin changes, dimpling, color change, dimpling and anything considered abnormal should always be looked for and should be brought to the doctors attention. He noted

that knowledge that people have a misconception about is on men and breast cancer saying that 'yes, it is in fact possible that men have breast cancer'.

With availability, the social and behavior change expert, Miss Maryam, said that knowledge is readily available and a lot of campaigns are in place. She also said that unfortunately men do not think they can have breast cancer and most people do not think performing BSE is vital practice.

Attitudes

Dr. Azeez said that men are equally at risk of breast cancer and culturally and socially, they have not been conditioned to accept that. Miss Maryam finds that fear and ignorance are the two most prevalent factors that are believed to hinder the performance of BSE. Tradition is also a factor that makes people not perform the BSE, saying that tradition gives false information. Risk is a factor that gives people a positive attitude towards BSE, when your family member has been a victim of Breast cancer or other cancer, it is a form of encouragement towards positive attitudes for BSE.

Practices

The best time to perform a BSE is right after your menstrual period and this should be done monthly. Clinical exams are the next step after BSE as aforementioned and should be done the moment one notices and abnormality and should be routine for individuals above the age of 45. If a lump or other abnormality is found, the thing to do is to visit a public health care facility immediately.

Figure 10: summary of the interviews

Questions	summary of response
1. In your expert opinion, how often do you think one should perform a breast self-examination?	once a month, right after the mestrual period
2. At what point should one seek a clinical exam?	the moment one notices an abnormality and those above 45
3. What happens during a clinical exam?	depending on age and case, a manual exam , mammogram or ultrasound will be performed
4. Does early detection make a difference?	absolutely, it gives better chance of survival
5. What are the factors that make a person at higher risk of breast cancer?	family history, lifestyle and genetics mostly
1. What are the most important steps in	carefuly observation and palpating on

performing the breast self-exam?	the breasts
2. What exactly should I be looking for?	any lumps, skin changes, dimpling, color change, dimpling and anything considered abnormal
3. What changes do I need to bring to my doctors attention?	any lumps, skin changes, dimpling, color change, dimpling and anything considered abnormal
4. Do men also need to perform the breast self-examination?	yes, men can also have breast cancer. It is just not as common
5. What do I do if I find a lump?	go to your primary healthcare facility immediately
1. What do you think stops people from performing breast self-examination despite having the information?	fear and ignorance
2. What role does tradition play in performing breast self-examination?	It gives false information
3. What role does a family history play in performing breast self-examination?	it makes people more at risk and encourages peforming the bse
4. Is knowledge on breast self-examination readily available ?	yes, people just need to make use of the knowledge properly
5. Are there any misconceptions on breast self-examination?	yes. That only females perform it and that it is not vital practice.

Discussions

Breast cancer is the most widely recognized cancer in women worldwide that is the reason women's consciousness of breast cancer is significant. The need to assess the knowledge, attitudes and practice of BSE among female university students who will be the future leaders, policy makers, and so on is important and suggested (Ayed, et al., 2015). This study was led to decide knowledge, attitudes and practice among female university students towards BSE.

The consequence of the present investigation uncovered that the sample had knowledge about BSE. The investigation was proper in this age bracket as they fall inside the age group of developing adulthood who are constantly anxious to discover data about things occurring around them henceforth a morbid disease like breast cancer ought not be abnormal to them just as BSE which has to do with paying special mind to changes in the breast. Comparative perception was accounted for in Bassey et al study (2011) (Bassey, Olowoyeye, Adeyomoye, & Onajole, 2011)where 58.6%

of the respondents' first wellspring of data was acquired from TV/radio, additionally upheld (Irurhe, Olowoyeye, Arogundade, Bassey, & Onajole, 2009).

From the investigation, majority of the sample had a good knowledge level of BSE which helped early detection of breast cancer. This is in agreement with other studies which demonstrated that a large portion of the respondents knew about BSE (Yakout, Moursy, Moawad, & Salem, 2014). Negative mentality has been accounted for in the present work in saying that what stops the practice of breast self-exam is a fear in finding something. Our discoveries are like (Bassey, 2011) study in which the demeanor of respondents to breast self-assessment was good. In the present investigation, just a small portion practice BSE in every case each month and some revealed that they never performed it . In different investigations the level of BSE execution have been seen as 39.5% among nursing understudies (Juanita et al., 2013).The previously mentioned examinations uncovered the low frequency of students month to month performing BSE everywhere throughout the world. It can be said that even with the knowledge and relatively acceptable practices towards BSE, the attitude rates are low and mostly driven by fair.

Conclusions

Breast Self-Examination, BSE, is a significant examination tool for the early finding of breast cancer because of absence of screening programs and proper facilities. University students whom are believed to be the leaders or tomorrow and also the most accepting of positive change should be appropriately instructed to effectively do this methodology. There is widespread knowledge about the BSE among students, with dreary attention to its use, method, timing, and frequency among the students examined. BSE and breast cancer training projects ought to be incorporated into the educational program as a major aspect. The rates of practicing of the BSE is one which is a cause for concern.

The hypothesis is disproven because female university students have the knowledge but have negative attitudes towards it which result from fear and a lack of practice resulting from a lack of comfort.

A recommendation is that more studies look into fear as a factor encouraging negative attitudes.

Appendices

Questionnaire

Please tick the correct answer in this section

age
- below 20
- above 20

academic level or year
- first year
- second year
- third year
- fourth year
- other

family history
- yes
- no

information of BSE
- yes
- no

gained from
- study/education
- personal experience

knowledge
- poor knowledge
- fair knowledge
- good knowledge

For the following questions, answer with :
five (5) for strongly agree
four (4) for agree
three (3) for uncertain
two (2) for disagree
one (1) for strongly disagree.

Do you feel performing breast self-examination is a waste of time?

[ ]

Breast Self-Examination makes me feel so funny

[ ]

I find breast self-examination embarrassing

[ ]

I find performing breast self-examination to be unpleasant

[ ]

I would rather get treatment from a traditional healer if I find an abnormality

[ ]

I do not feel comfortable and can't do Breast Self-Examination once in a month

[ ]

I think all women should do breast self-examination

[ ]

I avoid breast self-examination because I worry about having breast cancer

[ ]

I am interested in doing breast self-examination

[ ]

Always search for information regarding breast self-examination from the internet, magazine, and newspaper

[ ]

I perform a breast self-examination once a month

[ ]

I have learnt the correct method of breast self-examination

I have been taught breast self-examination by health staff or qualified personnel

If notice any breast abnormality, I will directly go to public health care

Figure 11: summary of quantitative data collection

parameters		number
	below 20	28
age	above 20	22
	first year	19
	second year	12
	third year	12
	fourth year	7
academic level or year	other	0
	yes	11
family history	no	39
	yes	31
information of BSE	no	19
	study/education	13
gained from	personal experience	37
	poor knowledge	7
	fair knwoledge	28
knowledge	good knowledge	15

items	strongly disagree	disagree	uncertain	agree	strongly agree
Do you feel performing breast self-examination is a waste of time?					
Breast Self-Examination makes me feel so funny	28	11	7	4	0
I find breast self-examination embarrassing	18	10	11	9	2
I find performing breast self-examination to be unpleasant	16	11	9	9	5
I would rather get treatment from a traditional healer if I find an abnormality	29	11	4	4	2
I do not feel comfortable and can't do Breast Self-Examination once in a month	5	12	15	17	1
I think all women should do breast self-examination	1	1	7	9	32
I avoid breast self-examination because I worry about having breast cancer	3	8	5	14	20
I am interested in doing breast self-examination	5	3	18	18	11
Always search for information regarding breast self-examination from the internet, magazine, and newspaper	10	8	14	8	10
I perform a breast self-examination once a month	7	5	1	20	17
I have learnt the correct method of breast self-examination	6	9	1	16	17
I have been taught breast self-examination by health staff or qualified personnel	5	11	1	14	19
If notice any breast abnormality, I will directly go to public health care	7	5	1	9	28

Figure 12: Summary of qualitative data collection

questions	summary of response
1. In your expert opinion, how often do you think one should perform a breast self-examination?	once a month, right after the mestrual period
2. At what point should one seek a clinical exam?	the moment one notices an abnormality and those above 45
3. What happens during a clinical exam?	depending on age and case, a manual exam , mammogram or ultrasound will be performed
4. Does early detection make a difference?	absolutely, it gives better chance of survival
5. What are the factors that make a person at higher risk of breast cancer?	family history, lifestyle and genetics mostly
1. What are the most important steps in performing the breast self-exam?	carefuly observation and palpating on the breasts
2. What exactly should I be looking for?	any lumps, skin changes, dimpling, color change, dimpling and anything considered abnormal
3. What changes do I need to bring to my doctors attention?	any lumps, skin changes, dimpling, color change, dimpling and anything considered abnormal
4. Do men also need to perform the breast self-examination?	yes, men can also have breast cancer. It is just not as common
5. What do I do if I find a lump?	go to your primary healthcare facility immediately
1. What do you think stops people from performing breast self-examination despite having the information?	fear and ignorance
2. What role does tradition play in performing breast self-examination?	It gives false information
3. What role does a family history play in performing breast self-examination?	it makes people more at risk and encourages peforming the bse
4. Is knowledge on breast self-examination readily available ?	yes, people just need to make use of the knowledge properly
5. Are there any misconceptions on breast self-examination?	yes. That only females perform it and that it is not vital practice.

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Prolonged Computer Use and Associated Health Disorders

Noof Al Habab,
Environmental Risk Management

1.0 Introduction

Technology revolution has made our lives much easier, it would difficult to imagine life without the internet, computers, PCs, tablets, TV, cellular phones and various digitalized equipment and tools. Currently, computers are one of the main tools in each business, educational institute, office and even at home. These technologies including computers are used in our everyday life, however, there have been many human health risks related to these technologies. With increasing demand for usage of these technologies the more probability of health risks would increase. Electromagnetic Field (EMF) is involved with production of each electronic device including computers and PCs. It is a non-ionizing radiation released from electronic devices. Usually, the energy is not enough to ionize the atoms, therefore it excites the electrons. Humans are exposed to this energy by using computers, PCs or even sitting in computerized workplaces which can risk their health issues.

The radiations from electronic devices may cause several health hazards, particularly computer users including employees and students who spend more than hours working on the computer are directly exposed to the harmful effects of negative radiation and energy (Ellahi et al., 2011). Occupational health problems assessment is one of the common fields of ergonomics study. Employees and students suffer from various types of disorders in their daily life, including using computer for long hours can increase the probability of having serval health problems. Regardless of working hours in government sector (7 hours) or private sector (more than 8 hours) employee and working students are facing health problems related to extent use of computer for long period of time. Hence, it is necessary to examine the direct or indirect negative effects of using computers on health.

2.0 Goals and objectives

2.1 Main ideas

In the past few years, extraordinary rate of development has been seen in information and communication technology (Ellahi and Manarvi, 2010). Along with positive effects including an increase in efficiency, accessibility of data and communication velocity (Blatter & Bongers, 2001). Different industries, areas, and fields using computers such as, banks, business, military, education, medical and media where it is impossible to use a product or service that does not utilize a computer. Over the past 20 years, computers have become increasingly common in both workplaces and private residences. The number of computer users has dramatically increased. In 2000, around 60% of workers were required to use computers as part of their job duties and with

80% of those workers used a computer on a daily basis. Currently, all age groups are using computers and PCs for many purposes including occupational and educational. The UAE embracing the potential of technology to improve the lives of the country's inhabitants, efficiency and reduce costs.

For example, several schools are introduced to virtual classrooms and other e-learning tools in the UAE. Where students do their homework and classwork online, interact with other students and participate in an educational discussion such as online forums. The e-learning platform is one of the popular platforms which considered as an education delivery and management tool for academic institutions. It allows students to expand their knowledge and learn beyond the classroom as well as it improves student's engagement skill with their peers and teachers (Nasir, 2017). Along with widespread use of computers, many researchers have confirmed that extensive use of computers may risk human health causing several health disorders (Sartang & Habibi, 2015). Computer-related health disorders and computer work are common in modern society and both show an increasing trend. These disorders occur gradually over a long period of time of exposure to the computers leading to potential adverse health effects. Prolonged computer use may be considered as occupational or study hazard or both in some cases on workers, students, and working students.

2.2 Main objective

The major objectives of the paper is to study the hazards at workplace related to computer users particularly workers, students and/or working students. The study will identify the most occurrence of health issues and it will investigate the effect of different direct and indirect factors such as, time spend on computer, gender and age on appearance to health problems related to computer. Moreover, other objectives of the study is to develop risk management plan that is applicable at workplace to reduce the hazard through creating tables, flowcharts or diagrams. Finally, the report will discuss risk communication plan to provide meaningful, relevant, understandable and accurate information to audience or/and public through interested parties such as, government, stakeholders, decision makers.

3.0 Literature Review

3.1 Previous studies

Many researchers have confirmed that risk factors associated with prolonged commuter use have caused several diseases. The study by Ellahi et al., (2011), mentioned several researchers have reviewed the effects of computer including Punnett and Bergqvist (1997) reviewed 56 epidemiological studies on the effects of computer work and they concluded that the use of computer and keyboard is resulting in hand and wrist disorders and less gradually causing neck and shoulder disorders. Moreover, Blatter and Bongers (2002) concluded that working on computer for four hours daily can produce musculoskeletal disorders of neck or upper limb in women whereas, six hours or more of computer use causes these similar symptoms in men. Furthermore, Keir et al., (1999) conducted research on carpal tunnel pressure among 14 individuals working with 3 different mice. The researchers found that use of mouse cause of increasing carpal tunnel pressure.

There are other disorders are associated with computer use for a long duration. Many researchers (e.g Sheedy, 1992; Smith and Stammerjohn, 1981; Costanza, 1994) reported other health issue related to computer use where individuals complain about eye - related problems which is more frequent health disorder among computer users, which is known as Computer Vision Syndrome. According to Ellahi et al., (2011) "the symptoms is categorized by Yan, eta.,l (2008) in three: (i) eye-related symptoms (e.g. "dry eyes, watery eyes, irritated eyes, burning eyes"), (ii) vision-related symptoms (e.g. "eyestrain, eye fatigue, headache, blurred vision, double vision"), and (ii) posture-related symptoms (e.g. "sore neck, shoulder pain, sore back")". Also, Wang et al., (1998) found that if computer is used more than 30 hours per week and more than 10 years, mental problems such as depression, obsession, and somatic disorders could increase (Ellahi et al., 2011).

4.0 Recommendations

4.1 Health risks reduction

Prolonged use of computer leads to severe health issue, however, agencies and educational institutions can provide ergonomics training programs to employees or students. The simultaneous occurrence of computer-related injuries among human beings is due to the human body is subjected to risks continuously. For example, by sitting and working on a computer for long hours the individual is exposed to several health disorders, electromagnetic fields. Body parts of an individual such as, hands, wrist, neck, shoulders, back, brain and especially eyes are exposed to risks which trigger these common health diseases, computer-related stress, computer vision syndrome and musculoskeletal disorders (including carpal tunnel syndrome). Moreover, ergonomics computer posture of the keyboard, mouse, hand, chair and sitting position along with ergonomics equipment including desks, document holders footrests and headsets at the workplace and educational institutions to prevent unsafe and uncomfortable computer work. Also, raising awareness on ergonomics principles at workplace can avoid chances of possible risks (Ellahi et al., 2011).

4.2 Ergonomic process at the workplace

Employees are future assets for any agency around the world. Some employees' jobs are creating health problems which turn enormous burden for agencies, organizations and economic sector. By implementing the ergonomic process at workplace it will reduce the rate of employees' absenteeism and maximizes productivity. For example, provide management support where the management should define clear goals and objectives for the ergonomic process, discuss them with their employees, assign responsibilities to designated members in the agency, and communicate clearly with the workforce. Furthermore, involving workers to identify and provide information about hazards and/or risk factors in their workplaces, communicating and sharing their concerns, suggestions, and solutions to reduce, control or eliminate risks factors at their workplace. Also, evaluating the risks and taking corrective actions are required to assess the effectiveness of the ergonomic process periodically and to ensure its improvement at workplace (Occupational Safety and Health Administration, n.d).

The easier approach to avoid the risk of computer exposure for long periods during the work by elimination, however, computers are impossible to be eliminated at offices. Hence, others approached risk control measures could be implemented as it is shown in Table 2 (Better Health, n.d). Correct posture at computer workstation and computer and desk stretches showed in Figure 10 and 11 (Work Safe NB, 2010). Risk assessment management plan divided into substitution, engineering and administrative control all of actions may consider as a low risks for reduction of hazard and probability due to other factor influence (Fig.9).

Fig 9. Risk assessment management plan divided into substitution, engineering and administrative control
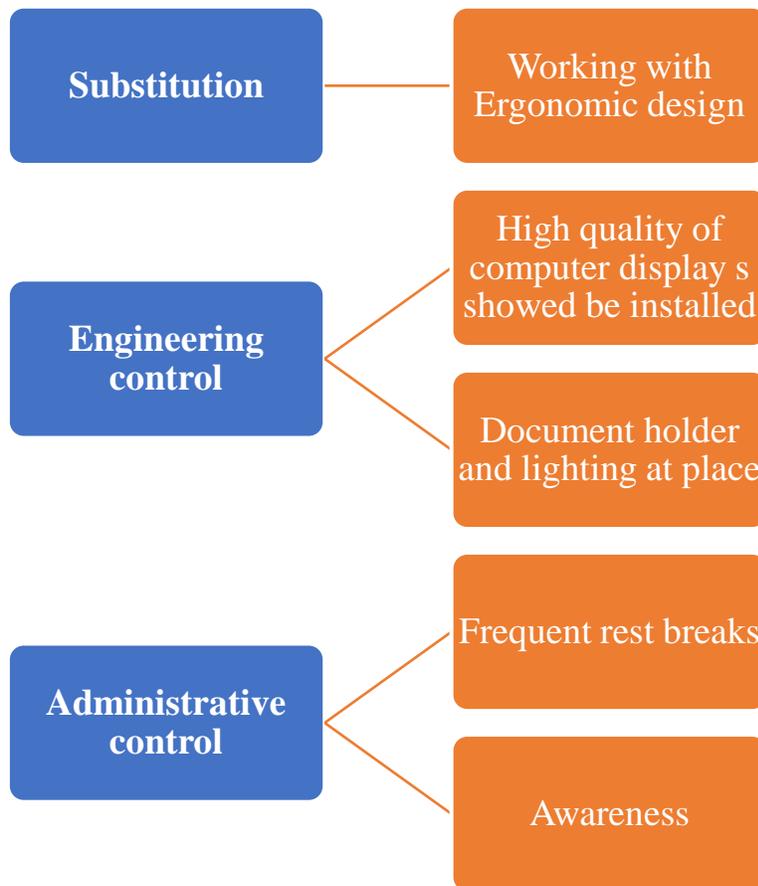
Table 2. Computer related injuries control measures at workplaces (Better Health, n.d).

1. Substitution	2. Engineering control	3. Administrative control
Ergonomic design: - Chairs with backrest that provides lumbar support -Adjustable height and angle to the seatback -Foot supporter desk -Adequate space should be available in the office -The forearm should be horizontal when hands on the keyboard	High quality of computer display screens that do not cause glare and reflection	Providing frequent rest breaks for workers. Workers could stretch up during the breaks
	Proving modern computer display screen that reduces the contrast and brightness of the screen by automatic adjusting controls.	Enforcing standardized health and safety recommendations at the workplace. Workers must follow the right guidelines for their health and safety
	Document holder should be provided	Encourage workers to maintain their health
	If a frequent telephone is used at workplace headset should be required	Employee's Awareness
	Proper lighting in the Workplace	Training courses to adopting safe habits

Fig 10. Correct posture at computer workstation (Work Safe NB, 2010).

Head upright and over your shoulders.

Eyes looking slightly downward
(30˚ range from horizontal line of sight)
without bending from the neck.

Wrist in a neutral
posture (straight).

Back should be supported by the
backrest of the chair that promotes
the natural curve of the lower back.

Elbows bent at 90˚, forearms horizontal.
Shoulders should be relaxed, but not
depressed.

Thighs horizontal with a
90˚–110˚ angle at the hip.

Feet fully supported and flat on the floor.
If this isn't possible, then the feet should
be fully supported by a footrest.

Fig 11. Computer and desk stretches (Work Safe NB, 2010).

10-20 seconds, two times · 8-10 seconds, each side · 15-20 seconds · 3-5 seconds, three times · 10-12 seconds, each arm · 10 seconds · 10 seconds · 8-10 seconds, each side · 8-10 seconds, each side · 10-15 seconds, two times · Shake out hands, 8-10 seconds
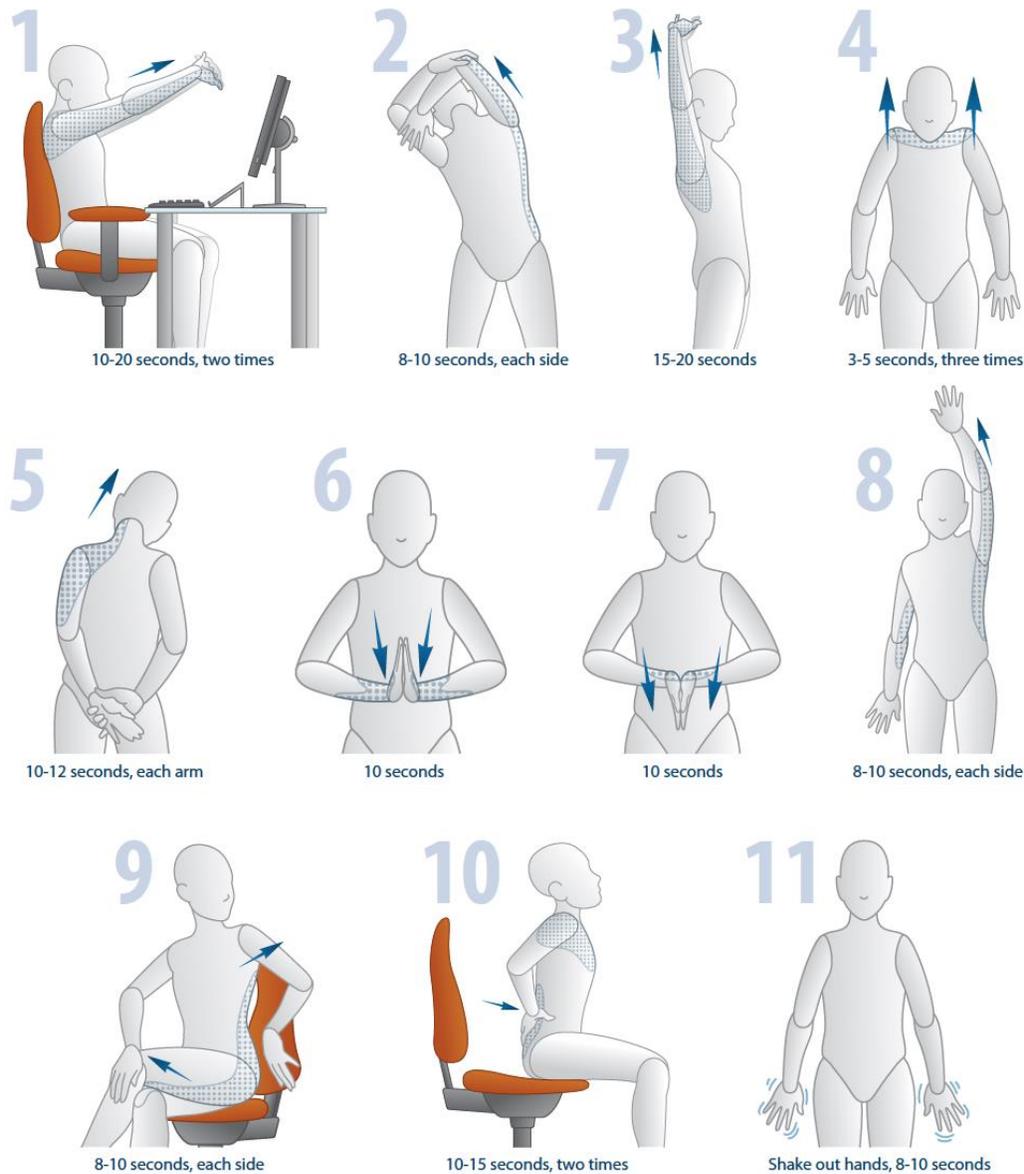
6.0 Conclusion and Risk Communication

The computerized workplace is creating risks for both employees and students in their health. Computer users suffer from several health problems due to prolonged computer use on a daily basis. After providing recommendations it is required to go through the next stage which is risk communication. It refers to the exchange and share of real-time information, advice, and opinions between main groups in the society which are stakeholders, decision makers, experts and public who are facing threats to their health. In addition, it helps the public to make informed decisions for prevention or protection purposes.

Communications techniques to deliver a message can be through social media communications, mass communications and community engagement could be the path of risk communication (WHO, n.d). In order to share health risks associated with prolonged computer use to main groups in society, the public need to be educated and well informed. Education can be through creating posters, leaflet, brochures on health and safety for computer operators by agencies or environment, health and safety organizations and disrupting them at workplaces and educational institutions. People's perceptions, concerns, and beliefs are important in risk communication should be aware of health risks such as musculoskeletal disorders, computer vision syndrome, computer-related stress and other the could possible to occur.

Also, computer users should know the trends of health disorders associated to prolonged computer use and the simultaneous probability of these computers related health disorders is high as it is found in the study, which poses serious threats for human health. It is easier to deliver information to computer users since they have an educational background and it is assumed communication about health and safety will be accepted by the audience. Practices could be implemented and shared to reduce risk such as, involving training and development programs and presenting the concept of health and safety at workplace to the audience. Providing ergonomics courses and engaging the audience to participate to get a certified degree such as NEBOSH International General Certificate in Occupational Safety and Health. Computer users should be trained on computer and desk stretches and agencies or organization should pose frequent short breaks for relaxation of muscles and body, figure 12 illustrates steps of risk communication.

Fig 12. Steps involved in risk communication

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Stigma and Discrimination against Persons with Communicable Diseases

Real AlZir

The choice of style for nurturing and upraising kids is the core building block of a values' system of a community. Kids are born with a default acceptance behaviour to diversity. This is not only in tangible aspects, but also, in emotional invisible ones. In elaboration, a child in the purest unconditioned mind state does not discriminate an individual of a different colour neither does a child discriminate an individual with a belief system different from itself or its parents'. This entitles a close attention to how kids are raised and are educated throughout their childhood, and how they continue being coached then after.

Some subconscious reactions by individuals raise up to a behavioural act(s) level. Some are as silent as inherent rejection. Other actions are physical and elevate up to a body linguistic act. This variation depends on both how a person is raised and the neurolinguistics programming the individual has been through in his/her life such as the educational journey, neighbourhood, parenting, babysitting, the counter practices to baptism from various belief systems, and other neuro programming incidents intentionally or unintentionally performed in front of the child.

Dictionary mentions two classifications of those reactions. One occurs at an emotional or thought level and results in negativity in the form of disgrace; Stigmatization. Another is a physical one. This later one, involves an action and results in a distinction and mistreatment that causes loss of individual's rights; discrimination. Dictionary.com [1] states (Dictionary.com, 2019).

Stigma:
1. Stigma a mark of disgrace associated with a particular circumstance, quality, or person.
2. A mark of disgrace or infamy; a stain or reproach, as on one's reputation.
3. Medicine/Medical definition: a mental or physical mark that is a characteristic of a defect or disease: the stigmata of leprosy.

Discrimination:
1. An act or instance of discriminating, or of making a distinction.
2. Treatment or consideration of, or making a distinction in favour of or against, a person or thing based on the group, class, or category to which that person or thing belongs rather than on individual merit: racial and religious intolerance and discrimination.

Or simply, discrimination is [2] "an unjustifiable negative behaviour toward a group or its members" (Myers, 2005).

Literature [3] has shown various responsive acts in the form of the three phenomenon together; stigma, discrimination, and prejudice over varying periods of time and at different geographies of the world [Parker, 2012]. No two original references referred to those three in a similar chronological order neither in similar geographic exposure. The elements of this research, however,

focused on stages of development of stigma and discrimination in relation to physical illness, psychological behaviours, and social consequences. In addition, the research of choice for reference in this essay is one that illustrates the history of stigma on one hand, and the history of discrimination along with prejudice on the other hand. For reference only and not for focus in this research, it is worth it defining prejudice herein for the sake of elaboration on the meaning and how it differs from both stigma and discrimination.

In his book[4], Social Psychology, David Myers refer to prejudice as "a negative prejudgement of a group and its individual members". (Myers, 2005) Thus, the definition of prejudice is obvious enough not to elaborate on, as it is not the interest of this essay. Nevertheless, it is important to highlight that a major root cause for both stigma and discrimination is prejudice.

The historical background that was found best summarizing the development of stigma and discrimination is what was published by Richard Parker in his article "Stigma, prejudice and discrimination in global public health".[5] (Parker, 2012). Richard–as many researchers—studied stigma, prejudice, and discrimination history since 1963 and focused on references detailing the structure of change throughout until nowadays. For example, in his paper, Richard stated that both stigma and discrimination "has grown steadily over the last 50 years". This covered several research aspects such as: "physical disfigurement and disabilities, mental illness, homelessness, homosexuality and gender nonconformity, juvenile delinquency, and other issues associated with non-normal and non-normative experiences or behaviour" as reasons for the feeling of stigma and the acts of discrimination.

Not only as aspects or case studies, this research has taken place, but also; as a disciplinary oriented research were a positive forward drive serves a resolution to this through existing conceptual platforms; such as the approaches with practical practices to handle stigma including: "anthropology, psychology, sociology, education, public health, and social work". The transformation witnessed by good deeds by medical and anthropological researchers and practitioners seems to have eased the management of stigma. For example, a dis-ease like mental illness though appearing as a disease that requires medical interference, some researchers and practitioners today has classified it as an anthropological case or a social one, if not a case resulting from absence of enough education to interact positively with the surrounding in order to survive. Another example to this is what Richard referred to as: "the emergence of the HIV/AIDS epidemic in the 1980s can be considered a watershed event for stigma research and work on HIV/AIDS-related stigma and discrimination has "boomed" over the course of the past three decades".

In parallel to that and "during much of this time, the development of research on prejudice and discrimination was motivated by growing social concern with racism, especially in the USA. Thus, work in this area has largely focused on race and ethnicity and how racial and ethnic discrimination are driven by prejudice, whereas work on stigma was more closely associated with health conditions". In 2012 when this research has been held, Richard stated, "what has been described particularly in the United States as health disparities, has only emerged over the course of the past 10 to 15 years". Therefore, turns out to be of importance to consider the root causes of upcoming issues while interpreting a resolution as this is the first and most shortcut step to resolve the consequences whether the impacted person(s) is stigmatized or discriminated with close attention to correlations with various conceptual platforms; for instance: social, psychological, educational, ..etc.

Says Richard in the brief of historical overview in his article that: "In recent years, the focus on both stigma and prejudice has led to a growing body of work on the health consequences of discrimination experienced as a result of these processes." This aligns with the evolvement of sciences and practices that adjoins medical sciences with psychological and behavioural in a trial to help overcome the cases that trigger stigmatization and discrimination. Those sciences are NLP (Neuro Linguistic Programming), TFT (Thought Field Therapies), TLPT (Time Line Paradigm Techniques), hypnosis, and the many sciences that existed to meet the need of resolving the negative impacts of stigma and discrimination by others and more importantly by oneself! Continues Richard in his comprehensive brief that the main categories that lead to stigma in society are: "people living with or perceived to be at risk of HIV in-fection; people suffering from mental illness; and the homeless". On another hand and in regards to stigma, "a large body of work has emerged, particularly in the United States that has sought to measure the experience of discrimination.

In countries such as the Unites States and South Africa, that have experienced a long history of intense racial discrimination, research has been carried out with the aim of understanding the differential experience of "acute" as opposed to "chronic" racial and non-racial discrimination, and their impacts in relation to a range of stressors and psychological factors (such as social desirability, self-esteem and personal mastery). Both stigma and prejudice-related discrimination has been examined in relation to what Meyer and colleagues describe as "minority stress". While much of this work has examined the psychological and mental health impacts of stigma, prejudice and discrimination, there has also been a significant increase in work on violence related to these processes".

Another set of efforts witnessed in regards to cases (classified as diseases) that provoke stigma or discrimination is the occurrence of medical-psychological correlations research and publication. An example is Christine's book[6]: "The Key to self-liberation: 1000 Diseases and their Psychological Origins" (Beerlandt, 2001). In her book, she provides a psychological reasoning for popular diseases and proposes the hints for overcoming them for the reader to start a resolve based upon.

The Magnitude of stigma and discrimination consequences is a function of two main items. The first is the impact on the person. The second is on society. At personal level, both the stigmatized/ discriminated individual and the stigmatiz-er/discriminator go through difficult processing of this. The victim who receives the negativity of those two aggressive behaviours ends up in possible psychological illnesses, social refusal, and possibly mental challenges in absence of tactical approaches to overcome this. This if not handled with consciousness can easily lead to the second impact which is more dangerous; the social consequences.

A society/ community that responds to individuals' dis-eases and diseases in an abusive attitude whether stigma or discrimination, is a fertile one for a cascade of this behaviour over generations and across cultures. Unfortunately, the wakeup call from those phenomena might cost a lot not only monetary-wise, but also, comfort and security-wise if lack of community advisory exists. An interesting analysis on how behaviour is transferred over generations is illustrated by NLP concepts

and specifically by a workshop manual named: "Personal Breakthrough Experience Workshop" prepared and delivered by Robert Simic[7] as shown in the following figure:
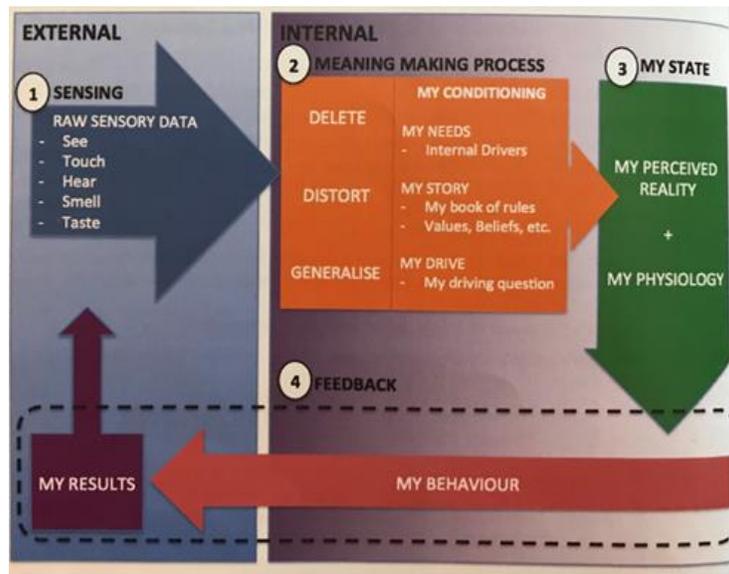
This is an illustrative representation that explains how the impact of the negativity of any behaviour whether a feeling (stigmatization) or an act (discrimination) results in negativity for both the doer and the receiver. The external circumstances are sensed by an individual through one or more of the senses shown in step 1 in the above figure. The process of making meaning starts then after and follows a pre assumed options of processes. Based on perceived reality (for instance in this case, the prejudice by a viewer) –step3—the behaviour results in the form of either a feeling or an attitude (step 4 above). This results in stigma or discrimination (last step).

Therefore, the magnitude of unresolved cases of stigma and discrimination is of essence to be taken care of by the community and the community-social associations. This is best practiced through social campaigns and activities that not only targets bringing up the consciousness about the role of individuals in regards to these cases, but also; in regards to the thinking fields/environment that needs to be in place to eliminate those at the first place. Those can be handled by initiative at the individuals' level and by initiative at organizational levels.

Stigma and discrimination proved to be provoked by a set of causes that at the first place represents the educational processes, pedagogy, and the decision of the team accountable for designing and delivering the same. As a random sample and on average, more than 38% of the student's time during school days (excluding the sleeping hours) until the age of 18 is the exposure to the educational neuro and thought system programming. This does not mean education is necessarily the direct cause as the rest of the time the student spends is what the parents supervise, allow, or make happen. This is also based on the assumption that parents are doing their parenting job. This means parent's education has also contributed to the state the students today are going through in regards to the received neuro programing. The discussion about that is unlimited and can go beyond the research focus. Other causes are stereotyping, generalization, lack of conversation with wise and elders who are community builders, media, and lack of corporate social responsibility.

Stigma is classified to various types and research mentions different classification criteria. The one found of most relevance to the subject here is the classification based on the extent of magnitude. The Mental Health Services Act of California[7] classifies stigma in three categories: public stigma, institutional stigma, and self-stigma. It defines each as follows:

"Public Stigma: refers to the attitudes and beliefs of the general public towards persons with mental health challenges or their family members. Institutional Stigma: refers to an organization's policies or culture of negative attitudes and beliefs. Self-stigma: occurs when an individual buys into society's misconceptions about mental health. By internalizing negative beliefs, individuals or groups may experience feelings of shame, anger, hopelessness, or despair that keep them from seeking social support, employment, or treatment for their mental health conditions". (Disabilityrightsca.org, 2019).

Whereas discrimination types varied according to various references, I chose the one that summed them up into two categories only including all types and this is the direct and indirect types referred to by the National Association of Citizens Advice Bureaux[8]. "Direct Discrimination lists the physical and personal characteristics which are protected by law and explains that you are not allowed to be treated differently from other people because of those characteristics. Indirect discrimination explains what is meant by indirect discrimination, when a practice, policy, or rule applied to everyone puts certain groups of people at a disadvantage". (National Association of Citizens Advice Bureaux, 2019).

Despite the negative impact of stigmatization on individuals and society, it serves as a prevention tool of possible activities leading to communicable diseases especially in absence of knowledge and the self-survival mechanism or at least its existence, which helps addressing the communicable disease within their actual size, impact, and consequences. This falls under some explanatory thoughts by researchers who state that [9]: "Stigma results in discrediting and loss of dignity and value and tends to label people as being unfortunate, inferior depending on the way it is applied. Discrimination arises from differences that can be consistently labelled and that set up the person as different from the perceived norm and can be based on various factors ranging from race, gender and sexual orientation". "Both stigma and discrimination has huge effect on the management of the disease as it can results in delay in diagnosis and therefore causes delay in entry into treatment and adoption of a healthy lifestyle, causes fear in disclosure of illness to important people in the family that will assist in the management of the disease and also causes restriction in participation involving activities of life and depression" (Stewart, Omicsonline.org, 2019). This risk-fully leads to an open loop of descending especially in absence of consciously or inherited innate hopeful behaviour.

The advancement in technology today and the extent to which it has been utilized for the good of individuals, their safety, security, and wellbeing has left almost no gaps for open-ended questions. For instance, today disease like flu though communicable, had its luck of being resisted via flu vaccines. Reversing the concept of stigma-based prevention has been an attitude dealt with by NLP and TFT. An illustration of that, NLP-based sessions allows the chance of the positive perception of activities—without which—would result in communicable and/or non-communicable diseases.

The circle of stigmatization related to specific diseases witnessed an extended act even beyond stigma to result in discrimination. "For more than two decades, HIV-related stigmatization, discrimination and denial have characterized the pandemic and presented a major challenge to the effectiveness of prevention, care and treatment programmes", thinks some researchers[10]. They elaborate: "Much of the societal and individual reaction towards people with HIV/AIDS may arise from stigma towards those most affected, where fear and blame are assigned and from which societal, political and behavioural responses are derived. Stigmatization and discrimination are reported to occur in a variety of forms–from societal level responses such as coercive government policies and laws, to apathy and denial of the HIV epidemic". Those "may result in an individual's self-exclusion from information, treatment and care" (Taylor & Francis Online, 2019). The same applies on many other diseases that has a physical appearance like viral hepatitis, and leprosy.

Christiane[11], explains how the positive psychological or thought field drive plays a magnificent role in overcoming this at a personal level through what science calls it NLP. This not only applies to HIV, but also to other communicable diseases such as viral hepatitis, or non-communicable ones even such as cancer; for instances. She advises, for illustration, the patients of AIDS to be accepting and conscious about self-love and the appreciation of the overall uniqueness of personality disregard of a physically related state/ appearance. Similarly, she advises of similar approaches for other diseases where she states a resolve for leprosy by stating: "believe in one's own worth and in the possibility of (from now on) "deserving" positive evolution will reward you" (Beerlandt, 2003). This style aligns with the affirmations that help maintain self-worthiness and life worth unconditional of a dis-ease or obstacles to wellbeing.

In conclusion, addressing a stigma or discrimination is important not only via direct pinpointing; but also, on a long term. Short-term resolutions and treatment of such behaviours comes usually through policies, regulations, and set of terms and conditions to adhere to. However, long term addressing of the same is far more powerful in influence and magnificence. The reason is that long-term change management tends to help cease of occurrences of such types of negative behaviours. Looking at success models of individuals and nations who managed to overcome the difficulties, one finds that where negativity is not addressed, positivity supersedes. Looking at the same model above illustrated by NLP, one can radically address such issues via each stage of the model referring to the change that can better lead to positive results rather than submission in full surrendering to proposed resolutions and ideas. This transliterates what philosophers call it: Thinking out of the box.

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Household electricity conservation in the UAE

Noora Alqassim

Introduction

All types of electricity generation lead to variable environmental impacts either on air, water or land. Air pollution and the contribution of climate change are linked with electricity production and consumption; wherefore, personal electricity usage is an integral part of the environmental footprint (US Environmental Protection Agency, 2018). According to the UAE Government website (2018), people of the UAE consume about 20 to 30 Kilowatt-hours of electricity daily. Since economic growth continues in the country, it is expected that the demand for energy will increase to 9% yearly. In 2013, the need for electricity reached 105 billion kilowatt hours (kWh), making the UAE one of the highest countries in electricity consumption globally (UAE Government, 2018). As for 2014, the total use of energy in the UAE per year was 113 billion kWh and an average of 12,042 kWh per capita consumption. On the other hand, in 2014 the per capita consumption of electricity was 5,514.17 kWh in Europe which is almost half the consumption when compared to the UAE (World Data, n.d.).

According to a study done by management consultancy strategy (as cited in Maceda ,2015) showed that electricity usage among UAE residents had been growing dramatically and mostly doubled in the past ten years. In that study, it was expected that the gross domestic electricity utilization would be around 141 terawatt-hours by the year 2020. As the number of residents in the country is increasing and most of them (about 85%) live in urban areas; they should be more aware of their electricity consumption and the negative effect of over-consumption (Maceda, 2015).

Efforts have been made to reduce electricity consumption in the country. The Abu Dhabi Distribution company had set a structure for electricity payment to encourage sustainable consumption. The rates and tariffs are dependent on multiple factors such as the amount of electricity used, the type of property a person lives in, and whether a person is UAE national or expatriate. When a person consumes according to the ideal rate "Green Band" then he will pay fewer bills, for example, the electricity rate is 6.7 fils for 1 kWh for UAE nationals within the green band, and 7.5 fils for 1 kWh when exceeding the ideal allowance for their property type. (Abu Dhabi Distribution Co., 2018).

In 2015 the total electricity consumption in the UAE was 126,581 GWH, and the amount was divided by the Ministry of Energy according to electricity and water authorities of the country as mentioned in the Annual Statistical Report (2016). The consumption in Abu Dhabi reported by ADWEA was 62,979 GWH, in Dubai by DEWA was 40,740 GWH, in Sharjah by SEWA was 10,797 GWH, and in the Northern Emirates by FEWA was 12,065 GWH (Ministry of Energy, UAE, n.d.). In Dubai, the number of electricity consumer was 796,764 in 2017 of which 74.54% were residential (593,890 consumers) (Dubai Electricity and Water Authority, n.d.). Besides, in

Abu Dhabi, the percentage of electricity consumption in 2015 was 26.9% for the domestic sector (Statistics Centre, UAE, n.d.).

Literature review/Background

Several studies have been published on the factors affecting household electricity consumption and conservation patterns. As a study by Laicane, Blumberga, Rosa & Blumberga (2014) examined the Determining factors of household electricity consumption and savings through a comprehensive literature review. The study investigated different factors; for example, when examining personal characteristics, it was found that the rise in age, the higher the education level, and the higher number of family members led to increased consumption of electricity. Likewise, in the socioeconomic investigation, some studies showed that high income increases electricity consumption, others found it not a significant factor. Furthermore, the more appliances available in a household led to higher growth in electricity usage. Also, household structure affected the usage of electricity as it was higher in houses when compared to apartments. Finally, the study investigated other factors like people awareness, external temperature as determinants of electricity consumption (Laicane, Blumberga, Rosa & Blumberga, 2014).

Another study by Wang et al. (2016) explored rural energy consumption and the dominant factors of the use. According to the study, the frequency of energy consumption is higher with activities associated with cooking devices, water heaters, and home appliances when compared to activities related to other devices. Moreover, Wang et al. examined the frequently used area and the number of air-conditioners per house which had a clear relationship with energy consumption; however, the association is not apparent with income, building area or shape (Wang et al., 2016). Also, a study performed by Chen (2017) to examine the factors affecting electricity usage and the consumption characteristics in the residential sector in Taiwan found that the electricity price does not significantly change the amount of electricity consumption. In contrast, it was found that the employment of electricity labeling system that gives information about energy efficiency during purchasing devices can help in reducing electricity consumption among residential consumers (Chen, 2017).

As for the UAE, a study conducted by Sbia, Shahbaz & Ozturk (2017) analyzed the electricity consumption relationship with economic growth, financial development, and urbanization using time series data over the 1975–2011 period. The research found that economic growth primarily rises electricity consumption then decreases it when the economy is matured. Also, financial development increases electricity consumption. Besides, urbanization is linked with high electricity consumption (Sbia, Shahbaz & Ozturk, 2017). limited studies were done on the UAE population to evaluate determinants of electricity consumption and conservation such as personal characteristics, socioeconomic factors, knowledge and attitudes, and household structure.

Aim/Objectives

Lack of research in the field of electricity conservation raises many questions regarding the knowledge and practice of the society about this issue and whether they are ready to change their patterns of electricity consumption. The study aims to know the knowledge, behaviors, and intentions regarding electricity consumption and conservation among a sample of people residing in the UAE. This research will provide an understanding of the beliefs of the people living in the UAE regarding this issue and their behaviors and actions concerning electricity-saving.

Methodology

This cross-sectional study was conducted during May 2019 among a sample of people living in the UAE aged 19-65 years old. The sample size was equal to 36 participants. Primary data were collected using quantitative instruments through online based surveys distributed to a convenience sample; the study was developed with a total of 14 questions. The first part collected general socio-demographic information about participants such as their age, gender, education level, and nationality. The second part investigated the beliefs and knowledge of participants regarding the importance of electricity saving at home; the reasons for considering electricity saving important. The third part was devoted to investigating respondents' current practices of electricity-saving at their house (e.g., The frequency of turning off lights or electrical switches when not in use, the frequency of adjusting AC temperature to save energy, etc.). The last part examined respondents' willingness to commence behaviors related to electricity conservation (e.g. intent to buy energy efficient appliances, intent on depending on natural air to dry clothes instead of electric dryers, etc.).

The question types were mainly single answer questions for socio-demographic information except for age as it was an open-ended question for better analysis. The second section combined single answer, and multiple answers question in investigating knowledge and beliefs. Moreover, the multiple answer question allowed participants to add additional reasons for energy saving importance in their opinion. The third section was designed in 5-point Likert type (e.g., 1 – Never, 2 – Rarely, 3 – Sometimes, 4 – Most of the times, and 5 – Always) in examining the frequency of practicing energy-saving behaviors. Furthermore, the fourth section was designed in 5-point Likert type (e.g., 1 – Strongly disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, and 5 – Strongly agree) as questions looked into the extent of agreement and willingness to commencing energy-saving behaviors.

Results

A total of 37 people agreed to contribute by filling the developed survey. All answers were used in the analysis. Table 1 summarizes the characteristics of respondents, 19.4% of whom are male and 80.6% female. Most participants are bachelor's degree holders (61.1%) with an average age of 35. Finally, 69.4% of respondents are local Emirati while the rest are UAE residents.

Table 1: Characteristics of the survey participants

Household characteristics of respondents (n=36)		
Sex	**Total**	**Percent**
Male	7	19.4%
Female	29	80.6%
Sex ratio (male: female)	0.24: 1	
Age (years)	**Mean**	**Standard deviation**
Overall	34.5	11.4
Education	**Total**	**Percent**
Less than high school	1	2.8%
High school	5	13.9%
Bachelor level	22	61.1%
Masters level	6	16.7%
Doctorate level	2	5.6%
Nationality	**Total**	**Percent**
Local Emirati	25	69.4%
UAE resident	11	30.6%
Nationality ratio (local: resident)	1: 0.44	

The following charts (Figs. 1-5) highlight selected trends seen during results analysis. First, when asked if saving electricity at home is important, most of them (97%) answered "yes" as showing in figure 1. Second, 26 out of 36 participants thought that energy saving is essential due to environment protection and health reasons, indicating a good knowledge about the importance of electricity saving. Moreover, 24 out of 36 thought it is crucial as it reduces electrical bills and living expenses; 2 out of 36 believed it is important in improving social image among other people, and 2 out of 36 chose other reasons such as reducing waste of resources as seen in figure 2.

Figure1: survey responses – knowledge about the importance of electricity conservation at home
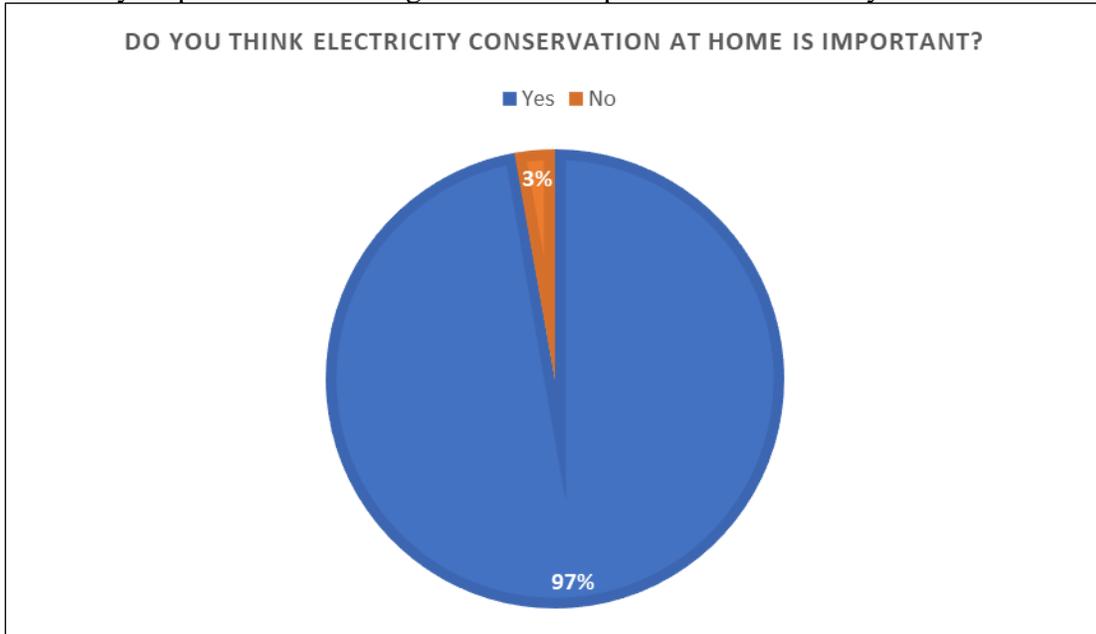
Figure2: survey responses -knowledge about reasons for electricity conservation importance at home
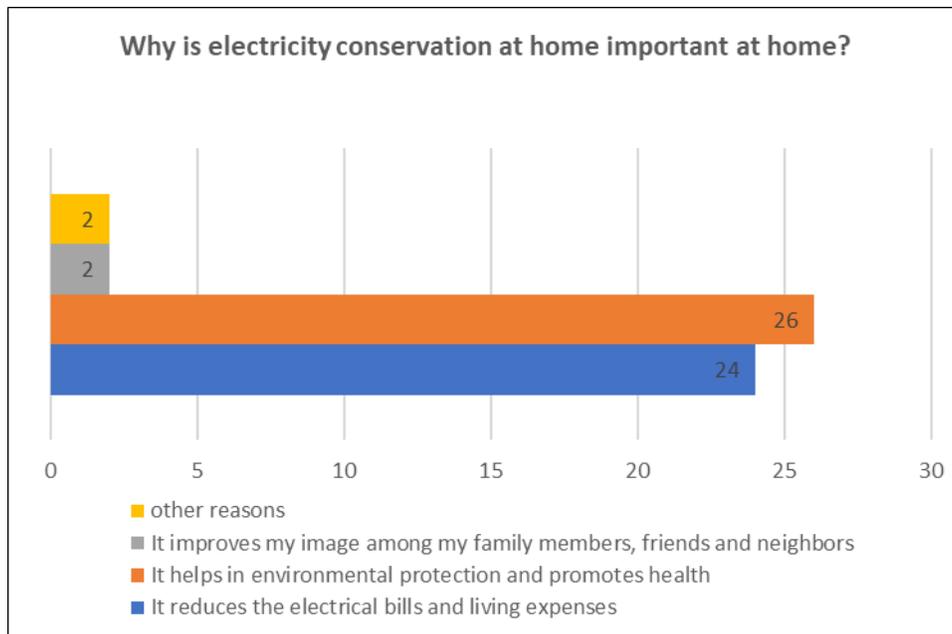
On the other hand, other questions explored current practices of respondents' in saving energy. For instance, the results of figure 3 indicate that most participants (50%) turn off lights "most of the times" when leaving an unoccupied room at home. However, the responses varied from "never" to

"always" when respondents were asked regarding adjusting temperature/ AC at home and when asked about the frequency of switching off appliances not in use at home.

Figure 3: survey responses – energy conservation practices among respondents
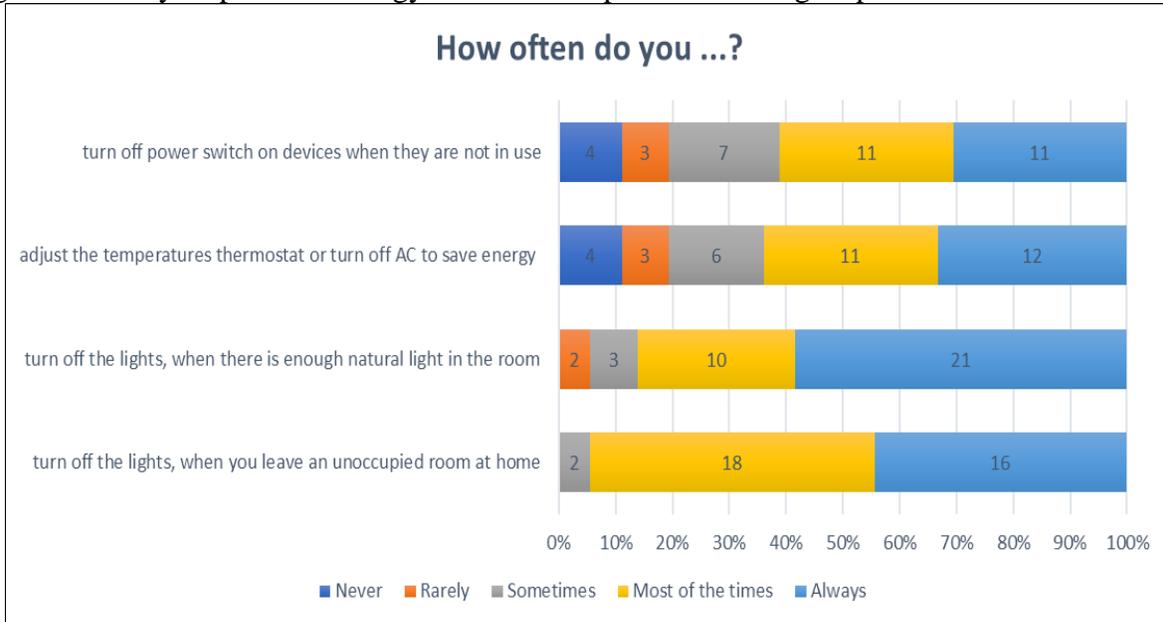
The last part of the questionnaire was exploring the desire and intention of participants about energy saving (as illustrated in Fig 4-5). First, when asked if they should save more energy at home, the majority (92%) responded by "yes"; initially indicating a good desire in this scope (Figure 4). Second, when investigating the willingness of commencing energy-saving actions (showing in Figure 5), most of the answers were between "strongly agree" and "agree". One participant "strongly disagreed" on buying energy efficient light bulbs. Furthermore, two participants "disagreed" on drying clothes traditionally to save energy rather than using electric dryer.

Figure 4: survey responses – intention to save more energy at home
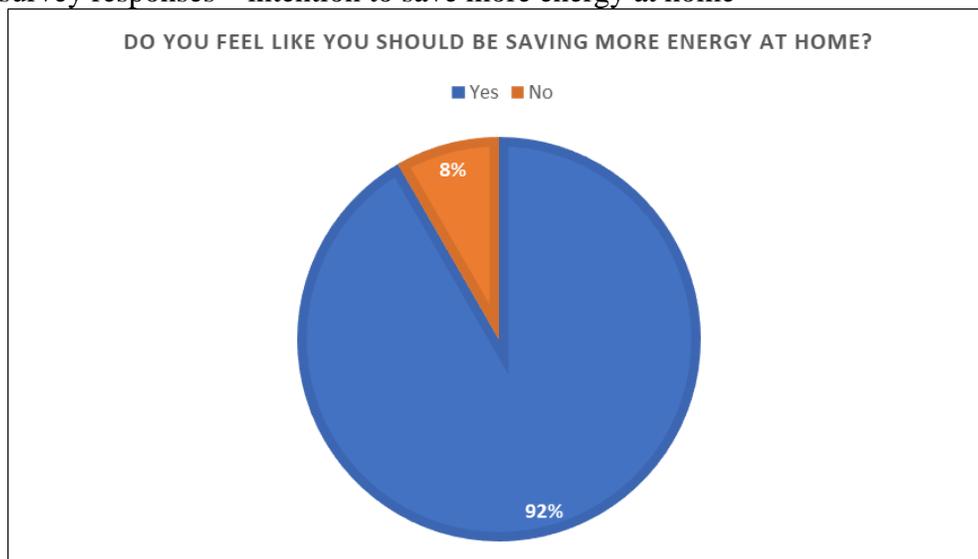
Figure 5: survey responses – the extent of agreement on commencing energy-saving behaviors
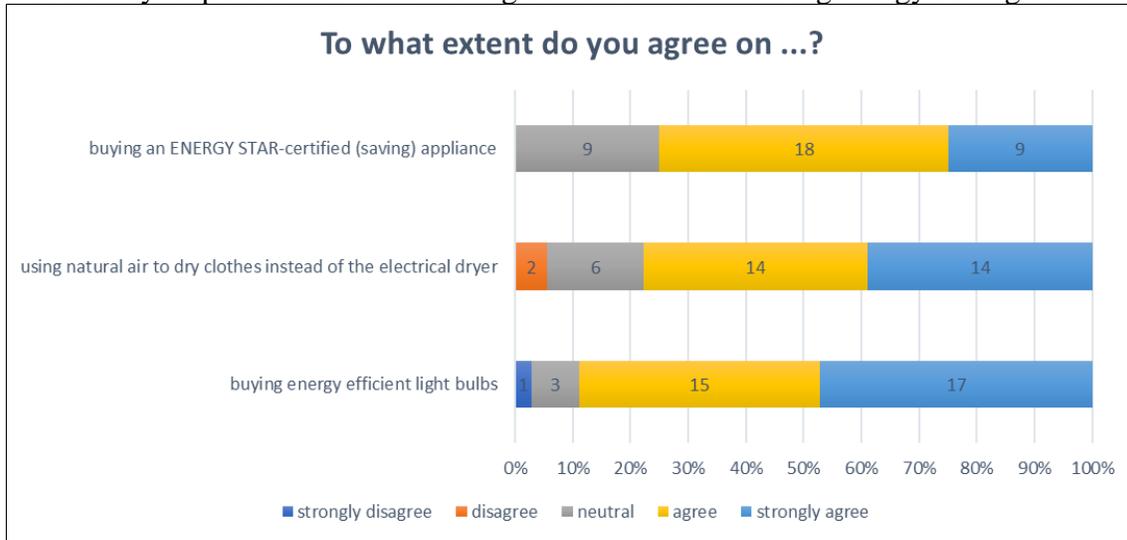
Discussion of the results

The results show different profiles of UAE households concerning energy-saving knowledge, the adoption of energy-saving habits, and the intention to commence energy-saving behaviors. Given the dependence on self-reported information, factors such as social desirability, wording, reply scales, and other sorts of conscious or unconscious response bias may result in imprecise reports of real behaviors.

The results of participants knowledge about electricity saving importance were analyzed in two questions (Fig 1, 2). 48.1% of participant (26 out of 36) knew that energy saving is related to environmental sustainability followed by 44.4% responses relating it to costs reduction. Accordingly, people should be more aware of the electricity effect on the environment, and overall health promotion as the percentage is not high. The result is inconsistent with another study done in the UAE by Azar & Al Ansari (2017) which found that cost reduction was the main driver for energy saving in households; 49% of responses in that study indicated that cost reduction is the main factor for energy saving behavior followed by 37% of answers reported for environmental factors (Azar & Al Ansari, 2017).

Moreover, when participants were asked if saving electricity is significant to them, most of them agreed (97% of them answered yes). On the other hand, Azar & Al Ansari's study 91% "agreed" or "totally agreed" about the importance of electricity conservation (Azar & Al Ansari, 2017).

With regards to the adoption of energy-saving practices, participants were more likely to switch off lights when leaving an empty room or when there is natural light in the room (as showing in figure 3). Yet, the concern of practicing electricity conservation habits was less when participants were asked regarding switching or adjusting the temperature of AC; 4 of the participants never worry about temperature adjustment, and 3 of respondents rarely do. Similar results noticed for the question regarding turning off switches of unused devices as 4 never do that, and 3 rarely do it out

of 36 participants. No similar studies were found in the literature examining similar energy-saving practices.

The overall intention of respondents to save more energy at home in this study was 92%, and knowledge is an essential factor related to intention of energy saving actions. On Azar & Al Ansari study (2017) 80.5% of respondent "agreed" or "strongly agreed" that they should save more energy at home (Azar & Al Ansari, 2017). In this, research the percentage is higher and might be a bias due to the small sample size. Different questions in this study explored the willingness of participants regarding commencing energy conservation habits. When asked about the agreement of buying energy efficient appliances or light bulbs; most of the participants agreed or strongly agreed on that; surprisingly one of the participants strongly disagreed on buying energy efficient bulbs; the reason for that might be unawareness of its advantages or high costs. On the contrary, responses to drying clothes in natural air rather than electric dryers varied between disagreeing and agreeing as (as showing in figure 5).

When participants were asked if energy saving is essential to them or they feel the necessity to save more electricity, most of them agreed. Nevertheless, the reported willingness and electricity usage practices did not necessarily follow.

The UAE Sustainable Development Goals (SDGs) is a set of 17 goals that purpose to deliver better living circumstances to all. The UAE makes efforts to achieve the SDGs at home and outside. One of the SDGs goals (goal number 12) is to have responsible consumption and production. Under goal 12 the country launched several initiatives to encourage sustainable energy resources; from those initiatives is prohibiting the import of inefficient incandescent light bulbs (UAE Government, 2018). In 2014, the federal Emirates Authority for Standardization and Metrology (ESMA) banned incandescent bulb imports, stating that they weren't within required quality standards (Masudi, 2017).

Conclusion and Recommendations

Before concluding, it is vital to highlight some limits of this research, which will help in future research. First, the information used in the study was attained through a questionnaire, where some of the questions on knowledge and practices might be felt sensitive by participants. As a consequence, respondents might have been unwilling to report their actual behaviors. The survey had privacy and did not obtain identity information such as names as an attempt to overcome this issue.

The results of the current research cannot be instantly generalized to the larger society of the UAE. Because the sample size was inadequate to obtain statistically significant responses and the study couldn't reach all segments of the UAE population. Future studies should purpose to confirm and expand the results of the current research by applying the context to greater and more assorted data sets.

One of the recommendations of this study is the proper evaluation of the demographic features of residential buildings and used home appliances to recognize current consumption patterns and plan targeted approaches to encourage other practices among particular groups of people (e.g., females 40 years of age or older).

Another recommendation is to endorse energy saving in awareness programs and initiatives which can lead to higher motivation, intentions, and actions in this field. Energy education can also be started from earlier stages of life such as in schools and universities.

This study presents a context to evaluate the residential energy consumption knowledge, practices, and intentions of people living in the UAE. The context covers current knowledge of people about energy-saving importance; current practices taken in this direction; and the intention to the adoption of energy-saving behaviors. The framework is demonstrated in a case study on a convenience sample of the UAE, where information was gathered from 36 respondents. Data were obtained from an online survey and analyzed using Microsoft Excel. Results showed that people have good knowledge of energy conservation and most of the respondents related energy conservation to environmental protection and wellbeing. The knowledge of participants does not necessarily lead to desired actions or intentions in that regard.

Decision-makers such as governmental authorities, policy-makers or owners of facilities can apply and improve the context of this research to assess better and recognize current and future drivers of energy-savings in households. Targeted electricity conservation interventions like energy awareness campaigns can then be adjusted for specific practices or a particular group of people. Studies in universities or energy industry can also apply similar ideas of the current research and advance it in different areas, eventually helping in achieving a green sustainable environment.

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Internal Corporate Social Responsibility (ICSR); Perceptions of Employees in a Private Hospital in Dubai

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1. Introduction

The health care industry is evolving very fast nowadays and facing many challenges in the UAE. One example of these challenges is the involvement of health care organizations(HCO) in corporate social responsibility activities(CSR). CSR concept is emerging as an acceptable activity in UAE health care organizations these days. Moreover, the employee's decisions in any health care corporation is a reflection of their perceptions about their organization.

Hence, the purpose of this study is to investigate the perceptions of the hospital employees about the internal CSR activities within their organization at a private hospital in Dubai. Although CSR include large number of stakeholders such as; customers, shareholders, and employees, hospital employees are critical stakeholders (Siniora, 2017), and their opinions about the internal CSR activity are affected by the activity and strategy related to CSR.

CSR is multi-dimensional construct, although for the purpose of this study we are investigating the employee's perceptions only, we focus on the effects of CSR activity on employees, in other words as perceived by hospital employees, if this activity perceived negatively, the entire CSR program of the organization will be ineffective.; as a result, the hospital performance and image will be affected negatively. This case study will answer the following questions: Do perceptions about CSR activities affect employee's decisions and actions? Do perceptions of employees influence the image of organization from employee's perspectives? This study aims to increase the awareness of the internal CSR programs among the hospital employees within the available resources the hospital has.

The objectives of this study are:
 - To define the influence of CSR on hospital staff decisions and actions.
 - To make recommendations for the hospital management to improve CSR policies and strategies from the employees perspectives based on findings from this study.

2. Literature Review

CSR concepts have spread widely between the 1960s and 1970s (Chapin, 2016). CSR has many essential and valuable core constructs. Examples of CSR components mentioned in the literature include; accountability, transparency, competitiveness, responsibility, economic profits, legal

compliance, philanthropic, and ethical dimensions (Cherian and Pech, 2017; Hung Chen and Wongsurawat, 2011). However, in this case we focus on CSR construct related to employees. This is critical because the employees perceptions about CSR within their work environment connected positively with their behavior and practices at the workplace (Cherian and Pech, 2017).

The hospital management should demonstrate a sense of accountability about their policies, decisions and actions towards their employees, because the employees are relevant stakeholders, and they have a critical role in the hospital performance and the desired financial outcomes. Therefore, if the employees are satisfied, dealt fairly and transparently, openly communicating their concerns without barriers to their management, the organizations financial returns will be positive, and the image of that organization will be reflected positively in the community because of their employees satisfaction. The employee satisfaction is usually mirrored in the staff attitudes, actions, decisions, and behavioral communication with the customers internally and externally.This communication with customers is a fundamental construct for the hospital strategy and CSR program to maintain their business and to retain their customers (Russo, 2014).

Organization responsibility toward their workers and their work environment is counted as a company social responsibility for that business internally; however, there are some cost implications for the organization to maintain their employees' health and wellbeing (Andre S., 2017).On the other hand, when the company invests in their staff wellbeing as a part of their internal CSR program, the less cost will be incurred for their employee health; as a result, the company will be known as a socially responsible company(Andre S., 2017). Consequently, CSR has a positive impact on companies, which reflected in value enhancement and increased their profits (LIANG and RENNEBOOG, 2017).

There is a limited number of studies for hospital social responsibility applications. However, the majority of studies in hospitals concentrate on related hospital issues. For example, Hwang & Chung (2017) found out that there is a strong connection between market awareness and hospital social responsibility and the performance in Korea, which can support the hospital to run their business for the long term. However, it's difficult to measure it. Moreover, the ethical aspect of the human right perspectives and bioethics was included in the previous studies.

Hospitals recommended investing more money in the social activities since caring and giving are core values of the hospital business even though there is limited metric evidence to evaluate the hospital involvement of the hospital performances in the social activities. Money generation and social events are relevant managerial aspects that have no conflict to be running simultaneously to ensure business sustainability in the current competitive market. However, the Hospitals should be oriented to market needs and stakeholders' demands, such as employees and patients, and act accordingly to maintain their image and continue their success financially (Hwang & Chung, 2017).

Chapin (2016) said hospitals considered the social association with commercial goals, the social responsibility concept in the health care industry means that the HCO committed to the society and their stakeholders away from making profits. This will support what Hoffman (2018) mentioned as essential functions of CSR activities to help poor people or other employees with less salary to have affordable medical services, not limited to health insurance coverage inclusions (Chapin, 2016).

Employees protection and wellbeing turn out to be a mandated demand globally, and ensuring staff safety is a human right standard. If the HCO is not fulfilling the employee safety at the work setting, they become liable legally. Hence, taking care of the hospital employees is a legal concern in addition to social one as well, which affects the hospital image among the employees positively or negatively (Hossain & Diah, 2015).

In healthcare field the main core values of the health care industry is to directly associate with the community needs by providing the care and cure services for the community individuals, organizations who implement CSR initiatives and program in their daily operations and as part of their strategic directions can achieve a good exposure in the competitive market, in addition, to promote the company services and image to the private and public sectors (Lubis, 2018).

Moreover, CSR programs reflect a positive response inside the organization among the employees and grab their attention, as a result, it will affect the staff decision, action, and behavior with the internal and external customers through the health services provided at the hospital and other services offered inside the organization (Lubis, 2018).

CSR programs inside an organization should be transferred transparently and correctly among the employees as part of the strategic management direction inside the organization, in order to reflect a positive image and reputation about the organization, attract the staff and catch their attention, improve the staff and patient loyalty and the other stakeholders as a result of the positive impact for the CSR (Lubis, 2018).

Lythreatis, Mostafa and Wang(2017) found when the management speaks to their employees and consider their suggestions in their management decisions, this resulted in a positive perception about the internal CSR among the employees, consequently make the employees feel committed to the organization by reflecting this commitment in their positive attitudes at their work settings, this positive attitudes of the employees will help the organization to achieve their goals with their stakeholders or customers.

For example, the organizations who deal with their staff fairly, support their staff educational opportunities and provide attractive salaries and benefits. This type of organization they value their employees through their internal CSR policies will achieve the return of this investment in their staff performance and attitudes during their work. It will reflect the positive image for that organization internally and externally (Lythreatis, Mostafa and Wang, 2017).

(Cherian and Pech, 2017) Conducted one study in UAE and explored the CSR influence on employees in two UAE companies. The study showed that the staff could show a behavioral change according to the CSR activities and policies inside that organization. Additionally, they mentioned that CSR policies at any organization are essential to reflect the positive impressions about the organization internally and externally to all the stakeholders to retain the existing customers and relations of that organization with others, which resulted in maintain the company performance.

Previous studies tested the importance of CSR from different perspectives, financial, consumer behavior, and employee behavior. CSR affects the employee manner either positively or negatively (Cherian and Pech, 2017). CSR actions have a substantial effect on the employee's performance and improve their engagement in their organization business, which leads to success organization and better business. However, some employees may have the feeling that CSR activities are not belonging to their work, and it's not useful. Hence, the engagement of the institution staff is critical to have a successful CSR outcome (Cherian and Pech, 2017). Consequently, the committed management should strive continuously to find opportunities for socially responsible programs that create collaboration between stakeholders within and outside their organization (Groves and LaRocca, 2011).

3. Research Methodology

This study is a quantitative exploratory study. The target population for this study was healthcare professionals (physicians, nurses, and allied health, non-medical) working in a private multi-specialty hospital with more than 100 beds in Dubai. Sample size was decided based on the total number of employees working in the hospital in that period of time. The sample size selected randomly includes all hospital staff, and the research team distributed 300 questionnaires, 173 staff responded with complete data, with a response rate of 57.6%. The participation of the study was voluntary, the participants approved to participate verbally after that the questionnaires was given to them by the research team, if they were refused they were thanked for their time and left without receiving a copy of the questionnaire, all of the personal details of the participants kept unidentified. Approval from the hospital management to conduct the study was obtained before the distribution of the survey started.

Survey Instrument**:** For this study, we used the questionnaire developed by Maignan and Ferrell's (2001) scale adapted from Carroll's (1979) CSR Model (Lythreatis, Mostafa and Wang, 2017). Since the questionnaire is borrowed knowledge, we used a focused group strategy to validate the questionnaire questions to suit the contexts of the studied hospital; the focus group consisted of 8 members; 2 doctors, three nurses, one university faculty, and two administrative staff. As a result, the focus group endorse these questions and validate the items selected in the questionnaire. The eight elements were tested on the Likert scale range from 1 to 5, (1) strongly disagree, and (5) strongly agree.

Internal CSR Items Table (1): In order to evaluate the insights of internal CSR concepts from the employee's perspective, 8 questions selected for this purpose using Maignan and Ferrell (2001) measure, consist of 'compensation and promotion' and 'My company supports employees who want to acquire additional education' 'My company has internal policies that prevent discrimination in the employees'. The scale used for this study tested in 3 different countries by Lythreatis, Mostafa, and Wang (2017) showed reliable results in Lebanon, Tunisia, and UAE with alpha score 0.90, 0.90, and 0.91 correspondingly. The selected measure for this study evaluates the four conceptual components proposed earlier by Carroll (1979) include an ethical, legal, philanthropic, and economic level of the organization (Lythreatis, Mostafa and Wang, 2017).

Table 1: Corporate Social Responsibility of Workplace Survey Questionnaire items

No	Question
Q1	My company closely monitors the employees' productivity.
Q2	My company seeks to comply with all laws in hiring and giving employees benefits
Q3	My company has programs that encourage the diversity of its workforce (in terms of age, gender, or race).
Q4	My company has internal policies that prevent discrimination in the employees' compensation and promotion.
Q5	My company has a comprehensive code of conduct.
Q6	My company supports employees who want to acquire additional education.
Q7	My company encourages employees to join civic organizations that support the community.
Q8	My company has flexible policies which enable the employees to better coordinate work and personal life.

Ethical Consideration: This Research maintained the ethical research principles for example; the hospital's higher management approval was obtained to conduct this survey; participation was voluntary after the purpose of the was study explained, anonymity and confidentiality of the participants were maintained, after the participant approved to fill the questionnaire. Completed questionnaires were accessible only to the research team.

4. Results

Descriptive analysis method found to be supportive in evaluating the impact of CSR on employees (Cherian and Pech, 2017). Hence it is used for the data analysis in this study, totally 300 questionnaires were distributed to all staff who were working in the hospital in October 2019. The number of surveys were decided based on the total number of medical and non-medical employees working in the hospital. 173 respondents submitted completed questionnaires and the response rates 57.3%. The responses which represent 57.3% (n=173) met the inclusion standards for statistical analysis.

Demographic characteristics of the respondents

Demographic variables such as gender, different groups of healthcare professionals (doctors, nurses, allied health professionals and non-medical staff), age and experience are essential in studying the internal corporate social responsibility in a workplace as presented in Table (3).

The gender distribution of participants was almost equal for both males (50.9%) and females (49.1%) with male respondents slightly higher than the females. However, in the nursing group majority of nurses were females (Table 2). This sex ratio supports the Dubai Health Authority(DHA) report (2015) and represents the nursing population in the UAE. Work experience years, age and the job role was used as a demographic characteristic to identify if cultural values influence the perceived social responsibility. Majority of the participants belonged to the age group of 20-30 years (39.9%) followed by 31-40 age group (33.3%). Employees who had an experience of 3-5 years in the workplace were the major responders (75.1%) for this study.

The groups participated in the survey were from doctors, nurses, allied health professionals and non-medical staff. Nurses (41%) were the highest responders followed by Non-medical (24.3%) and doctors (22.5%).

Table 2: Study Groups & Gender Ratio

Group 1 (Nurses)	Male (%)	26.8
	Female (%)	73.2
Group 2 (Medical)	Male (%)	82.1
	Female (%)	17.9
Group 3 (Allied Health Professional)	Male (%)	90.5
	Female (%)	9.5
Group 4 (Non-Medical Staff)	Male (%)	25.4
	Female(%)	33.8

Table 3: Demographic characteristics of the respondents

Variable	Value	Valid Percent Survey group (N=173) %
Gender	Male	50.9
	Female	49.1
Group	Nurses	41.0
	Doctors	22.5
	Allied Health Professionals	12.1
	Non-Medical Staff	24.3
Age	20-30	39.9
	31-40	33.5
	41-50	16.8
	>50	9.8
Year Experience	<1=1 year	4.6
	2-3 years	19.7
	3-4 years	75.1
	>4 years	0.6

Reliability Measurement

Internal reliability for the 8 questions were calculated by coefficient alphas, and the scale reliability are illustrated in the table below. Coefficient alpha are used to measure internal reliability for each question and overall agreement scales. Reliability analysis determines data trustworthiness obtained from questionnaires. The Cronbach alpha score was 0.640 for this survey with a reliability percentage of 64%. These scales indicate that the overall result of the study has acceptable internal consistency score as mentioned in a previous study (Hulin, Netemeyer, and Cudeck, 2001).

Internal CSR Measurement Results

Perception of healthcare professionals to the eight internal CSR measurements within their organization is illustrated in Figure 1.and Tables 4, represents a detailed response to the 8 question items.

Highest agreement (Table 4) was observed for Question 5 followed by Q4, Q3, Q2, Q1. Whereas highest disagreement was observed for Q8 followed by Q6, Q7.

Table 4: Degree of Agreement & Disagreement on Questions

Highest Agreement Responses	Highest Disagreement Responses
Q5: My company has a comprehensive code of conduct (98.8%)	**Q8**: My company supports employees who want to acquire additional education (93.6%)
Q4: My company has internal policies that prevent discrimination in the employees' compensation and promotion (97.7%)	**Q6**: My company encourages employees to join civic Organizations that support the community (83.2%)
Q3: My company has programs that encourage the diversity of its workforce (in terms of age, gender, or race (96%).	**Q7**: My company has flexible policies which enable the employees to better coordinate work and personal life 61.8%)
Q2: My company seeks to comply with all laws in hiring and giving employees benefits (88.4%)	
Q1: My company closely monitors the employees' productivity (87.3%)	

Internal CSR Items

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
■ Strongly agree	40.5	49.1	57.8	60.7	79.8	0.6	1.2	0.0
■ Agree	46.8	39.3	38.2	37.0	19.1	1.7	6.9	2.3
■ Neutral	12.1	10.4	4.0	2.3	1.2	4.0	30.1	13.9
■ Disagree	0.6	0.0	0.0	0.0	0.0	38.2	55.5	52.6
■ Strongly disagree	0.0	0.0	0.0	0.0	0.0	55.5	6.4	30.6

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree
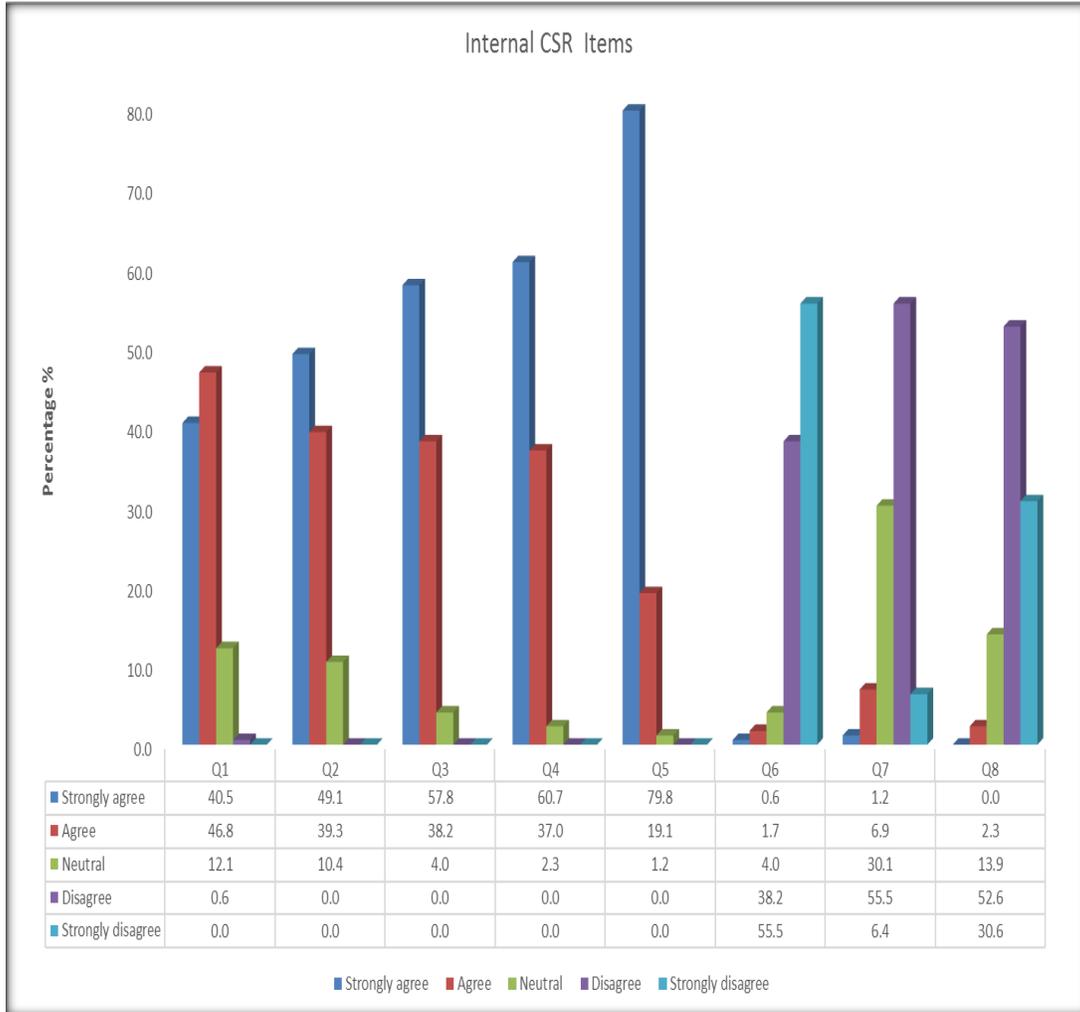
5. Discussion of Results and Recommendations for Policy

This study aimed to investigate the perceptions of the hospital employees about the internal CSR activities within their organization in a private healthcare setting in UAE. This study also aims to increase awareness among the hospital employees of the internal CSR programs within the availability of hospital's resources.

The results of this study shows that the CSR programme of the hospital in relation to code of conduct, policies related to discrimination and upgrading of position, employee benefits related laws are well perceived and accepted positively by the employees who responded to the survey. However, there was disagreement related to career development, work life balance and supporting civic community were the mostly disagreed by the target groups. This implies that the work culture should be improved in related to the disagreed items mentioned above to show that the CSR of the hospital is positively connected to the employee behavior.

Recommendations

The primary reason for the study was to investigate the CSR concept in a UAE private healthcare setting with healthcare professional in medical and non-medical departments. To conclude, CSR is a vital concept to be integrated in each organization culture and daily operations for the businesses, hence, each company management should assess their employees understanding and perception with different background about the corporate social responsibility in private hospital settings. This study has some limitations.

Firstly, the finding is limited to only one hospital in one region of the UAE and does not include other health care organization thereby reducing the ability for generalization, and the demographical features may change from area to another. Furthermore, respondents were skewed towards private healthcare setting. Secondly, this study examined staff views in only one hospital in the private sector. Therefore, the result cannot be generalized about all hospital staff (government & private) perception in the study region, it is recommended to develop the existing research findings by including both private and government hospital inside UAE and different region for valid comparison. A similar study can be implemented in different healthcare settings with a bigger sample size in various regions of the UAE.

Future research recommended to investigate the CSR impact on employee's conduct and attitudes outside the organization's boundaries (Cherian and Pech, 2017).

Contribution to knowledge: This study produces necessary information about the CSR concept in healthcare agencies related to work condition in UAE private hospital. However, the duration of this study was challenging because it was done in one-month.

This study has a series of important implications for hospital management to identify the areas that required for the improvement and the results could be used in devising proactive management approaches to address various issues affecting work condition and to plan to inculcate social responsibility in relation to motivating factors such as training and career development, schemes to improve work life balance and joining the civic community.

Another suggestion for management decisions makers is to allocate a budget from their yearly budget for the CSR programs, part of this budget should be allocated to improve their employee's conditions, such as improve their internal CSR policies by considering the educational support for their staff and be more flexible with their working hours in order to help their employees to achieve the life-work balance.

Therefore, the management should revise their CSR policies and mainly which is related to their staff, and incorporate the CSR programs in their vision, mission, and strategic goals, and their daily operational activities. And communicate this program clearly to their staff to encourage their engagement (Cherian and Pech, 2017).

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7. Appendix:

Items used to measure internal CSR perceptions:

1. My company closely monitors the employees' productivity.
2. My company seeks to comply with all laws in hiring and giving employees benefits
3. My company has programs that encourage the diversity of its workforce (in terms of age, gender, or race).
4. My company has internal policies that prevent discrimination in the employees' compensation and promotion.
5. My company has a comprehensive code of conduct.
6. My company supports employees who want to acquire additional education.
7. My company encourages employees to join civic organizations that support the community.
8. My company has flexible policies which enable the employees to better coordinate work and personal life.

Domestic waste recycling practices among the UAE population

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A. Introduction

Domestic recycling is a process that facilitates the regulation of non-biodegradable wastes in the environment to a manageable level. Although non-biodegradable wastes consist of mostly solids, it also includes liquid waste enclosed in containers (EPA, 2016). Recycling refers to the method of altering waste materials into reusable new material, usually aimed at the conservation of the environment. Wastes have created a significant environmental challenge globally, and the UAE is among the countries significantly affected due to its rapid development in both population and infrastructure.

The nation is, however, diverting its attention and finances to sustainable, eco-friendly waste management through policies and coordinated strategies aimed at handling domestic waste recycles as well as consumer attitudes towards recycling. There are numerous benefits attributed to recycling which include conservation of resources through making use of the wasted ones, production of recycled products saves a lot of energy and most importantly the process aids in the protection and conservation of the environment. Recycling also reduces the amount of waste within a household, the country and environment at large. There are numerous methods of handling waste like incineration, landfills, and combustion; however, none of these procedures are as safe for the environment as recycling (Rushton, 2003). Notably, landfilling has become unsustainable as the population increases (Sil & Kumar, 2016). Likewise, combustion and incineration have direct environmental consequences such as the release of toxic fumes into the atmosphere. Consequently, waste pervasively strays into water bodies and affect marine life.

Fortunately, the UAE government have commenced several programs to sensitize the citizens on waste recycling and its importance. It has also implemented policies that curb waste disposal to ensure recycling of most waste produced in the country, which is coordinated by the local authorities. Other agencies such as Tadweer have also joined in the effort to enhance waste recycling in the country (Rana, 2016). The government has also improved waste collection and separation systems, and what remains is the country leadership providing incentives that encourage waste recycling. In my research, I investigated the user attitude and behavior regarding waste disposal and made a comparison to Germany. The results showed that Germans are increasingly recycling domestic waste while UAE citizens show the contrary.

B. Literature Review

The household wastes in the UEA have reached an annual average of 730 kilos and 725 kilos per home in Abu Dhabi and Dubai respectively, with the number expected to rise over time According to Abiad and Meho (2018). Wastes mainly entail solid trash or refuse from different households. Recycling involves the process of increasing the use of domestic wastes by converting them into other materials. Waste management has remained a critical challenge in the UAE; hence the contemporary waste recycling campaigns have focused on providing alternatives to waste management. Waste recycling is a complex problem in the UAE because the government is yet to commit adequate funds to the process. Despite the commitment of the government to reducing waste dumping in landfills, the amount of funds allocated to process is insufficient (Anwar, Sergany, and Ankit, 2017).

Therefore, gaining better insights into recycling requires a knowledge of who recycles domestic wastes and how it is done. The UAE has a population of 9.68 million in which 80 of the population are expatriates, whereas 20% are Emiratis (Abiad and Meho, 2018). Despite the diversity of its population, UAE is still one of the largest producers of waster around the globe. For instance, 8, 200 tons of waste is produced every day with each household in the UAE producing a per capita waste of 2kg to 2.3kg daily (Abiad and Meho, 2018). Some of the causes of the higher waste generation in the UAE include demographic and socioeconomic factors, environmental awareness, and the limited green solution options. These factors have also influenced the attitudes and behavior of residents since the older generation in the UAE is yet to respond positively to the domestic waste recycling.

Based on the income statistics, the goal of the paper will be to explore the attitudes and behaviors of residents of the UAE towards domestic waste recycling. It will also examine the factors promoting waste recycling in the UAE as well as how those factors have influenced the change in behavior and attitudes of residents. With the limited knowledge of the behaviors and attitudes towards waste recycling, this paper will provide vital information to assist in developing programs for minimizing wastes. The effects of the limited knowledge on waste management are that people will continue to use non-recyclable materials, which will increase the rate of solid generation wastes. This will not only increase the number of solid wastes in the UAE but also it will reduce participation in waste recycling programs or practices.

The behaviors and attitudes of consumers are demonstrating a positive trend because they believe that they have a personal responsibility to support recycling. The public has a vital role in addressing waste management. Similarly, they have developed positive attitudes towards waste recycling because they believe that it promotes environmental conservation efforts around the globe (Genena *et al*., 2018). Attitudes and towards domestic wastes recycling have changed significantly because of the deteriorating ecological quality in the UAE. For example, the public is developing a preference for recyclable or reusable materials in their homes to reduce the number of wastes in the UAE.

They are Raising awareness of the UAE's population on the importance of reducing wastes while increasing recycling to promote environmental sustainability or improve the quality of life (Ayoub, Musharavat, and Gabbar, 2014). A study conducted by Ayoub, Musharavat, and Gabbar (2014) determined that raising awareness on recycling promotes a positive change in behavior towards the

recycling of wastes. The study conducted in Qatar indicated that attitudes towards recycling are changing; hence the Qatar citizens are increasingly participating in recycling. The public increasingly understands that domestic waste recycling is an approach aimed at promoting environmental sustainability to improve the living standards of individuals by reducing the possibility of environmental pollution (Hall *et al*., 2016). This has not only encouraged them to support domestic waste recycling but also, they have actively participated in the recycling process (Yano and Sakai, 2015). For instance, they have supported or actively engaged in the process by using reusable materials.

Rajopapal and Bansal (2015) argue that the behaviors and attitudes towards domestic waste management have steadily changed over the last decade. A study conducted across different states including New York, California, Illinois, Virginia, and Florida indicated that people tend to develop positive attitudes towards recycling when it is tied with the issues of the loss of natural resources. 70% of the respondents indicated that they have participated in domestic recycling of wastes because of the threat that the increasing number of dumpsites presents on natural resources. The safety culture has influenced the adoption of domestic waste recycling practices in society since the public deems it as an appropriate approach to waste management.

Despite the changing attitudes and behaviors towards domestic waste recycling in the UAE, various factors influence such attitudes and behaviors. For example, demographic factors or variables such as age have had a significant influence on the commitment of individuals to sustainability because the younger generation has a positive attitude towards recycling as compared to others (Howari, Qafisheh, & Nazzal, 2018). A study conducted by Bendak and Atili (2017) indicated that members of the second-generation view recycling more positively, hence they actively participated in recycling activities. The authors found that the second-generation groups exhibit higher recycling participation, as well as awareness and willingness to support recycling promotions (Bendak and Atili, 2017).

Despite their commitment to recycling, lack of past participation in the practice might present several barriers. Demographic factors such as age, gender, and income levels have shaped the attitudes of the residents of Ras Al Khaimah emirate, which has prompted them to support the domestic recycling of waste campaigns (Assaf, Idwan, & Farhat, 2018). A study conducted by Assaf, Idwan, & Farhat (2018) indicated that socio-demographic factors and environmental awareness are the determinants of recycling attitude and behavior. 75% of the response indicated that environmental awareness and socio-demographic factors such as age and income. Therefore, demographic and socio-economic factors have significantly shaped the attitudes and behaviors of individuals; hence motivating them to support/participate in domestic waste recycling (Assaf, Idwan, & Farhat, 2018).

With the troubling statistics of total waste produced in the UAE and other countries like the U.S. and Qatar, the current state of knowledge on waste recycling is lower than the expected level. This demonstrates that there exist knowledge gaps among current generations including the millennials and generation Z on the benefits of waste recycling in the society. Moreover, limited knowledge of the existing waste recycling programs has increased the knowledge gaps in waste recycling practices.

C. Research Objectives

The first objectives of this study are to find out why people in UAE are not participating in recycling domestic waste as well as they have a good general attitude of the population towards recycling. Secondly, to investigate how age and level of education affect household recycling. Another objective is to compare the recycling rate in the United Arab Emirates to Germany's.

D. Methodology

This cross-sectional study conducted a sample survey with a total of 50 participants. Primary data were collected using a simple questionnaire. The age of the participants varied from (19-65) years. The question consisted of two sections where the first part required participants to fill out their demographic data as shown below:

    a) Age (19-20, 21-30, 31-40, 41-50, 51-65)
    b) Gender
    c) Marital status (married, single, divorced, other)
    d) Level of education (high school or lower, diploma, bachelor, masters or higher).

In the second part was designed to gain a better understanding of the domestic waste recycling knowledge of the participants, and hence, their attitude towards the same. The questionnaire was formulated as shown in table 1 based on a total of 13 questions. All questionnaire contents were based on previously developed and validated surveys except question nine which was modified to achieve the objective. Specifically, questions in section two were based on similar items in a survey conducted by Bendak and Attili (2017).

The questions types were predominantly single answer question for socio-demographic data. The second questions consolidated single answer and numerous answer question in exploring the attitude and behavior of household waste recycling.

The questionnaires were distributed conveniently to potential respondents around, United Arab Emirates. The survey took place in April 2019 on an interview basis. All participants were briefed about the purpose of the study before being allowed to answer questions. I altered some of the questionnaire items so that the final document would suit the United Arab Emirates context. The targeted sample size in this survey was 50 people. I discarded two questionnaire responses because of invalid responses. I evaluated the data I collected from the 48 valid questionnaires that remained. Respondents were asked if they were ready to contribute before being presented with questionnaire forms. Descriptive statistics were used to assess the responses written by the respondents, and the data were analyzed quantitatively.

Table 1: Questionnaires

Question	Answers
1. **How convenient do you find recycling?**	Not at all Somewhat inconvenient Neutral Convenient Very Convenient
2. **Do you consider recycling a waste of time?**	Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree
3. **Is it my personal responsibility to help in the recycling effort?**	Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree
4. **Why do you recycle? (tick all applicable)**	Recycling saves energy Recycling reduces landfills Recycling preserves resources and protects the environment Recycling is good for the economy Others
5. **What encourages your participation in waste recycling? (tick all if applicable)**	More recycle beans Less walking distance to dispose Mass media education and advancement Clear recycling guidelines Frequent waste collection
6. **Are you concerned about the environment or global warming?**	Very concerned Somewhat concerned Not sure Not at all
7. **On a 5-point scale, how strongly do you agree that the governments should force producers to use recyclable materials in their packaging?**	Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree
8. **Do you have access to waste recycling bin at work and at home?**	Yes No
9. **Depending on whether recycling beans are available, would you prefer sending somebody to do it when you cannot?**	Often send my children Often send my siblings Prefer to go by myself Send anybody Do nothing
10. **Do you currently participate or ever participated in any waste recycling program(s)?**	Yes, but not currently Yes, I do currently Not at all

11. How do you receive information about recycling? (tick all applicable)	School/university lessons Internet Neighbors Leaflets/posters Radio/television Newspaper articles General perception/knowledge
12. Do you think there are enough recycling bins?	Yes. No. Not sure/not applicable
13. How recent have you received information about recycling?	In the last month In the last 6 months In the last year in the last 2 years None that you know of

E. Results

First, how are age and level of education affects household recycling?

Demographic factors, such as age and education level, affected the attitude toward recycling. Young people had a more positive outlook toward recycling than their older counterparts. The attitude data was obtained from the questionnaires.

Many youthful participants (31.25%) were particularly positive of the idea of waste recycling indicating that although they are not fond of employing the concept in their household management of wastes, they have once contemplated introducing it. In contrast, a large proportion of the mature and aging population appeared either oblivious or critical of the idea of recycling waste.

While in high school people who recycle are many compared to those who think it is a personal responsibility. As we move on to higher education people who perceive it as a personal responsibility, continue to increase, and at the master's level, it is at par with people who recycle. As the graph indicates, all the numbers keep rising, and that is an indication that as people continue to acquire knowledge, they become more aware and concerned about the environment.

Table 2: Demographic factors, such as age and education level and marital status

Sex	Total	percent
Male	17	35.42%
Female	31	64.58%
Age (years)	total	percent
19-20	5	10.42%
21-30	13	27.08%
31-40	15	31.25%
41-50	10	20.83%

51-65	5	10.42%
Education	**Total**	**percent**
high school and lower	12	25%
Diploma	12	25%
Bachelor	16	33.33%
master or higher	8	16.67%
marital status	**Total**	**percent**
Married	26	54.17%
Single	20	41.67%
Divorced	1	2.08%
Other	1	2.08%

figure 1:Effects of the educational level on attitude towards waste recycling

figure 2: Effects of age on attitude towards waste recycling
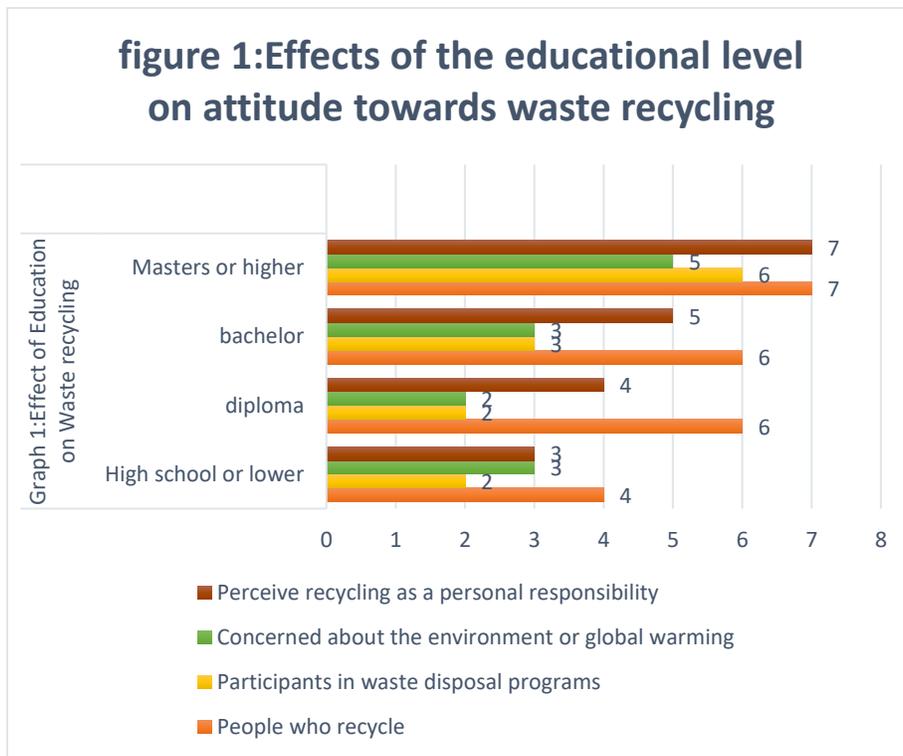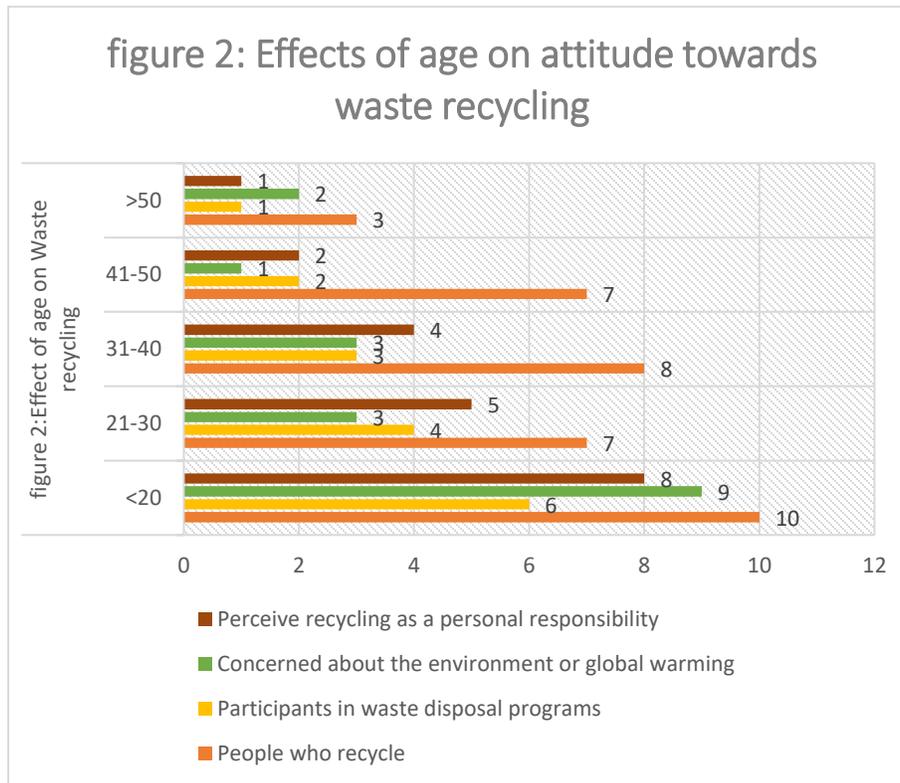
The second objectives of this study are to find out why people in UAE are not participating in recycling domestic waste as well as they have a good general attitude of the population towards recycling.

Based on the respondents' data, most people think waste recycling is not a time-wasting effort with (38) strongly disagreeing. Nevertheless, a more significant number, (25) out of the 48 respondents say it is their responsibility to help in the recycling effort. It indicates that think recycling is a good deed, but they are not directly responsible for ensuring waste are recycled. Most of the respondents also agree that the government should restrict packaging materials used by manufacturing companies, where 26 of the respondents strongly agree.

figure 3: User attitude and behavior towards waste recycling
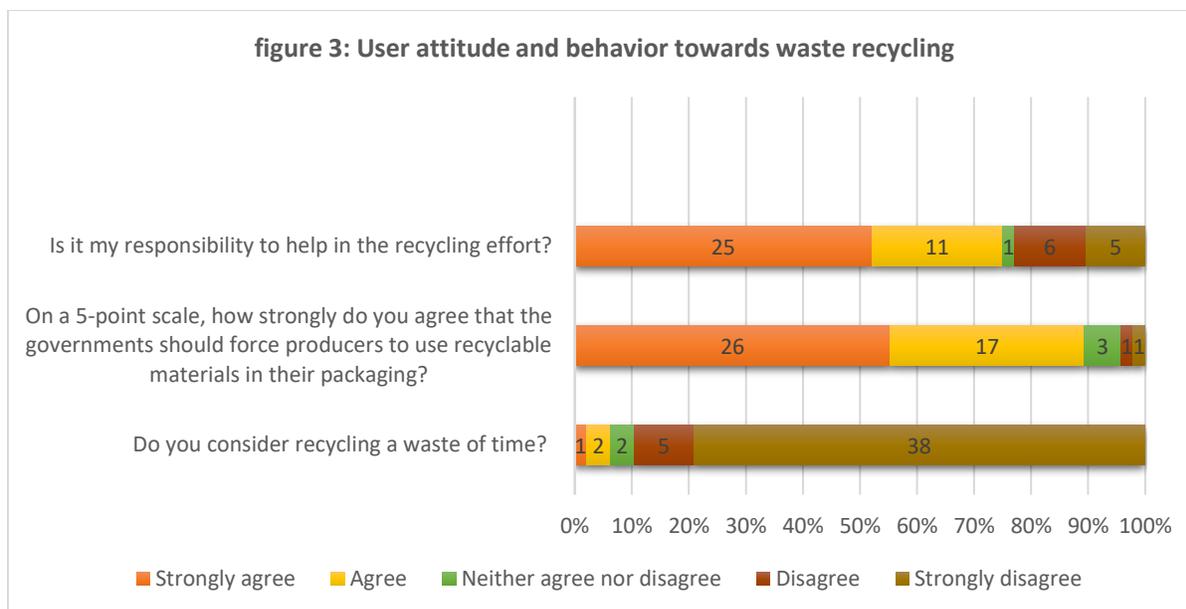
According to the above chart, most people agree that recycling is something that can help in conserving the environment. They also think that the government should direct all producing companies to use recyclable materials. Furthermore, most people agree that recycling efforts should be personal responsibilities.

Table 3: General perception of waste recycling

Question	Answers	Percentage	Total
How convenient do you find recycling?	Not at all	20.83%	10
	Somewhat inconvenient	10.42%	5
	Neutral	2.08%	1
	Convenient	39.58%	19
	Very Convenient	27.08%	13
Why do you recycle? (more than one selection allowed)	To save energy.	10.42%	5
	To protect the environment and conserve the natural resource.	37.5%	18
	It is effective economically.	4.17%	2
	To reduce landfills.	45.83%	22
	Other	2.08%	1
What encourages your participation in waste recycling? (more than one selection allowed)	More recycle beans.	29.17%	14
	Less walking distance to dispose.	25%	12
	Mass media education and promotion.	14.83%	7
	Clear recycling guidelines.	10.42%	5
	Frequent waste collection.	20.83%	10
Are you concerned about the environment or global warming?	Very concerned	54.17%	26
	Somewhat concerned	35.42%	17
	Not sure	6.25%	3
	Not at all	4.17%	2
Do you have access to waste recycling bin at work or home	Yes	64.58%	31
	No	35.42%	17

Depending on whether recycling beans are available, would you prefer sending somebody to do it when you cannot?	Often send my children	14.83%	7
	Often send my siblings	10.42%	5
	Prefer to go by myself	25%	12
	Send anybody	45.83%	22
	Do nothing	10.42%	5
Do you currently participate or ever participated in any waste recycling program(s)?	Yes, but not currently	22.91%	11
	Yes, I do presently	29.17%	14
	Not at all	47.92%	23
How do you access or receive information on waste recycling? (more than one selection allowed)	Through posters or leaflet	10.42%	5
	Through TV or radio	29.17%	14
	Through the internet	20.83%	10
	Common knowledge or perception	2.08%	1
	From my neighbors	10.42%	5
	Newspapers	16.67%	8
	Lessons from school or university	10.42%	5
Do you think there are enough recycling bins near your households.?	Yes.	41.67%	20
	No.	56.25%	27
	Not sure/not applicable	2.08%	1

From the survey, 41.67% of the participants claimed to have access to recycling bins near their households. Notably, a relatively large number find recycling inconvenient as indicated by 10 respondents representing 20.83% who say not at all.

The trend entailed 10.42% of the participants accepting that they would ensure that they disposed of their waste in a container even if it meant sending their siblings. It was otherwise surprising to note that many participants' attitude toward recycling was dependent on the availability of public recycle bins to practice recycling. Without a state provided bin in the neighborhood for waste separation, most households stuck to mixing wastes in a single bin or collection material and carry on with life.

The majority of the responses (56.25%), however, indicated that most households have no access to recycling bins (figure 4). Most users referred to recycle bins as waste bins, which further gave a hint into people's perceptions towards recycling.
The majority of the response does not currently participate or ever participated in any waste recycling program at 47.92%.

Figure 4 Do you think there are enough recycling bins

figure 5: What encourages your participation in waste recycling?

Frequent waste collection.	10
Clear recycling guidelines	5
Mass media education and promotion	7
Less walking distance to dispose	12
More recycle beans	14

- Frequent waste collection.
- Clear recycling guidelines
- Mass media education and promotion
- Less walking distance to dispose
- More recycle beans
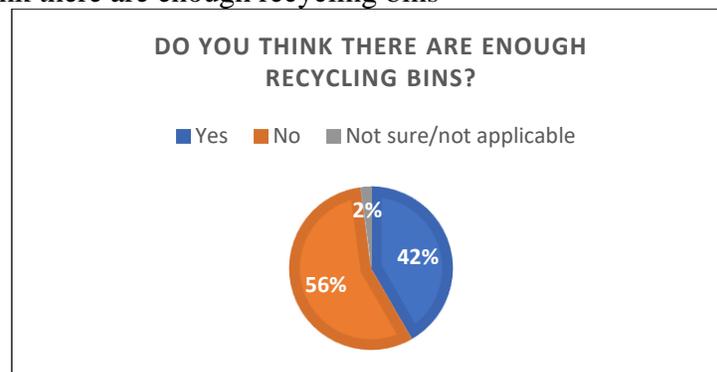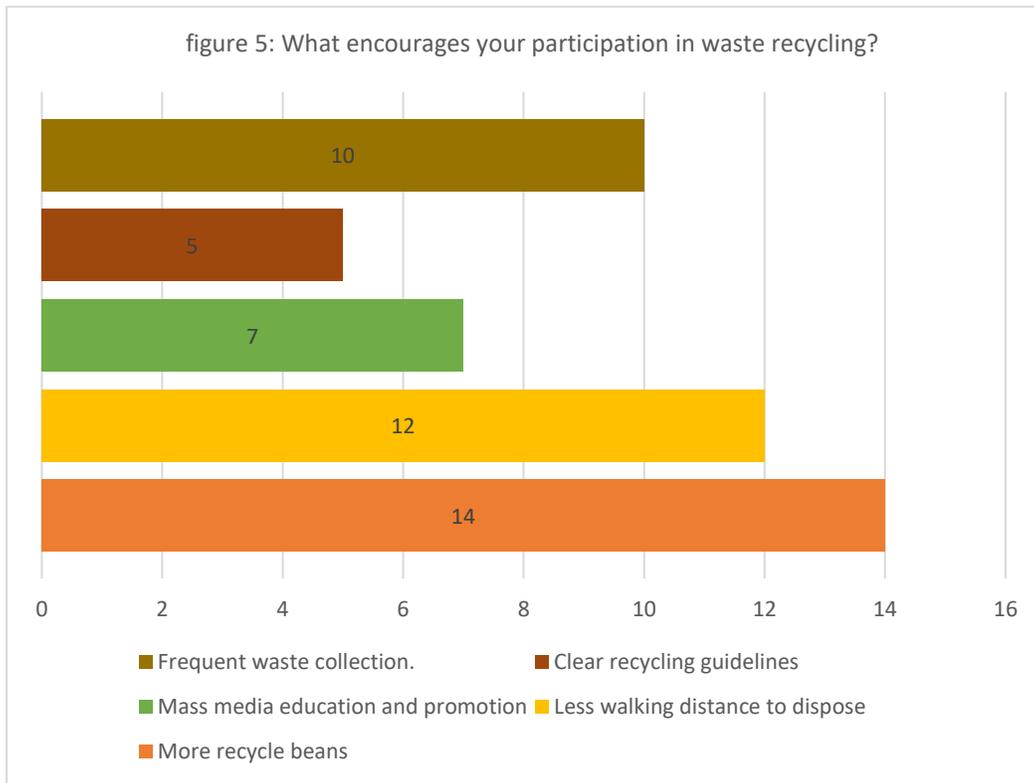
This graph presents the percentage of general attitude and behavior towards waste recycling. It entails what motivates people in the UAE to participate in waste recycling. Clear recycling guidelines are the least motivators at 10%.

Equally, a large number says more recycle beans (29.17%), less walking distance to dispose of waste (25%) and various waste collection (20.83%) encourages them to participate in waste recycling (see figure 5).

The last objective to compare the recycling rate in the United Arab Emirates to Germany's.

Figure 6: percentage of implemented household recycling in UAE and Germany, source Statistics Center(2015); Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. https://www.scad.gov.abudhabi/Release%20Documents/Waste%20Statistic%202015%20EN.PDF

https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/abfallwirtschaft_2018_en_bf.pdf
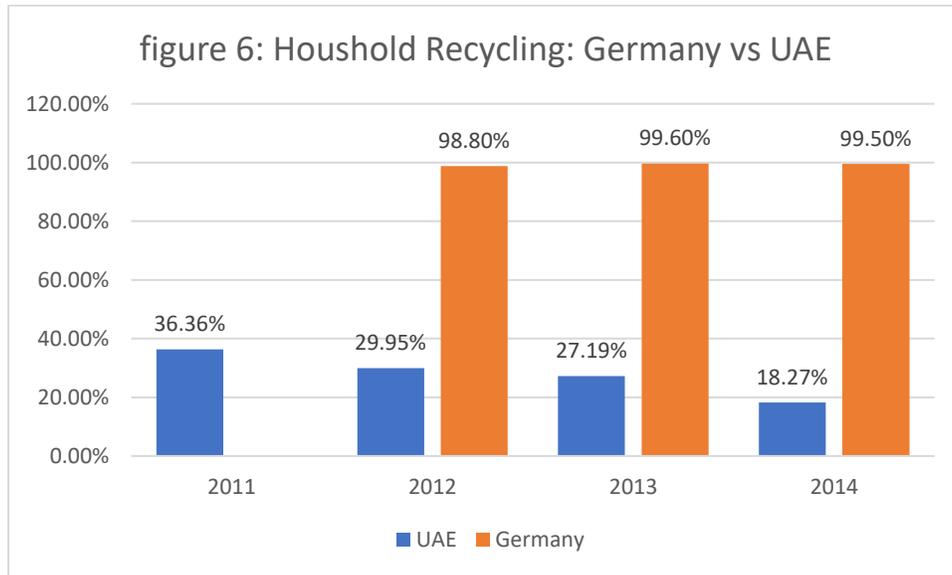
According to the graphical representation of Germany and the UAE, the efforts of the UAE need an improvement. Furthermore, as time goes by, the number of people engaged in household recycling in the UAE keeps going down, while that of Germany keeps rising as the percentage of people involved in household recycling was 99.5 in Germany and 18.27 in the UAE in 2014.

In Germany, Recycling was, in fact, more common among females than among male household members in 2016 (Dornack, 2018). Further, 70% of the Germans confessed that they developed a routine of recycling wastes due to the education and extensive campaigns by both the state and environmental justice organizations to create awareness about recycling as an effective method of waste management (Wünsch & Simon, 2018). Therefore, it appears the Germans' recycling behavior and attitudes are deeply embedded in their perceptions, values, and personality, factors that have not been sufficiently cultivated in the UAE.

In Germany, about 92% of the households had easy access to a recycling bin in 2017, a fact that played an essential role in influencing people's attitude and behavior to promote the recycling concept (Wünsch & Simon, 2018).

F. Discussion

The results of the study indicate that only a few people practice recycling. Notably, the composition and volume of domestic waste vary from one country to the other (Ojeda-Benitez, de Vega, & Ramí, 2003. The open dumping of organic material creates favorable conditions for disease-causing organisms to thrive (Choden, 2015). The scarcity of land and the low cost of starting and

maintaining landfills make recycling seem uneconomical (Alhoumoud, 2005). Therefore, most government and organizations would prefer to run landfills.

However, people are becoming more aware of the environmental degradation caused by the accumulation of wastes in the environment if we were to go by the findings in this study. The Environment Agency - Abu Dhabi (EAD) (2016) recommends the reuse of plastics. Recycling programs can be made successful if the positive perception of the public towards it is translated into action. The study established that households with higher education levels were more likely to recycle wastes compared to the others. Based on the data presented in table 2 and figure 1, the positive attitude towards recycling waste was higher for those holding bachelors and masters compared to high school and diploma. Therefore, it is justified to conclude that the more a household is educated, more likely they will adopt waste recycling practices.

Notably, the data on the age factor presents an interesting turn of events. Naturally, the younger generation is expected to loosely attach cognizance to essential practices such as the responsible disposal of waste. On the contrary, the data portrays the young as the more responsible group compared to the old regarding waste recycling. Perhaps, the young generation is now taking over the responsibility to take care of their environment now than ever. The data also provides a new perspective in environmental conservation that can facilitate government programs on waste recycling and sensitization.

On other related areas of the research, recycling programs can be made successful if the positive perception by the public towards it is translated into action. Participants of the study generally had a positive attitude towards the initiative, but many of them reported that they do not participate in the programs. The inadequacy of recycling bins has given most respondents no option but to avoid recycling. Many of those who participated in the survey are willing to join recycling programs though. The amount of waste produced in the country was 6.6 million tons in 2016 (Fernandez, 2015). It was expected to increase by 30 percent in 2017 (Mazumder, 2016). Other estimates indicate that domestic waste production may increase exponentially over the next few years (Geranpayeh, 2015).

The number of companies recycling their waste has also increased all over the country. Sharjah has become one of the leading emirates in waste recycling in the United Arab Emirates thanks to the efforts of the Sharjah Environment Company in educating people about recycling (Khamis, 2014).

Advertisements on the internet have played a substantial role in spreading the recycling message. Additionally, social media platforms, such as Facebook, Instagram, and Twitter, are being used to educate people on the importance of recycling. The press also frequently features opinions about recycling and its positive impact on the environment. Newspapers and magazines also feature advertisements that urge people to recycle all recyclable products. The television is also a useful source of information about recycling in the United Arab Emirates. Some TV stations air documentaries that encourage residents to recycle domestic waste. Radio stations have also begun sensitizing the public about recycling.

The confusion exhibited in many people's distinction between waste bins and recycling bins explains why UAE has only managed to recycle a little number of wastes despite being one of the largest waste producers in the world. The condition epitomizes the existing notion that public

awareness concerning waste recycling in the developing and transition economies is a serious problem that undermines their efforts to minimize waste production (Bendak & Attili, 2017). The UAE has made an effort to reach sustainability. Waste to energy is the way toward creating vitality as power or warmth from the essential treatment of waste. Masdar, Abu Dhabi's sustainable power source organization, had consented to a necessary association arrangement with Bee'ah to build up the UAE's waste-to-energy (WtE) area (UAE Government,2018). This association will help add to the UAE Government's Vision 2021 which focuses, among different objectives, occupying waste from landfills by 75 percent by 2021. In Abu Dhabi, A 100 MW office, one of the world's biggest, is a work in progress in Abu Dhabi by Abu Dhabi National Energy Company PJSC (Taqa), in a joint effort with the Center of Waste Management (Tadweer) (UAE Government,2018).

In Germany, for instance, the state understands the role of public knowledge in the implementation of various programs that intend to generate benefits to society (Dornack, 2018). Education and awareness campaigns about such programs in the European country run concurrently in different ways. While one runs at schools to enlighten the millennial, generation Z, and generation X, the other is conducted at the national level through various media platforms to inform the older generation, hence influence their attitude (Brassaw, 2017).

G. Conclusion and Recommendations

The United Arab Emirates should allow public participation in domestic waste recycling by making facilities accessible to all people. Waste production is increasing as the manufacturing capacity of companies and the population increases. Recycling is a solution to the problem of increased non-biodegradable waste. Few research studies have previously explored people's attitude towards domestic waste recycling in the United Arab Emirates. My research aimed at investigating household waste disposal attitude in the UAE. The study also sought to compare the local waste recycling rates in the United Arab Emirates to those in Germany. 48 people participated in the survey. The results indicated that the consumer's attitude toward recycling differed from their practices. Some of the reasons why people do not participate in recycling are the distance to recycling bins.

The results indicated that the consumer's attitude toward recycling varied based on age and educations. Notably, the research showed that individuals who have achieved higher education showed a better sensitivity to waste recycling compared to those with lower education. Also, the young aged participants showed a better attitude towards waste recycling compared to their older counterparts.

Educating people about the importance of recycling can help in creating a culture of sustainability. The study shows that many people do not know how to access domestic waste recycling services. The United Arab Emirates government needs to conduct public awareness campaigns that teach people how to recycle their waste. It should also consider that there are people of various nationalities living and working in the country. Therefore, it should ensure that all educational material about domestic waste recycling is made available in multiple languages.

Furthermore, the government should introduce mandatory domestic waste collection laws, which will help the country reach its recycling target. The United Arab Emirates government may also reach its recycling targets by imposing additional charges on goods packaged in recyclable material. The fees should be refunded upon returning the recyclable items to the retailer. The program will act as an incentive and encourage people to recycle household items. The government should collect statistics on recycling volumes so that the progress made in the process can be quantified. Information can be collected by recording the weight of the recyclable material at various collection points. Recycling is the most sustainable method of domestic waste management that has been developed so far. It is the best way of conserving the environment as the demand for recyclable products increases. Recycling has gradually replaced landfilling and incineration to become the favorite way of waste disposal. It should be adopted all over the world because it encourages the conservation of non-renewable resources, such as crude oil, and helps in cleaning the environment. Recycling could soon become the only method of waste disposal in the United Arab Emirates and the rest of the world.

Attitudes played an essential role in negatively influencing people's perception of recycling. The precise factors that determine people's attitude comprise of family, the media, education and religion, personal experiences, and economic status among several others. A family is an essential unit of society, which implies that it bears a massive influence on people's attitudes. In most families, the information and instructions flow from family leaders (parents, guardians, or senior members of the extended family) to their descendants. The subsequent perceptions and attitudes generated from the communication and relationship in families are often difficult to alter. Accordingly, changing people's attitudes in UAE's households will need a carefully calculated strategy that will entail offering incentives to help communities embrace recycling as an essential environmental management practice (Brassaw, 2017).

In Germany, the state has managed to influence attitude at the family level through a variety of approaches. Foremost, German children, learn about waste recycling in their preschool curriculum where they are taught about refuse separation and colors of different recycling bins (Brassaw, 2017). A second approach is through offering monetary rewards (25 cents) for a plastic material recycled. The incentive encourages families to practice recycling as the practice amounts to approximately €156 annually that can supplement the household budget (groceries). Other mechanisms are through transitioning electricity consumption to renewable energy produced from biomass and by implementing the nation's waste management policy. The UAE needs to deploy similar methods to increase its waste recycling success.

Limitation of the study

The present investigation focuses on household waste recycling in the UAE. More research is required on customers attitude and behavior towards reusing of different kinds of waste. Likewise, a consequence of the present investigation depends on serving a limited number of people's.

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INTERVIEWS WITH KEY INFORMANTS TO EXPLORE SCHOOL NUTRITION PROGRAMS: A CASE-STUDY IN DUBAI

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Background

School Nutrition Programs (SNPs) are proven to influence school children eating behaviors, which in turn impacts their intellectual, social, and emotional development, as well as their risk to Non-Communicable Diseases (NCDs). Many stakeholders are involved in the development, implementation, and evaluation of SNPs in Dubai, United Arab Emirates (UAE). This study presents a rare attempt to develop a thorough understanding of stakeholders' perceptions on SNPs in Dubai, UAE.

Objective

This study aims at exploring the perceptions of the myriad of stakeholders, positioned at differing levels of the public health and education ecosystems in the UAE, in relation to SNPs in Dubai, UAE. Accordingly, this study will enable the development of a better understanding around the relevant standards and guidelines set in place, and the challenges and opportunities of improvement in planning for and implementing SNPs.

Methods

As part of this study, 29 semi-structured interviews were carried-out with a selection of Key Informants, all of whom are directly or indirectly involved in SNPs. The generated data was analyzed thematically using a Health Systems' perspective.

Results

The generated data sheds light on the challenges in setting effective SNPs in Dubai. All the data segments were categorized into the following themes: governance, resources, implementation, and monitoring and evaluation, school-home coordination, and diversity.

Conclusion

This study unearthed a deep understanding of the SNPs in Dubai, UAE. Our results emphasize that all the involved stakeholders, from all the various institutions, should better collaborate and in turn co-create on the level of the Emirate and also nationally.

Keywords: School Nutrition Programs, Health Policy, Healthy Schools, Dubai.

Introduction

School Nutrition Programs (SNPs) significantly affect school children eating behaviors, and health and wellbeing[1], which in turn impact their intellectual, social, and emotional development. It is established in the literature that SNPs have a direct relationship with students' school cognitive function and academic performance.[3] Several international nutrition-based organizations strongly recommend that schools adapt strong and comprehensive nutritional program, and promote nutrition education, as well as strengthen school-home-community partnerships, in order to maximize the positive impact on the general health of a community.[2]

The effects of SNPs are not limited to the attitudes and behaviors in the school setting. They extend to their eating habits at home.[4] In fact, SNPs are proven to decrease the students' risk for NCDs.[5] SNPs not only affect the school children, but also their families by enhancing mother's knowledge on health, nutrition, and child care.[6] However, even if these polices are put into place, their effect on children health and BMI is highly dependent on effective implementation and long-term sustenance.[7]

Hence, for any country to reap the benefits of SNPs, it is imperative to develop a better understanding of the SNPs in place, as well as the enablers and barriers for their proper implementation. This is of pivotal importance especially in countries where school children overweight and obesity are epidemic.

To the best of the researchers' knowledge, no study has been conducted to capture such information in relation to SNPs in the UAE. Accordingly, this study aims at exploring the perception of stakeholders, positioned at differing levels of the public health and education ecosystems, in relation to SNPs in Dubai, UAE.

Methods
Context

This study took place at Dubai, UAE. Dubai is the most populated Emirate of the UAE, with close to three million (a third of the country's population) inhabitants. According to the Dubai Statistics Center, in 2017 close to 18% of the population of Dubai were 19 years in age or younger. With the exception of children in the pre-school age, all of those are in Dubai's schooling system which includes 209 private schools and 71 public schools. The distribution of school children in Dubai, in the Academic Year 2018-2019 were as follows: 280979 student in private schools and 29387 students in public ones.

In 2017, the prevalence of obesity among UAE in-school children was 13.69% and 13.4% in 2018 as measured by the UAE Ministry of Health and Prevention (MOH). The target of the national agenda indicator is to reduce this value by 17% (to 12 percent) by the year 2021.

Multiple organizations and authorities in the country are working to achieve this indicator including: the Ministry of Health and Prevention (MOHAP), Department of Health- Abu Dhabi, Dubai Health Authority (DHA), Dubai Municipality, and Ministry of Education (MOE). While each of these entities has its own programs, activities, and strategies, they all acknowledge that the reduction of school children obesity, and the enhancement of their health and well-being would not be optimally realized without the proper implementation of SNP.

Anecdotal evidence reveals inconsistencies in the implementation of SNPs in Dubai schools with no clear information on the enablers and barriers to such implementation. The UAE does not have a national policy for school nutrition. There are several school nutrition guidelines generated by differing federal and Emirate level governing bodies: MOE, DHA, Dubai Municipality, MOH, and Abu Dhabi Health Department. Although all the various entities are working to achieve UAE vision 2021 indicator of reducing the prevalence of childhood obesity, there remain major discrepancies across the guidelines that are affecting the planning, implementation, and monitoring and evaluations of SNPs. In Dubai, public schools are following the MOE guidelines, while private schools are following the DHA and Dubai Municipality guidelines, along with the KHDA recommendations. Public schools end-up having, more or less, similar programs as they are centrally managed by the MOE, while plans in private schools are quite varied, and depend on the curriculum that the respective school offers.

School canteen suppliers must be approved by the MOE and DM. For the public schools in Dubai, the MOE is responsible of deciding upon the food suppliers. The role of the school is only supervision, where they only control for the food safety. Private schools, however, have the freedom to choose their suppliers and then get the approval from Dubai Municipality. Below is a list of the most prominent initiatives that are taking place in Dubai:

- School canteen standards and guidelines: A guidance manual to improve the nutritional standard of food served or sold in schools
- Food labelling: Guidelines to ensure that children have access to nutritious, safe, and wholesome food during their school time
- Happy Schools Initiatives: An award to recognize schools that have made achievements in supporting the health and wellbeing of students
- Health Awareness Campaigns: Periodic campaigns to boost awareness about healthy eating among students
- School Nutritional Education Activities: Raise awareness of students about the nutrient quotient in foods.

Research Design

A qualitative approach to research was adapted. This design enabled the development of an in-depth insight into the perspective of the participants.

Sampling

The Principal Investigator identified key stakeholders who are well informed and experienced with the school nutrition programs in Dubai. A snowball technique was utilized to recruit those informants. These included leaders and directors from different institutions with clinical and/ or management backgrounds, decision and policy makers, nutritionists, nurses and nurse managers, and schools' principals and vice principals.

Out of 48 key informants who were initially recruited, 29 agreed to participate. Accordingly, semi-structured interviews were conducted with stakeholders from the following institutions, namely: Ministry of Health and Prevention (n=5), Ministry of Education (n=3), Dubai Health Authority (n=6), Dubai Municipality(n=1), Sharjah Education Council (n=4), Prime Minister Office (n=1), Food Security Office (n=1), Media (n=1), private schools (n=3) and public schools (n=3).

The head of each department, or the person in charge from each institution, received an invitation letter as an attachment to a personalized email. After two weeks of the invitation, there were two reminders: the former one was by email. If there was no response, the second reminder was through a phone call. All those who were interested eventually replied to the email. After that, a mutually convenient timing with all the key informants was set for the interviews to be carried out. One day before the interview, a reminder email, with the participant information sheet, was sent to each of the participants.

In addition, a list of all 209 private schools in Dubai was provided by the Knowledge and Human Development Authority (KHDA). The target was to interview (n = 3) private schools with different curriculums. Eleven private schools were randomly selected from the extensive list. Each of the randomly selected schools was contacted through phone calls to get the email of the school principal and/ or the involved person in the school nutrition program. Then an invitation email followed by a reminder in two-week time were sent out. After which each school was visited to further solicit interest to participate in the study and if possible, arrange a timing for the interview. Accordingly, representatives of three schools participated in the study, out of a total of eleven schools who were invited.

Another list of all 71 public schools in Dubai was provided by the Ministry of Education (MOE) and three schools were randomly selected (one male school, one female school, and one mixed school). The school principals of the public schools were contacted by the (MOE) to participate in the study then the interviews were conducted during mutually convenient timings. They accepted the first invitation with no rejection as they received a letter in advance from the MOE requesting their participation in the study.

Data Collection

Semi-structured interviews were conducted from January 14, 2019 through April 18, 2019. The interviews focused on common topics, but with the freedom to pursue additional topics of interest as they came up. The interviews were anonymous, but the positions of the interviewees were noted. Before the interviews were conducted, a written informed consent in English, which was also translated into Arabic language, was obtained from all the participants.

They were informed about the scope of the study and the overall subject of the questions. The interviewees were informed that they could leave the interview at any point or request for the termination of the interview. Interviews started by introducing the title and the phases of the study and by asking the informants some demographic questions including their position at the institution and years of experience in the field. Then they were asked to reflect upon: (1) how they are involved in school nutrition in Dubai, (2) any nutrition plans, policies, or programs in schools that they are aware of, (3) implementation and evaluation of school nutrition programs, and (4) how they intervene if needed. All interviews were conducted either in English or Arabic based on the preference of the participant and were recorded with written consent of the participants. Interviews, lasted on average 30–60 minutes, were recorded, transcribed, and (if need be) translated.

Data Analysis

First, the twenty-nine audio-recorded interviews were transcribed verbatim. Interviews in Arabic were translated into English by an assigned Research Assistant. The research team members then read all the interviews. A myriad of themes surfaced. In carrying out the thematic analysis, the research team adapted a health systems perspective to analyze the data.

Results

The conceptual framework resulting from this study is composed of five key themes as per the diagram provided below.

Governance	Resources	Implementation, and Monitoring & Evaluation	School-Home Coordination	Population Diversity
• Multiplicity of governing bodies • Lack of adherence to Guidelines • Diffusion of responsibilities • Lack of a holistic national policy/ Incomprehensive food security framework • Lack of an accountability scheme	• Poor quality food offerings • Limited food offerings to students with chronic diseases • High pricing of healthy food/ Unaffordable food offerings • Limited Support Personnel (e.g., designated nutritionists within schools)	• Lack of clear Monitoring and Evaluation Framework • Inapplicability of international guidelines to the UAE context	• Uncooperative Parents • Inconsistency between the school and the home environments	• Diverse food preferences • "Pickiness"

Governance

Among the most prominent challenges, within the Governance theme is the multiplicity of regulating bodies, where a dietician who works in a regulatory body indicated:

> "…the food suppliers are unified for public schools, and this is controlled by the Ministry of Education. All the private schools, however, are registered under the KHDA…"

As per a stakeholder in the school health section of a governing body, schools in Dubai need to abide to multiple guidelines of SNPs, issued by different national governing bodies. This is leading to a lot of unnecessary confusion.

> "…the problem is that there are four guidelines for the school canteens. The Ministry of Education has its guidelines. The Dubai Health Authority has another one. There are also guidelines developed and implemented by the Dubai Municipality. The Abu Dhabi Health Authority also has its own guidelines…basically, in the UAE there is no unified policy when it comes to SNPs…"

These discrepancies increase with the schools' lack of adherence to guidelines, where the same informant highlighted:

> "…since the guidelines are not mandatory, they are not implemented by all schools. It is up to the school's principal and administration to decide whether, or not, to implement the guidelines…"

In addition, another manager, who is involved in overseeing the health and wellbeing of students in private schools, indicated that many of the private schools seem to be operating on an independent basis:

> "…we give them the tools, and we bring speakers and provide open learning opportunities, but then whether, or not, they put these resources into use is totally up to them…"

Along the same lines, school food quality control officer, working for a regulatory body, mentioned:

> "…some private schools have their own guidelines. Nothing requires them to keep us in the loop…"

Other challenges are linked to the apparent diffusion of responsibilities in between the various relevant stakeholders. The abovementioned manager who is concerned with the health and wellbeing of students in private schools said:

> "…it is not part of our mandate. They have to take action if they find any violation in schools. The Dubai Municipality needs to take action on that front since they are the entity overseeing the supplying catering companies…"

The same stakeholder highlights that the generated misunderstandings, around roles and responsibilities, are leading to conflicts in between the relevant stakeholders:

> "…at some stage, we used to be engaged in the process of monitoring the performance of school canteens, but unfortunately, three to four years back, the Ministry of Education sidelined us…"

The respective informant also highlighted the absence of a concrete accountability framework:

> "…our colleagues in Ministry of Education keep telling us that all is on track on their end. Reality does not show so- not all the food offerings in schools are healthy. This is evident in the reports provided to us by the school nurses…"

There may be an existing food security framework at a national level, but it is incomprehensive, as highlighted by a national policy-maker:

> "…we analyzed the national framework which is more than 100 pages. The nutrition aspect is touched upon, very slightly though…"

Moreover, another dietician who works for a governmental entity, brought-up the fact that there are no polices, or any sort of accountability framework, for school nutrition at the national level. There is nothing that requires the commitment of the schools in applying the standards.

> "…currently I do not think that there is a policy or law, and most of the practices are mainly decided by the school itself or the ministry of education…"

Resources

According to a school nurse, who is significantly involved in the National Obesity Prevention Program, some parents attribute their restricted buy-in to SNPs to the dissatisfactory quality of the food offered by the school to the students, which sheds light on internal inconsistency, at the school-level, in relation to this matter.

> "…parents continuously complain that the school claims that fostering a healthy lifestyle is among its priorities. However, the food offerings at the various schools are nowhere close to that…"

Moreover, some students suffer from chronic morbidities that require special diets. The schools need to cater to their special needs which is not always possible due to limited resources and expertise in the subject matter, as highlighted by a manager at a governmental entity, overseeing the nursing and clinical support services:

> "…some students are phenylketonuria patients, and others are intolerant to gluten and/ or suffer from celiac disease. Those students who have special dietary needs do not know what to do at school. They do not get food offerings that match their health needs…"

Along the same lines, a stakeholder in the school health section of a governing body emphasized:

> "…sometimes healthy food is available but more expensive than the unhealthy food…"

A nutritionist working in a federal governing body indicated that high prices of healthy food are a challenge not only at the school level but also at the Emirate level, where the companies supplying the school canteens are profit oriented.

> "...some suppliers will refuse to collaborate with the Ministry of Education, because providing healthy food at regular prices will result in financial loss at their end…"

Moreover, according to a public school registered nurse, the administration of the SNPs is usually assigned to the existent school nurse. This increases the school nurse workload, and when other priorities are pressing, the SNPs responsibility ends-up falling through the cracks:

> "…of course, it is not enough to have only the school nurse to handle all health-related aspects because we have huge numbers of students. I already have a lot of important matters to follow-up on. I do not have the space to follow-up with the students who really need help in relation to eating attitudes and behaviors, or to conduct awareness campaigns and in turn evaluate their impact on the respective students. I am really busy; all I end-up doing in relation to SNPs is giving didactic lectures about healthy food options. That is it…"

Similarly, another national policy-maker highlighted the importance of having qualified personnel to sustainably implement guidelines:

> "…even when you have the framework or the policy, you still need people to implement it…"

Implementation, and Monitoring and Evaluation

Apparently, according to a school nurse, raising awareness about healthy behaviors, including but not limited to: nutrition and dietetics, is not mandated on students. Conducting nutrition-related initiatives, every now and then, is insufficient.

> "…the nutrition program is optional. This in of itself is a problem: why would the students come to the nutrition-related awareness session if it is not mandatory?…"

The a key policy-maker in a federal governing body highlighted that there seems to be no clear system for monitoring and evaluating the effectiveness of SNPs.

> "…there is no evidence that proves that the schools are following the guidelines, or any sort of explanation of how such a project has impacted the attitudes and/ or behaviors of the students. There are also no consequences if a violation takes place…"

When it comes to setting the guidelines, it is usually based on international understandings of the key concept. A manager at a federal governing body indicated that these benchmarks are not necessarily applicable to the UAE:

> "…the new food portion control system is based on international school nutrition guidelines…some apply British guidelines for food canteens- they are the most applicable, in my opinion. The Canadian and Australian guidelines are not bad, either. I personally do not believe that the American guidelines suit this side of the world- the ideal portion sizes are huge…"

School-Home Coordination

According to a school nurse, who is significantly involved in the National Obesity Prevention Program, one of the most prominent challenges facing the SNPs in Dubai is the parents' resistance to change, and their limited cooperation with the school administration in applying what is learned by their children about healthy nutrition.

> "…while we have developed a special system for obese students, parents seem to have an active role in students' lack of commitment to the recommended diet…"

Another senior dietician in a governing body, on the level of the emirate, highlighted that this dissonance is further fostered with the inconsistency between the school and the home environments. Nurturers at home, be it parents or otherwise, have great impact on the students' attitudes and behaviors. Their lack of cooperation in regard to SNPs leads to uncalled-for confusion among students.

> "…what is the point of having the child eating healthy in school, and then going home and eating junk food and unhealthy snacks?..."

Population Diversity

According to manager who is concerned with the health and wellbeing of students in private schools, there are people from more than 200 nationalities who are co-existing in Dubai. Correspondingly, the school children in this city are quite diverse. It is very challenging to come-up with a selection of healthy food offerings that meets the expectations and preferences of everyone.

> "…when you look at food habits, a lot goes back to the students' cultural backgrounds…one size will certainly not fit all- giving an Indian food menu might work for a school that is dominated by Indians, but will certainly not work for international western schools or with schools that has mostly Emirati students…"

In addition, according to a senior dietician in a governing body, students are 'picky' in their very nature. The challenge is not only to provide healthy food, but also to provide it in a way that is attractive enough for the students. Most school students nowadays complain about the lack of diversity in the type and quality of food items offered.

> "…most students complain about the lack of food that they prefer in the canteen…students, even those who are aware about healthy choices, are still more attracted to unhealthy food…"

Discussion

The study unveiled the major gaps in the federal and local frameworks that guide the planning and implementation, and sustenance of SNPs in Dubai. From a system perspective, the lagging quality and inconsistent outcomes of SNPs seem to be attributed to the firmness of the structure overseeing and controlling for the SNPs, availability and sufficiency of resources, and the contextualization of the current SNPs approach. This can be mapped onto the World Health Organization (WHO) framework that was developed primarily to assist countries to assess the overall performance of their health systems. The respective framework sets out three intrinsic goals: improving health, enhancing the responsiveness of the system to the legitimate expectations of the population, and assuring fairness in financial contribution.

On a governance level, there seems to be a lack of effective collaboration between the various involved parties. This gap could be attributed to the lack of a unified national level plan. Such structural fragmentation is not unique to the UAE. In fact, several studies have reported similar hurdles in implementing SNPs in developing countries (e.g., Rowling & Jeffreys, 2000, Saito et al., 2014, Tomokawa et al., 2018, 13). According to Shrestha et al., 2019, in response to such challenges in Nepal, the collaboration between the involved governing bodies was strengthened through introducing strong leadership that is concerned primarily with enhancing the health and wellbeing of school students. In addition, a series of meetings among the various involved stakeholders were conducted, on a national level, to discuss activities and achievements.

To address similar gaps in the oversight of SNPs in Nigeria, the Federal Government launched the Home-Grown School Feeding and Health Program in September 2005 under the leadership of the Federal Ministry of Education. The ultimate goal of this program was to provide nutritious meals during the school day to all public and private primary and secondary educational institutions across the country. This national program framework was inaugurated on a state and local levels,

with a state steering committee led by the Ministry of Education (Taylor & Ogbogu, 2016). Apparently, similar challenges are evident in developed countries, such as: the United States of America, where the school food environment seems to be governed by a patchwork of federal, state, and local laws and policies. However, the federal government maintains primary authority over the school meal programs and has recently issued updated regulations governing the food and nutrient requirements for meals sold or served through the National School Lunch and School Breakfast Programs (Budd, Schwarz, Yount & Haire-Joshu, 2012). Along the same lines and , our recommendations would be for the UAE to develop a single all-encompassing government structure that oversees the work on the federal and local levels, and public and private sectors. This structure needs to be characterized by strong leadership and firmly enacted policies and procedures. This is expected to significantly enhance the collaboration and in turn co-creation on the national and emirate levels.

Recommendations

- Capacity building of all involved stakeholders
- Enhance school home coordination
- Bulk purchasing of healthy food offering to capitalize on economies of scale
- Incentives for food suppliers
- Curriculum based program (report cards)
- Contextualization
- Adapt approach to the intricacies of the UAE- multi-cultural
- Listening to the voice of students and parents (parent council)

Limitations and future direction

- The generalizability → only Dubai Key Informants → not represent stakeholders from the whole country.
- Bias → social desirability → the tendency of survey respondents to answer questions in a manner that will be viewed favorably by others.
- Did not include parents or students as Key Informants.

Ethical Considerations

Ethical approval for the study was obtained from the International Review Board (IRB) at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU), Dubai, UAE.

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Importance of research in healthcare quality system

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Abstract

This research proposal intends to explore the importance of research in healthcare quality system from different perspectives. The goal of this research is to shed the light on different areas that wouldn't be possible without research in healthcare quality system, and that advances of quality system have led to significant improvements in healthcare and management of quality. This has been informed largely by empirical and theoretical ideas found in the fields of literature and case studies. However, a parallel and at a time, importance of research haven't received big attention in fields of ergonomics, and healthcare organizations focusing on quality and tools with minimum consideration of the role research plays in modification and application of these tools.

This research will be helpful to deliver an overview on how quality tools developed over recent decades, and that different phases have improved through research, different quality tools and mostly effective ones are based on research and gives researcher the opportunity to implement them wisely using research techniques and qualitative methods. Moreover, the objective of proposing this research is to unveils the fact that research attempts to improve quality in healthcare system through activities carried out by health system or an organization to improve and enhance the outcomes, and that many of these activities are approached through collaboration and interaction between different parties and stakeholders, to understand healthcare quality system better and know the needs and expectation of each. To communicate theories and find out more about importance of research, this project will interview experts in the field of quality and healthcare system. It's expected to find that research supports quality tools in different aspects, and that there will be a positive impact on investing in research in healthcare quality system, and that a better understanding of healthcare system could be approached through interaction and communication between different stakeholders.

Introduction

Recently the concept of quality in health care has gained big attention, the concept is complex and multidimensional, and some of the questions can't be answered through traditional practices ,therefore research in health care quality raised to answer many of the questions and defines concepts in this complex system (Pope, 2002).According to (Margolis et al. 2009) the goals behind research in healthcare quality are, to recognize major effective ways to deliver, finance, manage high quality care, improve patient safety and experience, and to reduce medical errors. There are many contributions in health care quality and services, and research remains the most important contribution among all, because of its ability to identify and describe gaps in healthcare (Margolis et al. 2009). According to (Taylor et al. 2013), optimizing delivery in safety and quality of healthcare remains an international challenge.

The proposed research intends to address the importance of research in healthcare quality system, the concept is taken from different perspectives. Looking at different articles related to the development of quality in healthcare through research, describing how some tools in healthcare quality depends on research, how research attempts to improve quality in health care, and going deep in the feature of collaboration in research and its role in providing a better understanding of

healthcare quality. Addressing the importance of research in healthcare quality system assumed to raise awareness of how this could impact healthcare system in general in UAE and in particular at any health organization. This research will be conducted based on literature reviews and exploring the founded facts through qualitative methods.

Literature review

To acknowledge the importance of research in health care quality, there was a need to explore different resources and look closely into issues related to the topic. Many authors have discussed and examined critical topics in the field of research related to healthcare quality. The paper is shedding the light on four topics as follows:

1. Development of quality in healthcare through research

Over the past few decades issue of health care quality has evolved, and brought up in different phases. Recently, the issue received great focus from researchers, and this have led to better understanding, especially for decision makers among clinicians and managers, who requires awareness of continuous change of the system in healthcare to ensure better quality, care, and services for patients.

Clinical risk and patient safety become major international priority in early 2000s (Waring et al. 2016). Two parallel paths followed by research and practice in healthcare, 1st path have pictured the understanding of quality and safety through medical science, human factors, social psychology and safety science.2nd path have included an understanding of sociological informed work with an explicit focus on quality and safety through sociology of illness and health, classic concerns, knowledge and expertise, organizational culture and other social related issues (Waring et al. 2016). Kieran, pictured quality improvement and research as complex social interventions that includes levels of high variance in content, context and application (Walshe, 2007).

Safety and quality researches started by examining relationships between active errors and latent factors, this have given the medical profession an opportunity to promote quality and safety as policy and practice priority (Waring et al.2016). Research and research on healthcare became more sophisticated which required a clear agenda and framework, Research road map has been described in 3 phases, detection, understanding, and reducing. In detection researchers considers specific selection of disparities or vulnerable groups, in understanding they go in depth to find more about the root causes of disparities, finally by creating and implementing interventions to reduce and stop disparities (Kilbourne et al. 2006).

Moreover, evaluation based on theory driven data attempts to draw the program theory depends on the intervention followed by research evaluation to test the theory (Walshe, 2007). Evidence-based Practice Center (EPC) program also designed to offer best evidence for decision makers in health care quality through a wide variety of stakeholders, some of the lessons learned through such programs in health care quality to be more effective are, the correct identification of the right target for evidence, the definition of scope and questions of a review, including both flexibility and consistency in methods, defining inclusion and exclusion criteria, and involving experts in the field (Atkins, 2005).

2. Research based tools in healthcare quality

There are a good number of quality tools that's considered to be research based in nature, because of the activities it includes through the steps and measurements. These tools are helpful in prioritizing safety and quality problems and focusing on systems not individuals, through observation of structures, process and outcomes (Atkins, 2005). The reason behind the measurement of quality enhancement is the firm belief that good performance results in better quality, and comparison of performances among different providers and organizations, encourage better performance (Waring et al. 2016).

Quality improvement (QI) projects are considered research if the intervention tested includes a deviation from initiated practices, subjects are individual patients, blinding or randomization is conducted, moreover, part of the activity should include data collection from large data sets, change protocols frequently (Varkey et al. 2007). Quality projects distinguishes whether efforts of improvements have led to change in the end point in the desired direction, contributed to unplanned results in the system, extra efforts needed to adjust a process, which leads to pursuing ideas that work and discarding poor ideas (Varkey et al. 2007). Some of research-based tools in healthcare quality are PDSA, Six sigma, lean, MUISQ and Delphi model.

The most commonly tool used for rapid improvement in healthcare quality is the PDSA cycle, it involves trials and learning approaches where suggested solution or hypothesis is made for testing the improvement, changes carried out in a small scale before big changes being applied to the whole system (Taylor et al. 2013). PDSA could stand alone, or in some cases become the initial tool for other QI approaches. Six sigma is a business strategy that aims to minimize or eliminate waste, this can be achieved by improving, designing and monitoring process (Varkey et al. 2007).

Lean focuses on the identification of customer needs and works on eliminating non-value-added activities to improve the process (Pope, 2002). Another interesting model is the model for understanding success in quality (MUSIQ), which is used to optimize and understand contextual factors affecting success of quality improvement projects, researchers and organizations uses this model (Kaplan et al. 2011). In the Delphi technique, series of questionnaires and rounds are carried out in a structured process to gather information, and this technique has been used for setting quality indicators (Boulkedid et al. 2011). All these tools and techniques wouldn't be carried out without the assistance of research at some steps and activities.

3. Research attempts to improve quality in healthcare

As described earlier, there are many tools in health care quality that are based on research, or includes research as part of some of its activities. Apart from tools and models, research in general attempts to improve quality in healthcare through different approaches such as, quality programs, translational research, organizational or case study research, and quality improvement research.

Quality programs are defined as managed activities carried out by a health system, or an organization to prove and enhance the quality of healthcare. Such programs are meant to cover interventions and are more complex than a project of a single team (Ovretveit, 2003). Two problems faced by quality programs are, the difficulty of evaluation large scale programs that

doesn't start and finish the same time, and the multiple criteria of program success. Different research designs are described such as descriptive case design, audit design, and retrospective design. The suitable design depends much on the type of quality program participants of research and examined questions. By paying attention to common failures (Pre-study theory, outcome assessment, Outcome attribution, Explanation and Measurement variability) of previous researchers, research into quality programs could be improved (Ovretveit, 2003).

Translational research attempts to improve the quality of health care by promoting action and change in the real world. This research can enhance health care if the principles of the community-based research were applied. Principles of participatory research are, being engaged in all phases of research, having goals and resources ready in the community, investment in robust and long term partnerships, and engaging research as a cyclical process (Schmittdiel, Grumbach, & Selby, 2010).

Policy makers and researchers find it very challenging to improve implementation of effective practices in healthcare, case studies and organizational research, provides ways to understand the organization role and microsystem to improve care and aids in the development of theories (Baker, 2011).

Whereas quality improvement research includes 2 types of studies, 1st one explores interventions to redesign delivery of care and evaluate intervention, 2nd studies focuses on evaluation of the efficacy of QI methods. Many benefits could be obtained from research in healthcare quality improvements (Margolis et al. 2009).

4. Interaction leads to a better understanding of healthcare quality

Recently, collaboration in healthcare delivery has gained big interest and attention under well-managed care, for different reasons. The most internal valid design for testing the link between interprofessional collaborative is the field experimental/control groups (consists of random patients to control condition or interprofessional team), this design distributes factors affecting patient outcomes between control groups and intervention (Schmitt, 2001).

Research is considered embedded when the researcher is part of a team that use and generate research results, it aims in creating good collaboration between researcher and end users. Through collaboration, many challenges can be defined and addressed which could be used further for quality improvement (Vindrola-Padros et al. 2016). This could be approached through focusing on organizational cultures and having participation of individuals from different levels, these findings are translated into practices in the later stage. Another similar research in concept is the community based participatory research (CPBR), which ensures an equal partnership and offers sharing of power, recourses and knowledge between research participants and investigators at all stages of research and application (Schmittdiel, Grumbach, & Selby, 2010). CBPR leads to rigid findings that are more useful and practical to community needs. Both embedded and CPBR leads to easier incorporation into practice changes.

Much of interactions in research methodologies are brought up by qualitative research. It provides useful ways of answering research questions which can stand alone or as supportive for further quantitative studies (Schmitt, 2001). Qualitative methods include organization, a systematic collection of data, and analysis of texts derived from observation or talk (Pope, 2002). Its main benefits reside in having close and true experience of participants and end users, this perspective found in social sciences and humanities, and is very useful to understand complex issues in healthcare quality (Pope, 2002).

Methodology

Research purposes differs according to the topic and nature of issues discussed. According to Eriksson & Wiedersheim-Paul (2001), research purpose is to state what's to be conducted and how to use results. Moreover, Yin (2003), mentioned that research can be exploratory, explanatory or descriptive, it also possible that one research has different purposes.

According to Saunders, Lewis & Thornhill (2000), exploratory researches are very crucial in finding what's really happening, to ask questions, to look for new insights and evaluate phenomena in a new way, it's also useful for authors trying to clarify the understanding of a particular problem. Three ways could be used in conducting such research, through literature , interviewing experts or people dealing with issue, and having focus group interviews. This research depends on literature and interviews.

Among the two categories that any study can be divided to, qualitative and quantitative, this research is based on qualitative methods. As it involves description of the opportunity to know more about importance of research in healthcare quality system, in a way that's very close to reality. According to Saunders, Lewis & Thornhill (2000), qualitative research draws a clear conclusion of a research that depends on no quantifiable data, like values, attitudes and perceptions, which considered very important elements when talking about healthcare quality and importance of research. Qualitative data in nature has an implication on both its collection and analysis. Purpose behind choosing qualitative methods is to have a better understanding and rich information about the importance of research in healthcare quality system therefore, data can't be collected in standardized way like quantitate data.

In qualitative research, data gathered to have deep understanding, to describe situations in a better way from different perspectives, where research problem being investigated. Interpretation and analysis of data carried out in a way that's impossible to quantify, as they are based on meaning described by words and expressions. According to Holme and Solvang (1997), there's a close relation between respondents and source of information in qualitative approach and it intends to capture attitudes, values, and different perceptions matters in the investigated area. Therefore, this approach is best to understand and achieve a full understanding and wider overview of the importance of research in healthcare quality system. And looking at the purpose and research questions, as well as discussion in literature, qualitative approach considered in this research to gain a deep understanding of the strong relation between research and quality. There's no intention to generalize the concept of research importance in healthcare but to look closely into quality and research, to fulfill the desire of having a clear idea and a better overview.

As indicated earlier, this research based on literature reviews including case studies and qualitative approach to understand more and interpret the data collected in the literature, implementation of this strategy carried out in two stages, finding data then conducting interviews. According to Yin (1994), one or more case studies could be investigated, and the more case studies and literature investigate the better understanding of topic will be obtained, as it delivers the reader to more convincing situation and solid views.

The sample for proposed research will include two participants, who deals with quality in healthcare system and research. Each interview consists of 6 questions.1st question explores the features of research that attracts healthcare mostly, 2nd question aims to find how research supports application of healthcare quality tools, 3rd questions investigates the ways considered in bridging the gap between units lack research and central department of quality in healthcare organization, 4th question digs deep to find out the impacts of investing in research in healthcare quality system, 5th question communicates the human nature of interaction and communication and its role in understanding and enhancing the quality system to serve stakeholders at its best way, last question looks into areas that experts in quality would like research to cover in future studies.

Starting with secondary data collection and interpreting data using primary data collection form interviews. Facts and views could be collected in different ways such as, archival records, documents, interviews, participant observation, physical artifacts, interviews, direct observation and there's no source have shown an advantage over the other (Yin, 2003). Data proposed to be collected from two separate interviews with, director of clinical quality and health care accreditation department, and with an expert from a health organization.

Expected Findings

According to (Baker, 2011), useful methods could be found through research for facilitating, identifying and impending improvements. Despite the fact that both qualitative and quantitative research are important, based on previous studies it's expected to find that from quality point of view, qualitative research is more important especially with topics related to investigation of a phenomena with an impact outcome. Moreover, healthcare depends on human factors therefore qualitative research would answer why and how questions.

Research supports quality tools in different aspects, when using any of the useful tools like root cause analysis, failure mood effect diagram, scatter diagram etc., such feature pretends that all these tools gives research an opportunity to link data together, highlight hot topics, and helps understand and present data in a better way. Moreover, usage of different quality tools purposes either for analysis or presentation are supported by research.

There's always positive impact on investing on research in general, accordingly in healthcare quality systems research expected to have equivalent impact if not more actually, as this feature let the organization gain a better reputation among other similar organizations, it impacts staff working in that organization as it improves their confidence and keep them updated. On the other hand, and speaking about quality tools in particular, research would help reduce harm and risk associated with poor quality practices, reduce cost by improving quality of care and improve patient experience.

Interaction and collaboration between different entities and individuals leads to a better understating of healthcare system thus, improves the quality and that's because the outcomes of this action in health care quality system, engaging parties and stakeholders who are part of the process would bring the issue from different perspectives and enhance the ideas discussed which in return improve the quality of care.

Research lacks topics related to patient safety therefore, it's expected to have recommendations on covering more topics related and leads to patient safety such as encourage staff more to report errors, role of leadership, and ways to measure actions taken and its effectiveness.

Conclusion

The wheel of quality in healthcare system is accelerating everyday due to many environmental and scientific changes, and research is considered one of the most powerful tools to catch up such changes and grasp many concepts in the field to enable health care workers to propose different techniques in quality that matches the changes. Moreover, research opens doors to new era of many other practices in healthcare quality that has been done or under process and this gives an overview of the situation at larger scale. This in returns gives a great opportunity to overcome many barriers and challenges in healthcare.

Quality tools main purpose is to consider safety of patients and quality of services provided, therefore, it needs to consider the system complexities, where more of improvement actions and plans are introduced. Programs of healthcare quality improvement are also very complex social interventions, such programs can be evaluated only if their content, interconnected context, applications and outcomes are understood (Walshe, 2007). Conducting research at different levels in healthcare quality have made it possible for many healthcare providers and researcher to define many areas in the field of healthcare quality.

Through research and experiences, the concept of quality of health care and improvement evolved, it became an international priority in 2000s. Many of the tools used to measure quality in healthcare are based on research, such as PDSA, Six sigma, lean, MUISQ and Delphi model. Research in general, attempts to improve quality through different studies, either by exploring interventions, or evaluating the efficacy of quality improvement methods. Among all activities in research and its importance to health care quality, interaction and collaboration between different parties in research, leads to a better understanding of healthcare quality.

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Change Management – In the case of a fictional merger

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Abstract

The case study lists the common guidelines for managing change due to a merger between company X, a traditional and long existing company with company Y, a new established modern company. Those Guidelines can be used to any type of change and shall be customized by the top management as they see fit for their company. To manage such change successfully the essence of the change management always requires management to shed focus on the people involved with a clear direction in mind. The paper discussed the three main steps and their sub categories to guide the change based on both Lewin's and Kotter's change models supported by other research. They are: the pre change implementation, During the change implementation and post implementation. The pre change implementation includes defining and listing the reasons that forced the change like cost reduction, re-structuring and modernizing. Then comes Defining and addressing the possible impact of change on all stakeholders like investors, customers and most importantly employees. Finally communicating the change properly. Once the initial step has been established, the actual implementation takes place. It includes; creating an urgency, forming the guiding forces in both organizations, developing a vision and a strategy, communicating the vision, removing the obstacles and resistance, creating short term wins and consolidating gain. The final step is post change implementation; the results of the change implementation are sustained by anchoring the change in the corporate culture and making it part of their habits. The main point of combining the two change management models is to ensure the success of the change implemented. It does so by focusing on the human aspects that need to be addressed and taken care of in order for employees to participate voluntarily in the change process.
The change management for the merger is approached in three main ways; Pre – Change implementation, Change implementation, and Post- Change implementation. This method is following Lewin's change model, unfreeze, change and refreeze (Levasseur, 2001).

Pre-Change Implementation

When a change is about to take place in any company, it is a good idea to prepare. Since the merger is a planned change between the two companies, below are the main steps to help prepare before the actual change implementation process takes place.

Define reasons that forced the change and list them

People like to keep their routines and stick to what is familiar to them. They can accept the change better when there is a valid reason or an incentive for it (Vine, 2016). Therefore, a list of all the reasons that drove the two companies to merge rather than stay independent, should be prepared and presented to all the stakeholders. Based on research, the main drivers for change are the following;

Cost Reduction

The top management must have a financial consultant finding in the cost benefit analysis as well as the financial auditor's report as a proof for stakeholders of the financial crisis that caused the two companies to merge. This way stakeholders will understand that the risks of not changing the current situation is more than the risk of changing. In a study conducted by Postema, Goppelsroeder and Bergeijk (2006), The benefits of the merger are addressed, and was only considered valid when the benefits outweighed the costs.

Re-Structuring is needed

Both companies might have the need to re-structure their company in order to help with optimizing their operations and have the rightsizing for the companies. Explain to the employees how a merger will be a solution to give them an opportunity to find their proper place in the new re- structured company. Whereas if no restructuring took place, a lot of the benefits and jobs would have been lost due to the financial issues. having a re-structure blue print can help employees in finding an incentive to accept the change by finding the new place they fit in.

Modernizing

For the stakeholders in company X, they need to know that their ways were too traditional for the current market. Modernizing their company in the new merger is going to help them get the competitive advantage in the market. This is a valid reason for them to accept the change and try a new way of doing things. Changing the organization is a way to renew and modernize the company and by doing so, it gives it the potential of competitive advantage (Kawechi, 2018).

Define and address possible impacts of change on all stake holders

Before the change actually takes place, all the stakeholders impacted by the change must be identified and the impacts has to be addressed. The details of the stakeholders and their impacts are listed below:

Investors and shareholders

Investors are the people responsible for putting money in the company in order to gain future profit (Dictionary.cambridge.org, n.d.). Therefore, the financial status of the company is essential to them. The same goes for the shareholders since both companies are public and people own shares in the company. The change of a merger will have an effect on them and they will resist the idea of a merger. To prevent this, it is important to understand that this resistance is driven by fear and uncertainty as research shows that the failure rate is higher than 60% (Akrofi, 2016). Their fear needs to be addressed, use the annual financial statement of how the companies' stocks were below market price and a study of how the stocks of the merged company will be higher (Sachdeva, Sinha and Sinha, 2015) and they will not be losing their invested money. Based on the Auditor's reports, explain how none of the companies would have survived their financial troubles without the merger. And how their financial support and the right management will help in improving the odds of their success in the merger.

Suppliers

Suppliers for both companies will also be affected by the merger. Each company had different suppliers in which they did business with. This merger will impact the normal business operations. Therefore, it is important to take this as an opportunity to create new businesses. Do a study all the suppliers for both companies, and find the best of them in order to continue doing business with them. From the start be clear with the suppliers, prepare a new contact for the ones you will continue business with to ensure a smooth start for the merger and keep the supplier happy. As for the ones who will lose their business, make sure to adhere to the conditions of the contact between them and the company prior to the merger to.

Customers

Two companies have different customers. The merger will have an impact on all the customers, closure of branches, or their re- location will affect them. The merger can also affect the customer prices, service received and (Investopedia, 2015). to address those effects and minimize their impact, the top management shall decide early on the branches that will be kept and which ones will be closed. This decision must be taken by accounting for the customer's needs by conducting surveys in order for the customers to feel that they have a voice in the matter. Customer service departments must contact them to assure them that the change will not affect the quality and service and if anything happened it will only be to the better. A proof has to be presented to the customers; an example of proof will for the new company to have an ISO 10002 certification which focuses on customer satisfaction (Bsigroup.com, n.d.).

Employees

The merger is a transformational change that impacts all the employees in the company from the top management to the assistants. The CEO of each company is facing an anxiety knowing that one of them will lose the position of a CEO. This can lead to unclear decisions regarding the merger due to the power struggle. The employees are facing the biggest change impact due to the merger which is the Layoff dilemma and losing a sense of identity and belonging. This Causes the employees to resist the change and disturb the process. The way to address those impacts is first, to have the board of directors for both companies to have a meeting to set the criteria and skills needed in the new CEO.

The CEO has to be chosen prior to the change implementation to remove the anxiety and the power struggle (Feinberg, 2019). As well as to set a role model for employees about the readiness of the top to embrace the change. Another thing to be decided on is the name of the new company. While it might seem like a simple thing, the name of the company represents the place of belonging to the employees. According to a research done by Mase on the impact of name change on company value, the company name acts as an identity to employees and has an effect on shareholder, customers when it comes to stocks. (2009) This is why it is better to keep the old names in some way, a familiar name to the employees help employees keep their sense of identity. When it comes to the layoff dilemma, it is important to be honest about it, but with a planned method to minimize the negative effects (Smeltzer and Zener, 1994).

Do not layoff all the selected employees at once, first let go only the ones that no longer add value to the company. Second, select a group that will stay with a decrease in hours and salary as long as they are useful. Make sure that all of this is according to the contract and the help of a councilor to ease the of change on them through planned sessions (Minor, 2010). This way the resistance at the implementation phase will be reduce, which will be discussed more in the next section of the report. (removing obstacles).

Communicate the change

In order for the pre-change implementation phase to go smoothly, the communication has to be proper. As soon as the companies agree on the idea to merge, all the stakeholders are to be informed. As the rumors tend to spread and reach the people easily which will only make their acceptance of the change harder and affect their trust and loyalty (DesRochers, 2019). To deal with this, both companies shall have a meeting to address the change impacts mentioned above before those impacts affect the implementation process. I suggest that first the CEOs are informed, then the investors and employees. After that make sure to share the new externally, meaning with the suppliers and shareholders. Only when those steps are done the next phase can start.

Change Implementation process

When it comes to the change implementation, the Kotter model of change is suitable for the merger. This model includes 8 steps to guide the implementation, in my opinion following those steps include the critical success factors for the change implementation. Below are the Kottor change model steps to be followed and how they can be achieved.

Creating an urgency

After the unfreeze phase takes place, and the change impacts are identified. The SWOT analysis should be conducted to identify the threats and opportunities formally for the new merged company. This strategic tool helps minimize the risks and gives a better chance for success (Jurevicius, 2013). This step should be the first in the implementation to make people understand and act on the reasons for the merger as well as to evaluate the situation.

Forming Power Guiding Coalitions

The guiding force is the most critical key for the merger to succeed. After the CEO is chosen in the unfreeze phase, he and the top management must start Finding the right leaders from both companies to lead the change. Having the right leadership is crucial in order to have someone to set the change vision, define the path through the merger, communicate what is needed effectively, remove the obstacles to change and provide consistency. The first step is to identify the style of leadership required. Since this is a merger, both the task emphasis and the people emphasis should be highly focused on.

Therefore, the Democratic leadership style can be applied. This supportive leading style is important to keep the communication open and make people on all levels feel involved (Saleem, Batool and Khattak, 2017). It is also important to focus on the organizational leadership characteristics as well as the personal characteristics. The first one requires that the leaders are: future oriented, supported and have resources from the top management, and always needed for a change process (Jick and Peiperl, 2011).

The second is the personal traits required to lead the change which can include the leaders to have; good communication skills, motivational skills, commitment for the change, quick to respond in situations, and empowering. Having emotional intelligence is a great trait for the leader to poses as it helps in the psychological part of the change implementation in order to know how to address people's feelings properly (Yadav and Lata, 2019). The Ability to be decisive in the change process is critical, as the clear decisions help in avoiding the confusion and rumors (MTD Training, 2018) Not everyone poses the leadership traits or has the ability to lead the change. The competency of the leaders must be identified by using the available official tests held by different organizations. From my experience, I suggest using the following leadership assessment tools DSIC test with the Belbin test, to know the leader's personality.

DISC is used to evaluate the dominance, influence, steadiness and conscientiousness (DiSCProfile.com, n.d.) The change responsibility is not limited to the leaders chosen, it is a shared responsibility with the different people. Two change sponsors must be identified in each of the companies in order to supervise the whole change process. Then the change managers are identified, their task is to act as a role model throughout the change process based on their expertise. Since the merger is critical, it is a good idea for the change managers to be hired from outside the two companies to avoid bias. The change agents should be chosen from the middle management and employees in the two companies to help implement the merger, enforce the change, and report its progress (Jick and Peiperl, 2011). In my opinion, the change agents must be chosen based on their previous reviews or based on a personality test held by professionals in order to choose right. The change managers shall have the technical knowledge and the social support (Hammer, 2017).

The change champions should also be chosen based on their personalities, specifically their enthusiasm and ability to accept change. The change champions must be placed in each department to act on their supporting role for the other employees. The champion who helps the organization positively should be rewarded in a way that is decided by the top management. Finally, the change teams have to be formed. The change teams are at the core of the change implementation. The teams are formed from each concerning department re-structured after the merger from both companies to come up with the new common ground for the technical operation. The teams must be functional and is formed from members with different expertise in order to succeed with their responsibility According to Rod and Fridjhon (2016), an intelligent team is aware that refusing to change only results in failure. In my opinion it will effective if the teams are formed voluntarily by the employees with the supervision and approval from the top management to ensure effectiveness.

Developing a vision and a strategy

This is the third step of kotter's change model and falls under the responsibility of the merged company's leadership. In this step the leaders have to first form a change vision. This change vision has to align with the vision of the new merged company. The vision has also to be clear, realistic and achievable. The main purpose of the vision is to guide the change implementation by knowing where the company is headed and desires to achieve without confusion (Doseck, 2015). The company's core values have to be defined with the vision in order to help create the new identity for the company. The change strategy is the plan of how the change vision will be implemented.

There are four basic change management strategies that are used as needed depending on the level of resistance, target population, the stakes, the time frame and dependency on its people. Since it is two different companies merging, the change strategy has the address their differences. Company X was a traditional one, therefore the suitable strategies will be the Normative-Re educative and the Power Coercive. The first one will be done by creating new strong identity for them to commit to through the new values and norms. The second one will be through having a change manager with a strong authority figure to impose the change. As for Company Y, it was a modern company and the strategy for it includes the Empirical Rational and the Environmental-Adaptive. The first one is achieved by proper communication and incentive. I.e. the merged company must offer personalized benefits of helping with the change. The later can be achieved by giving the employees a chance to adapt to the news before the actual transfer. Since the merger is for a large population of more than 500 people and more than 50 branches and has high stakes for it to succeed in a limited time. It is suitable that all the four strategies are combined and used for the new company.

Communicating the vision

This is the fourth step of the model and an essential one for the success of the change. However, the communication is not limited only to the implementation. It is the link that holds all the phases together and allows for their achievement. It offers all the stake holders a way to stay updated and assured. An effective commination system has to be established by the top management. A suggestion is that the first step for the company is to get a psychological expert who can help chose the write words to be spoken to ease the people's fears and un certainty as well as to keep the message clear. The second step is done at the beginning phase, a face to face meetings shall be held with the top management and the stakeholders in order to have an interactive way to address the concerns without delay. The third step is to develop an internal communication system to share the updates about the change process. The fourth step is to designate a small team to deliver people's ideas, needs and concerns to the top management and make sure that the communication goes both ways properly.

A study by villa, Gonçalves and Villy Odong (2017) have shown that a two-ways communication help make people more involved and eases their concerns. The timing of the communication and the frequency is also critical and must be decided upon by the top management as they see fit. In my opinion, the frequency can be weekly on Sunday morning. In order for people to have the full week to respond to the update received.

Removing obstacles

The fifth step of the model and also a critical success factor of the change. It is important to realize that with a huge change like a merger, it is natural to face different obstacles when it comes to people. The Resistance to the change defensive retreat will be their natural psychological reaction according to the second step in the change stages (Castillo, Fernandez and Sallan, 2018). The management has to deal with the resistant employees differently. Since the merge will contain older traditional employees who are set in their ways, and contain modern young employees who are more change tolerant.

The first way to remove the obstacle of resistance is to have leaders and managers who understand the reasons behind the resistance and try to approach them by proper open communication (Villa, Gonçalves and Villy Odong, 2017). The second way is to be patient, as most changes take time and effort from everyone. The third is to allow the employees to express their natural emotions as they see fit. Barner (2008) stated that "the use of metaphors can help organizational members better interpret and make sense of organizational change" which has been proven to be effective. The fourth is to give them a sense of control by allowing them to actively participate in the change process. In order for the change process to go smoothly, it is critical for the leaders to prepare a new organizational culture to accept the change. Since the two merged companies are from a different organizational culture, it is important that a new shared culture is created in order to have a common ground.

The new culture created must be balanced and demonstrate the importance of flexibility and change. The steps to change the culture is first to define the company's mission, vision and values and their strategies. defining them gives employees a sense of identity and a reason to commit. The second step is to communicate them well with the stakeholders in order to remove any uncertainty. the third is to define the roles and responsibilities of the employees in the company and motivate them (Wilox and Jenkins, 2015). The fourth is to implement the change over a planned period of time which helps people accept the change better. The fifth is the continuous Measurement the progress. Finally, to give time to the whole process to unfold. A councilor shall be hired to address people's emotions and helps in creating a new culture that accepts the change.

Creating short term wins

The sixth step in Kotter's model. In such a big transformational change like the merger, the change process takes a long period of time. To keep your employees from losing interest in achieving the long change goal. You should divide the change implementation into different phases. Each department is assigned a departmental change strategy to be achieved in a specified period of time. From my experience, it is effective to have it on a monthly basis. This way the employees can have a sense of achievement and a tangible evidence of their wins in implementing the change. those departmental achievements are advertised to the others to take notice of the positive change. (Pollack and Pollack, 2014).

Consolidating Gains

The 8th step in Kotter's model is to build on the change. creating the wins is not enough, all of the implantation process shall be tracked by the leaders, change managers and change champions. In order to learn from the success of the small wins, they shall be analyzed to guide the others. The management should Prepare a form that records the reasons for the win as well as the reasons for failure. The form content is then analyzed by specialists in order to alter the goals and improve them.

Post Change Implementation

After the wins has been achieved and the change vision has been implemented through appropriate strategies. The change culture should not stop, the final step of the Kotter's model is applied for to achieve change sustainability.

Anchoring change in the Corporate Culture

After the hard work of achieving the merger, the new company structure will require more changes for improvement. With the help of the councilor hired, the organization is prepared for the culture change. In order for the new merged company to sustain the change the following points has to be addressed by the change leaders.

First, it should be kept in mind that the big changes should not be introduced immediately after the merger. The changes should be divided into phases and alternate between the big changes and the small changes. Second, the previous achievement should be highlighted and rewarded. The management should set aside a budget for the change motivation, to offer bonuses in order to keep the motivation for change. Third, is to offer employees a way to stay involved in the new changes implemented, i.e. stress the communication process.

Fourth is to deliver training related to change to the employees at different levels. According to Osman-Gani and Jacobs (2004), on the job training is the most effective way to consolidate the change. The Final and most important point is for the company to have continuous improvement. The leaders must establish an evaluation system applied quarterly in order to see when change is required. My advice is to use the Kaizen strategy. It incorporates small changes in order to achieved big improvement. The leaders should create a platform to receive change ideas and suggestions form employees in order to improve for the better and sustain the achievements.

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Lean And Sustainability: Similarities And Mutual Relationship

Abdullah Almatrooshi

Abstract

Purpose

The research work highlights the interrelationship between lean and sustainability and their significance in enhancing the different aspects of a business. The completion among businesses is increasing sharply these days and hence, adoption of Lean practice is in demand. Hence, the companies are considering an amalgamated business approach including environmental and social impacts of the business activities. The prime focus of today's business ventures is to contribute to the well-being of the society with special emphasis on protecting the environment.

Design/methodology/approach

A SLR (Systematic Literature Review) is conducted in this research work explaining the similarities and the mutual relationship shared by lean and sustainability approaches. There is significant evidence suggesting that Lean is advantageous for Sustainable business management. This is believed to be helpful from economic and environmental aspects (Das, 2018). The research paper identifies gaps in implementing a combined form of lean and sustainability to enhance business performance in relation to a methodology approach. A qualitative thematic analysis and quantitative descriptive analysis is provided in this paper to justify the mutual relationship and similarities between lean and sustainability (Lagrosen, 2019).

Findings

The findings suggest that lean is mainly utilized for practical guidance and by embracing the tool and techniques of lean approach, the organizations are able to denote the broad concept of sustainability in a tangible manner. On the contrary, it is evident that when the long-term philosophic base of lean is not adopted, its usage remains superficial and hence, it does not serve a long-lasting impact (Lagrosen, 20109. Sustainability only generates financial incentives for lean. Even if an additional purpose is not generated by sustainability, the emerging financial urgency can develop an advantageous tide for lean.

Research limitations/implications

The research work is only limited to the analysis is based on literature reviews describing the work of different authors in a simplified manner. A thorough evaluation seems beneficial to identify both the risk and opportunities shared by Lean strategy in bringing sustainability to the business (Tasdemir, 2018). However, this research paper only focuses on shared work by different authors

in terms of thematic and descriptive analysis. It is believed that if a survey is being carried out in any business field, the implementation and the interlinking of lean and sustainability can be effectively identified.

Practical implications

Lean and sustainability can be adopted by any business organization, which holds the motive to generate economic benefits by applying sustainable business practices. A lean strategy is believed to have a positive impact on the three pillars of sustainability, namely, society, economy, and environment (Vinodh, 2016). The target of the business is to equalize these three pillars so that they can acquire future opportunities for their business expansion.

Originality/value

The paper highlights the similarities and mutuality shared by lean and sustainability, although certain loopholes exist in their combined approach. It is evident that when implemented together, it can re-shape the business activities towards success. On the contrary, the lean is found to be a base where a sustainable approach of the business organizations follows a conceptual path.

***Keywords** – Lean, Sustainability, Business success, Mutual relationship*

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From Autonomy to Accountability: Perception of Professionalism among Healthcare Providers in the Ministry of Health and Prevention, United Arab Emirates.

Part I (out of IV)

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Background

Organizational values are key elements in shaping the visions, cultures and performance of healthcare organizations as well as healthcare providers. The value of professionalism emphasizes accountability, competency, integrity, and providing quality service. In the healthcare sector, the concept of multidisciplinary professionalism re-emerged as a core healthcare ethics principle since the 1980s when health maintenance organizations were established in the United States and business ownership of the healthcare industry expanded. Many healthcare organizations emphasize professionalism as one of the core values that facilitate accomplishment of their missions and visions. However, the extent to which a common understanding of 'Professionalism' and "Professional Competence" exists at individual and organizational levels varies widely. Being accountable at individual or organizational levels is not confined to financial or clinical aspects of health care management but also extends to performance outcomes, and quality of healthcare services as well.

Research objectives

This dissertation seeks to explore the concept of professionalism, its perceptions among healthcare providers and managers, its impact on organizational performance appraisal processes as part of corporate governance and clinical governance of health information systems at three hospitals in Ministry of Health and Prevention; MoHaP in United Arab Emirates; UAE. The study explores the context of professionalism at individual level from the following domains: *accountability, teamwork, learning and self-improvement, communication and integrity and work values* and at organizational levels from the following domains: *patient engagement, governance, organization culture, response to* **community need** and *daily operation & administrative support*. In (part I) ,only the results from the first objective is discussed , which is about the development of a context-

specific concept of professionalism, based on self-perception of five healthcare professions, on what constitutes professional practice from the perspectives of physicians, dentists, pharmacists, nurses and medical laboratory technicians.

Method

Using mixed method approach, (a) Healthcare Workers Professionalism Survey (HWPS) was constructed internally, based on literature from (Snizek, 1972; American Board of Internal Medicine(ABIM),2001; Stern, 2006; Moore, 2012; Shaw, 2015; Chioviti, 2015 and MOHAP, 2017). It consists of 25 questions based on likert scale (Strongly agree, agree, neutral, disagree and strongly disagree). The survey was supported by (b) focus interviews, which asked participants to list the most prominent professionalism values in their opinion. Finally, (c) a document review of reported unprofessional behaviors within the period of (2018-2019) were conducted.

Li, et al (2017) conducted a systematic search to assess the quality of used instruments in assessing professionalism from 1990–2015, eighty studies satisfied the inclusion criteria, and a total of 74 instruments for assessing medical professionalism were identified. Instruments analyzed varied among the studies and included: self-administered rating, simulation, multi-source feedback, direct observation, peer assessment, patients' opinion, role model evaluation, professionalism environment. The analysis revealed that methodological qualities of studies were usually weakened by vague hypotheses, missing data, and inadequate sample sizes. Based on best-evidence synthesis, three instruments were recommended: Hisar's instrument for nursing students, the Nurse Practitioners' Roles and Competencies Scale (NPRCS), and the Perceived Faculty Competency Inventory (PFCI).

However , in this study , the aim is not to validate an instrument to measure professionalism or to specify one definition for professionalism in UAE healthcare system, rather than having a thorough assessment of professionalism concept at a holistic level. Through assessing the interplay between individual and organizational professionalism and how both can be integrated for better outcomes. The outcomes are in a form of organizational excellence through international or local accreditation, achieving higher standards of patient safety and satisfaction and improving staff productivity.

Results

The majority of participants in the Healthcare Workers Professionalism Survey (HWPS) were female (67%), from nursing professions (64.9%), (45.4%) from middle age (31-40 years). Around half of the studied population spent (1- 12 years) in the selected hospitals. The author found that (HWPS) showed high level of individual perception of professionalism (average across all five domains = 95.3 %, Cronbach alpha = 0.920) , who agreed on being accountable (98%) , effective in their communication(96.5%) , abide with updating their skills and knowledge through Continuous Professional Development CPD (95.6%), believe in teamwork (95.2%), and had integrity and high personal values (91.02%). Their responses on Likert scale were grouped into (agree : combining strongly agree and agree together, disagree : combining neutral to strongly disagree together) as most of the results were positive.

Healthcare professionals 'responses were analyzed by comparing the perception of the majority (Nursing profession and others) and between physicians and other professions. To look at any significant findings in perception among the selected professions. For example in question (4) ***"I am aware of my profession's code of conducts and ethics and believes in the effective impact of my membership in any of my profession's related committee/group/association"*** there was significant difference between nurses' perception and others (p value 0.02, significant at < 0.05), when (100 %) of nurses agreed compared to (96%) from other professions. In the last three years, MOHAP nursing administration incorporated a revised version of Nursing 'strategy, code of ethics and Emirati model of care that are based on UAE community. Which had a positive impact on nursing ' responses in HWPS. Due to high level of agreement and in order to exclude social desirability bias, the findings were followed by focused interviews with selected healthcare workers (n=16) to list the most common professional attributes in their opinion. They suggested (n=35) attributes related directly to four MOHAP strategic values (patient priority, excellence and leadership, community happiness and respect). Which suggests positive signs of well-incorporated values among nurses, physicians and pharmacists.

The attributes of "respect and transparency" were with higher frequency (n=12 out of 35), and when compared to Morrow *et al.* (2014)'s study , similar descriptions were found under "respect for patients and colleagues". While in comparison to Stern's (2006), four principles of professionalism (excellence, humanism, accountability, and altruism), MOHAP's participants listed collectively (22.82 %) similar o professional attributes that matches Stern's principles (9.7% suggested "accountability", 7.6% " excellence", 3.2 %"altruism and ethics" and 2.2% "humanism"). Considering the diversity of healthcare workers in the three hospitals according to their professions and their different cultural backgrounds.

As the concept or professionalism is dynamic, diffused, culture and context-specific, participants in other countries like Japan (Kinoshita, et,al, 2015) listed other professional attributes like: accepting gifts, conflict of interest, confidentiality, impairment and honesty were among the common types. Following the results from both tools (HWPS and focused interview), document review of incidents were used to cross check the presence of unprofessional behavioral in two hospitals, as part of monitoring system for any breach of conduct and to support findings in the other tools. A total of n= 2426 incidents reviewed (between 2018-2019) and only 9.6% were reporting unprofessional behavior, accredited hospital had only (2.09 % reported unprofessional behavior compared to non-accredited hospital (17.3%).

Conclusion

There is absence of universal consensus of what constitutes professionalism; certain set of competencies in one country are not always fitting other countries. As a healthcare manager, it's important to know what really matter to health professions in term of professional values and what they are facing, to know how to close gaps between organizational strategic values and what is expected from these workers on daily basis. Empirical studies showed that investment **in organizational professionalism** resulted in (Brennan and Monson, 2014): (a) Improved patient safety, satisfaction and health outcomes, (b) increased patient and community trust of the organization,(c) improve organizational performance and reputation, (d) enhance individual moral,

engagement and being part of wider purpose that foster productivity and (e)enhance learning and thrive to continuous improvement.

Therefore, reliance on individual perception of professionalism is not strong enough to cultivate professional culture and enhance quality and patient safety. The strategic values and presence of corporate governance like risk management system and accreditation through corporate governance is more impactful and powerful in achieving excellence and ensuring patient safety and can foster professional behavior

Keywords: *Professionalism, Healthcare Professions, UAE, Ministry of Health and Prevention, Healthcare Managers, Survey, Focus Interview, Incident Reports , Governance, , Accountability, teamwork , Hospital ,Quality , Excellence and Patient Safety.*

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Critical Success Factors (CSFs) of Quality Management System in Healthcare – A Comparison between the Government and the Private Hospitals

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Abstract

Quality system in healthcare have critical impact on the safety and health of patient. Healthcare facilities consistently introduce solutions and address issues which gives them a competitive advantage in their field. The aim of the research to introduce the critical success factors of healthcare quality management system. Also, compare the healthcare quality management system between the private and government sectors. The literature review included seven CSFs for implementing successful healthcare quality system, and sated different authors' analysis about the quality management system in the private and government sector. Further, the methodology that will be used covers both qualitative and quantitative approach to give more rational, reliable and fair findings. The sample will include four hospitals which two are government and two are private that based in UAE. As well, four managerial level employees working as head of quality department will be interviewed, while 100 employees from different fields will be answering the survey questions. The research limitation be in including the patient perspective about quality, and take into consideration to have more health facilities from different, specialty and region in the survey. Finally, the expected finding will answer the research questions and hypothesis. Furthermore, will demonstrate the role of quality in healthcare and the benefit of adopting quality program on patient and staff and the organization performance. The following introduction will have the importance of quality system in healthcare and the research objectives and hypothesis.

Introduction

Quality system in health care has many positive impacts on performance. As a result, more healthcare providers focus on different quality tools and methods to increase their efficiency, service quality and productivity. As the author background in clinical quality, many healthcare quality system helps to reduce medical and medication errors and waste of resources. An organization should assess its current state depending on some factors that are critical for implementing a successful quality system. Quality in healthcare involves every activity or process that contributes delivering care to the patient from entering the health facility until discharge, and it involves both admin and clinical staff from different levels. When a health organization can adopt the quality program, then we can assure it's consistency in meeting the patient needs and contribute in a healthier and happier society.

The research will assess the effectiveness of the quality system in healthcare by analyzing the factors that are essential for implementing a successful quality program. And will compare the quality system in both the private and the public sector, to find out which sector is better or

whether they have the same level of quality. The comparison will help health organizations to focus and work on the critical factors that will assure their success and help them to achieve a competitive level in their field. The Research Objectives, Questions and Hypothesis are listed below for better understanding of the research path and outlines.

Research Objectives

1- Determine the critical success factors of Healthcare quality management system
2- Compare the Healthcare quality management system between private and government sectors.

Research Questions

1- What are the factors that contribute in implementing a successful quality management system in Healthcare?
2- What is the type of quality program used in the private and government sectors?

Research Hypothesis

1- If top management is involved with the quality program, then more effective outcomes will be accomplished in relation to organizational performance and quality services.
2- If staff awareness is applied toward quality practices and Its importance, then a health care organization will reach a high level of patient safety culture.
3- If a quality program is implemented in the Private sector, then it has higher probability of success than the Government sector.
After reviewing the importance and the aim; the next section will present the literature review that contribute to strengthen the research argument as follows below.

Literature review

According to J. Ovretveit and D. Gustafson (2002) the Quality program in healthcare refers to all processes included in the system that contribute to improving the care. Holden and Hackbart (2012), Chassin (2013), and Souza (2009) agreed on that current healthcare are focusing more on efficiency, productivity and quality of service provided to patients in term of time and safety, and staff satisfaction, which makes the management heading toward using quality programs and tools, to achieve their objectives. Also, it is proven that quality system helps in having better future planning and the best use of healthcare organization resources. Adding to that, Roger Hiltona, Margaret Ballab and Amrik S. Sohala (2008), and J Ovretveit and D Gustafson (2002) suggest to achieve all these benefits; the healthcare organization should first change their organizational culture and the way they perceive quality. There are different success factors listed in different literatures. The research will present the most common success factors which have the most effect on the healthcare organizations from the reviewed articles.

Leadership support

Ben-Tovim et al. (2008), Steed (2011), Radnor et al. (2012) stated that leadership support is essential in changing the healthcare culture to implement quality tools like the lean method to ensure commitment, involvement and understanding the reasons of adopting from the employees stand. Leaders are the implementation facilitators and deal with any problem that arises in the healthcare organization. Moreover, Armenakis et al. (1993), Ackroyd, (1996), Lehman et al. (2002) and Steed (2011) agreed that leaders roles include providing the needed resources from training, involving employees in the processes and provide sufficient time to complete the tasks. Also, Radnor (2011) noticed that leadership present in the implementation phase would help in continuing the required actions from all employees, which mean will have a successful sustainable program. And that will eliminate any resistance, as Ben-Tovim et al. (2007), Fillingham (2007), Carpenter (2011), Papadopoulos et al. (2011) found that physicians and nurses find more difficulty in accepting new changes than others because they don't like someone inform them how to perform their tasks where they are the experts in their field. Furthermore, Edmondson (2004) ensures the leadership importance in motivating employees towards continuous improvement by creating the vision and urgency for change. And have a blame free culture where employees can safely report incidents and mistakes that can be avoided in the future.

Including quality program in the organization strategic plans

Butler et al. (1996) notified that the strategic plan of healthcare in its mission and policies that should be consistent with their resources. Also, Kaye and Anderson (1999), Bateman (2001), Rich and Bateman (2003), Cinite et al. (2009) insist on the objective and reason of any change in health system; because by identifying the plan, Armenakis et al. (1993) and Dick et al. (2006) assure that everything requires from employees will be clear, easy to follow and implemented effectively. As a result, Rich and Bateman (2003) concluded that quality strategic plan would help in better understanding of the healthcare organization work, goals and desired outcomes from the new system. Also, long term plan for the changes identified in healthcare will have more probability to be accepted within the organization.

Defining customer segment and value in the health sector

Papadopoulos and Merali (2008), Young and McClean (2009), Hayes et al. (2010), Poksinska (2010) acknowledged that there are different customers groups in healthcare from patients, their family, suppliers, …etc., and by defining them we can specify what service to be provided depending on their needs, which will have more value to them. Also, Papadopoulos et al. (2011) and Womack and Jones (2003) summarized the benefit of defining the customers and their needs in focusing on value-added activity and remove any process that doesn't add value and waste the organization resources. Where, Womack and Jones (2003), Young and McClean (2009) Added that it would reduce resistance and conflicts.

Identify the whole process (patient pathway)

Fillingham (2007), Papadopoulos et al. (2011) Radnor (2011) Defines that the whole patient journey starts from the step he walks in the hospital whether as an inpatient, outpatient or emergency case till discharge. And, Joosten et al. (2009), Papadopoulos et al. (2011) ensure by defining the patient pathway, the value and non-added value activities can be identified to improve the quality of service we delivered to our patient, because as Fillingham (2007) stated there is no better way to evaluate the care than asking the patients himself. Therefore, in each process the healthcare organization should ask the patient what service to include and what to remove for better satisfaction and performance efficiency.

Training

Butler et al. (1996), Bateman (2005), Ben-Tovim et al. (2007) advice that to ensure sustainability of the improved processes, training should be provided to make the staff use their resources and the tools efficiently, that learned from the new quality system as it becomes in the healthcare culture. While Morgan and Cooper (2004) have proven that using Some of the quality tools like six sigma DMAIC process (Define, Measure, Analyze, Improve, and Control) , increase the nurse's satisfaction level because the pressure and complexity of their jobs where reduced by identifying their tasks in each of the DMAIC steps. Also, R. Grol, R. Baker and F. Moss (2002) suggest that training should be for both managerial and clinical staff, to achieve the long term goal of delivering quality care and safety that satisfy all members from employees and patients. In addition, Radnor (2011) indicates that training helps the healthcare to reach sustainability on the clinical, operational and departmental level.

Implementation of reward and measurement system

Sugimori et al. (1977), Cho (1995), Fillingham (2007) and Taner et al. (2007) notified that reward system enhances health care organization performance to achieve continuous improvement concept, as they recognize the hard work done by the staff. And that encourage the others to improve to get rewarded either financially or morally. Graber and Kilpatrick (2008), Fillingham (2007), and Gubb (2009) recommend having a measurement system in order to evaluate the success of healthcare organization, where they can identify their current and target state to define their progress. Also, Kollberg et al. (2006), Hines and Lethbridge (2008) and Radnor (2010) stated that measures in the healthcare sector should be accurate, easy to understand and implement and related in order to improve the current practice. Moreover, Antony and Banuelas (2002) confirm the importance of data to have effective decisions and statistical tools to monitor and avoid errors like process control charts.

Aligning organization capabilities with demand

Fillingham (2007), Dickson et al. (2009) and Delli Fraine et al. (2010) emphasize on the difficulty of identifying the real needed resources in healthcare, due to every patient has different needs, and it treated as individual case depending on their urgency. As a result, Balle and Regnier (2007)

suggest health organization to prepare reports by analyzing the trends and work volume on a regular basis, and based on that define the skills and resources needed approximately, to apply the new system and satisfy patients requirements without facing any shortage burden.

Quality system in the private and government sector

Johnson Olabode Adeoti (2011) stated in his study of Kwara State Government Hospitals that despite the available skills for applying total quality management system (TQM), the government must provide financial support as they are the primary source for these hospitals. And involve the employees more in the planning and implementation process, to enhance the hospital's performance because they have more knowledge and experience about the area of improvement. Also, Taylor (1994) notified the two crucial elements that all healthcare organization should focus on: meeting patient needs and delivering quality services. Furthermore, Middle East News Online (2002) and Angelopoulou et al. (1998) noticed that patient prefer private sector due to its flexibility and fast response in delivering high-quality health services.

On the other hand, Naceur Jabnoun and Mohammed Chaker (2003) stated that patient goes to a private hospital with a perception of good quality care and in the same time public hospital receive pressure from the government to compete with the private sector in terms of efficiency and quality of service provided to patients. In their study in UAE hospitals, they found that patient satisfied more with public hospitals than private, due to the high rate of reliability of skills, competencies and services delivered by the support of the government funding. Also, Eggleston, Lu, Li, Wang, Yang, Zhang and Quan (2010) stated from their study that there is no difference in mortalities rate and level of quality performance in both private and government hospitals that have the same size and competency level. The only differences were that government hospitals have more advanced equipment and machines, high number of employees and increased numbers of acute cases referrals. And that lead to the conclusion that performance depends on the hospital competencies and resources not the hospital type. Nevertheless, all hospitals should have system to monitor their performance to reach their organizational goals and protect their patients' rights in having a safe and healthy environment while receiving their treatment.

Methodology Design

The research will include both secondary and primary data. The secondary data will be based on literature and articles from different journals. While the primary data will consist of qualitative and quantitative methods. The qualitative approach will be four interviews with the Heads of the Quality Department from both the government and the private hospitals. The interviews will have 5 questions to cover the research objectives and answer the research questions. And, the quantitative approach will be a survey from 12 questions that covers the research hypothesis in terms of applicability and validity. The sample size will be 100 employees from different fields: Nurses, physicians, pharmacists, technicians and admins.

The sample in the survey will be chosen randomly with consideration of equal and standardized distribution of the survey questions between the hospitals to have a weight of 25% participation from each hospital; to assure a rational, reliable and fair finding. Furthermore, to conduct the interviews and the surveys; approval granted from 2 government and 2 private large size hospitals that based in UAE, especially in the Emirates of Dubai.

By using this methodology and including both approaches, we will have a stronger, valid and wider base of findings as different employees' level and categories will participate in the research. As a result the research will have different perspectives and opinions which allows to compare the results and find whether there is difference between the private and the government sector in term of their implemented quality management system. More over buy having both the literature review and the interviewees' answers; this also give the research a stronger arguments and point of view to state the research findings.

The data collection and analysis

For the interviews will be a semi structured face to face interviews with the Heads of Quality Department. This will give the research a deep insight and analysis as we get the answers from the experts. While the survey questions will be distributed through Monkey Survey and the results will be interrupted and analyzed through Microsoft excel; which allows implementing the regression analysis and finding whether there is relationship or no relationship between the variables in the research hypothesis.

Limitation

The research primary data covers only the employees' perspective about quality system in UAE hospitals. Further studies needed to include the patients' opinions and how they view quality service and the factors that will contribute into having a successful system in healthcare from their point. Since the patient voice is important, and when he is happy with the delivered care and his requirements is satisfied; then we can say we have a quality service and successful system.

Also there is opportunity to wider the study by including more healthcare organizations from different sizes, specialties and regions. This will give more advantage to compare and analyze the differences and similarities. As well as, introducing case studies to share knowledge and best practices and learn lessons from other healthcare organization experiences. Finally, further studies can be applied on barriers factors and solutions for implementing a quality system in healthcare, and how health facilities deal with these challenges.

Expected Findings

The research findings can projected from the literature review, previous studies and the author experience. To answer the research questions, it is expected that the following factors are found to be critical for effective healthcare quality management system. First, leadership support; by providing the needed resources, being involved in the processes and create a blame free culture to encourage the employees to report any incident related to safety or quality to implement action plan and improve the current system.

Second, including quality programs in the organization strategic plans; and be part of the organization vision. Third, defining customer segment and value in the health sector; by this the facility can focus on the value added activities and eliminate non-value added activities, to save efforts, time and cost. Forth, identify the whole process (patient pathway); and define the specific requirement for each process and have a focused process oriented system.

Fifth, training; and increase the staff performance and productivity by providing them with the needed skills. Sixth, implementation of reward and measurement system; which create motivation and encourage the employees to excel in their roles and implement a continuous improvement culture. Also, the measures will define the current state of the organization and what need to be done in the future to enhance the quality performance. Seventh, aligning organization capabilities with demand; to able to meet the requirements and prepare for future demand.

Moreover, for the research hypothesis can be expected that there is positive a relation between top management involvement in quality programs and organizational performance level and quality services. And, there is a positive relation between the staff awareness in quality practices and its importance and the level of patient safety culture in healthcare organization. Also, there no relation between the type of healthcare organization (Private or Government) and the probability of success in the implemented quality system.

Furthermore, there is no differences between the quality systems effectiveness in the private and the government hospitals. In fact the factors that affect the system success is the availability of resources and competencies, and the healthcare facility capacity and readiness to meet the needs of their patients' expectations. The questions answered from the interviewees expected to elaborate the nature of quality department processes and activities. It includes incidents reporting, KPIs, policies and procedures, statistics, audits and awareness sessions.

These roles aims to achieve the International Patient Safety Goals (IPSGs) and better allocation and efficient use of resources. Regardless, the different type of quality systems and tools applied; all healthcare provider aim to increase the safety and health of their patients, reduce medical errors and provide them with quality care that meets their needs. Also, insure the safety and satisfaction of the employees to ensure the continuity of delivering high level performance in term of effectiveness and efficiency. To summarize that, the main benefits of successful quality system are in having a healthy, satisfied and happy patient, employee and society.

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دور المهندس الاماراتي في اعداد المواصفات التصميمية للمدن الذكية في دولة الامارات العربية المتحدة

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مستخلص

نتيجة للتغيرات المتسارعة التي حصلت في الدولة في الثلاث عقود الاخيرة خاصة التغيرات التكنولوجية الناتجة عن التطور السريع في مجالات عديدة مثل الابداع والابتكار واثرها في الاسهام الكبير في نجاح وتطوير مختلف القطاعات الحيوية منها القطاع الهندسي والبيئي التابع للمؤسسات الحكومية والخاصة. وعلى الرغم من ان التطبيقات التكنولوجية الناتجة عن الابتكار التي تؤثر على المستقبل المهني للعديد من الوظائف الهندسية مما يساهم في تغيير طبيعة الادوار والمسؤوليات التي تقع على صناع القرار مما ينعكس سلبيا او ايجابيا على بعض المهارات الضرورية التي يجب العمل على تطويرها بشكل يتناسب مع هذا التطور السريع الذي يشجع على بناء المجتمعات والمدن ذكية لضمان التوازن بين التغير والتحول والابتكار في قطاع تصميم المعماري والبيئي في دولة الامارات العربية المتحدة.

تركز هذه الدراسة على الية تطوير خبرة المهندس الاماراتي المرتبطة مباشرة بالعوامل التكنولوجية المحيطة كالابداع والابتكار وحجم المعلومات المكتسبة من خلال تعامله مع اصحاب الخبرات الواسعة في هذا المجال والتي تتمحور حول تركيز دورة في تحويل المدن الحديثة الي مدن ذكية مع الحفاظ على التراث الاماراتي والبيئي اثناء اعداد تصاميم المشاريع وتنفيذها . وبناءا على التفوقات والانجازات الي احرزتها الدولة في مجال الابتكار والتكنولوجيا وذلك بفضل الافكار الجديدة والطرق والسياسات المبتكرة التي تتبناها الدولة في شتى المجالات ادى ذلك الي تحمل المهندس الاماراتي عدد كبير من المسؤوليات التي يجب ان يتبناها اثناء تنفيذ مهامه مما يشكل تحديا كبيرا لضمان وتحقيق المستقبل المستدام للمدن الذكية

ان حضور البرامج والدورات التدريبية التخصصية المتعلقة بالتطوير العمراني واسس تصاميم المدن الذكية والتي تساعد على تنمية المهارات التطبيقية لدى المهندس الاماراتي تساعده على استحداث منهجية موحدة تمكنه من استخدام المعلومات المكتسبة في إعداد تصاميم المدن الذكية.

تستعرض هذه الدراسة التحديات الواقعة على دور المهندس الاماراتي وايجاد الحلول المناسبة بعد تحليل المشاكل التي يتم طرحها

الكلمات المفتاحية: *التأهيل المهني ، الحداثة، التصميم المستدام ، المدن الذكية ، التعلم الذكي .*

المقدمة

نجحت دولة الامارات العربية المتحدة في استقطاب عدد كبير من الخبراء العاملين في مجال تطوير البنية التحتية للمدن بكامل خدماتها، وكذلك كان التركيز على تصميم وبناء المدن الحديثة الذكية تماشيا مع الجهود الوطنية الرامية الي ترسيخ ثقافة الحداثة في التصميم المعماري الذكي للمدن، والذي يعتبر من الاوليات الاستراتيجية لقادة

الدولة لبناء مستقبل مستدام . وحيث ان توجهات الدولة تركز على الاستثمار الامثل المواكب للحداثة والتقدم التكنولوجي السريع على مستوى العالم ، حيث التوجه للاستعداد لتصميم المدن الذكية بايدي المهندسين الاماراتيين من خلال تبادل خبراتهم والحوار المشترك مع الخبراء والعامليين والفاعلين في مجال تصميم المدن الذكية التي تعتمد على الابتكار والابداع وما يتبعهما . ان الهدف من تصميم المدن الذكية هو ادارتها بطريقة حسنه ، بتقنية جديدة تهدف الي تحسين الاداء والحفاظ على البيئة من خلال وسائل حديثة تعتمد على التكنولوجيا والاقتصاد والاجتماع الذي يؤدي الي تحسين العديد من الخدمات المقدمة مثل الكهرباء والمياه والاتصالات ، عن طريق وسائل التحكم الذكية وشبكات الاتصال المعتمدة على تقنية المعلومات الرقمية . ان مستقبل المدن الحديثة قائم على اساس التنمية الاقتصادية ، حيث ان المدن هي محطة تلاقي للثقافات والافكار، وتصاميم البنية التحتية للمدن تساعد على نشر ثقافات المتخصصين في هذا المجال.

تركز هذه الدراسة على دور المهندس الاماراتي في التعامل مع متطلبات المدن الذكية وكيفية انشاءها معتمدا على النظريات والتطبيق ، حيث يتطلب اعداد تصاميم المدن الذكية وتحويل المدن القائمة الي ذكية تحليلا وفهما لعدد كبير من التقنيات الحديثة ، اضافة الي ذلك ربط الاهداف الاستراتيجية للمؤسسة بخطط العمل التنفيذية للوصول الي الاهداف والنتائج المرتقبة. تعتمد الاجراءات التنفيذية و اولويات العمل المرتبطة بادوات محدده وتقنية تربط بين الحداثة والاستدامة والتطبيق على الاستراتيجية التي يتبناها فريق التصميم والاعداد من المهندسين الاماراتيين العاملين في الجهات الحكومية ، والقائمين على تحديد مهارات العمل في المستقبل التي تتناسب في التحولات الرئيسية التي تشهدها دولة الامارات العربية المتحدة ، والاستعداد لها خلال السنوات القادمة واضعين خبراتهم العلمية والعملية بالتركيز على ابعاد ومكونات ومتطلبات المدينة الذكية ، وكيفية تطبيقها وتركيز على المعايير العالمية المعمول بها لتقييم اداء المدن الذكية .

يتحمل المهندس الاماراتي مسؤولية كبيرة في اعداد استراتيجية تطبيق التقنيات الحديثة في تخطيط المدن الذكية بالدولة بما يتناسب ومتطلبات كل مدينة من خلال اعداد خطط تنفيذية واوليات عمل قابلة للتنفيذ. ان استغلال الطاقات الابداعية التي يمتلكها المهندس الاماراتي هي جزء مكتسب من خبرات متعددة لمشاريع قام بتصميمها، محافظا على التراث المعماري الاماراتي والبيئي لتصميم المدن. ولكن يجب ربط واضافة ما تم اكتسابه من خبرات عملية مع الوتيرة المتسارعة بتقنيات تصاميم المدن الذكية على ان يكون ملما بكل ما هو جديد في هذا القطاع.

أهداف البحث

تكشف هذه الدراسة عن مدى جاهزية المؤسسات الحكومية والخاصة لمواكبة استراتيجية الدولة بتحويل المدن القائمة الي مدن ذكية وتصميم مدن المستقبل على نحو ذكي لتحسين نوعية الحياة من خلال طاقمها الممثل بالمهندس الاماراتي القائم على اعداد التصاميم المواكبة للحداثة والذكاء والتغيير .

وكذلك كيفية تحديث الية مراجعة المعايير التصميمية بهدف تحديثها الي معايير تصميم ذكية جديدة تتناسب مع طبيعة المدن في الدولة، وكيفية اعتماد هذه المعايير على المستوى العالمي، كذلك نوعية الدورات التأهيلية والتدريبية المطلوبة للمهندس الاماراتي حتى يصبح متمكنا من اعداد التصاميم بشكل كامل مرتبط بشكل مباشر بالبعد الاجتماعي والثقافي لسكان المدن بالدولة .

ان تعزيز الممارسة المهنية للمهندس الاماراتي لا تعتمد فقط على النظريات المكتسبة اثناء دراسته الاكاديمية ، وانما على مواكبة التطور الوظيفي المرتبط بالعلم والتكنولوجيا والخبرة ، وتنفيذ استراتيجية المؤسسة الحكومية التي يعمل بها ، والتي تواكب سياسة الدولة في هذا المجال المرتبط بالحداثة والتصميم الذكي للمدن المعتمد على الابداع والابتكار والاستدامة . من اهم المواضيع الي يركز عليها البحث هو كيفية تعامل المهندس الاماراتي مع التطور التقني المتمثل بظهور تقنيات المعلومات، والذي ينعكس بشكل مباشر على طريقة اداءه مؤديا الي ظهور تحول في الاداء الوظيفي ، معتمدا على المعرفة والتقنيات الرقمية والبرامج التصميمية .

ينعكس على تقييم واداء المهندس الاماراتي وكذلك على اداء المؤسسة التي يعمل بها ، ان كانت قد حققت الاهداف الاستراتيجية التي حددتها الحكومة بالشكل المطلوب. تطرق الباحث ايضا في هذه الدراسة الى مفهوم وتعريف المدن الذكية ، والية اعداد تصاميم هذه المدن ، ودور المهندس الاماراتي في تبني و فهم التطور التقني ومدى انعكاسه على الية تنفيذ العمل، بالإضافة الي كيفية الاستفادة من التقنيات الحديثة في تخطيط المدن القائمة والمستقبلية ، على ان يتم توضيح مفهوم المدينة الذكية والتحديات التي تواجه الكادر الفني اثناء التصميم والتنفيذ ، والية اعتماد المعايير الضرورية التي يمكن تطبيقها لتتناسب مع استراتيجية واهداف دولة الامارات العربية المتحدة.

التعليم والتدريب المستمر واثره على الاداء

ينعكس التطور التقني السريع بشكل واضح وملموس على فكر المهندس الاماراتي المسؤول عن اعداد التصاميم المعمارية ، مما يشكل تاثير على اعداد التصاميم المعمارية المرتبطة بالحداثة والبيئة . وعليه يجب على المؤسسات الاستفادة من هذا التطور السريع والاستفادة من الاثار الايجابية لهذا التطور في مجال تخطيط وتصميم المدن الذكية، والعمل على وضع رؤية مستقبلية قابلة للتنفيذ على الواقع في ضوء هذا التطوير السريع . المهندس الاماراتي يجب ان يكون قادرا على تعريف وفهم المدن الذكية من خلال التطوير والتعليم المستمر والابداع ، والذي يقود الي حل مشاكل كثيرة متعلقة بالبيئة والاقتصاد والاجتماع والاتصال ، والخدمات المقدمة عن طريق التطبيقات الذكية .

ان القدرة التنافسية في الانتاج واستقطاب رؤوس الاموال لتطوير المدن وتنظيم المشاريع التي تتم من خلال اعداد تصاميم المدن الذكية تعتمد على خبرة الكادر الفني المؤهل لكي يكون قادرا على المشاركة الفعالة التي تتسم

بالشفافية في التعامل والابداع . ان التعليم المستمر احد ادوات التصاميم المتوفرة التي يجب على المهندس الاماراتي ان يكون ملما بها بشكل مباشر لتساعده على تطبيق وتحقيق اهداف واستراتيجيات المستقبل .

يتطلب تصميم وبناء المدن والمجتمعات الذكية نوعا من التوازن الفعال بين الاستدامة والابتكار والتحول والتغيير من خلال مشاركة المهندسين الاماراتيين مع الخبراء والعاملين في مجال الابتكار في القطاعيين العام والخاص. ان مخرجات التعليم لدى المهندس الاماراتي واجهت بعض التحديات عند التحاقه بسوق العمل، ولو تم اعداد ودراسة المخرجات في وقت مبكر لتتناسب مع التطور التكنولوجي السريع لكانت نتائج التطبيقات اعلى بكثير مما هي عليه حاليا في بعض المؤسسات. على الجهات المعنية في المؤسسات الحكومية التواصل المباشر مع مؤسسات التعليم لتحديد الية مخرجات التعليم في الجامعات الامارتية ، بحيث تكون قادرة على مواجهة التحديات الحالية التي يفرضها الابتكار والابداع ليتعامل معها المهندس الاماراتي لتمكنه من السير على الطريق الصحيح وتقديم حلول فعالة لتفعيل اسس تصاميم المدن الذكية.

تقع على المؤسسات التعليم العالي مسؤولية كبيره في صياغة وتصميم مستقبل التعليم المرتبط باعداد تصاميم المدن الذكية المعتمده على التطور التكنولوجي السريع ، ياتي ذلك من خلال تقديم مقترحات وافكار من المهندسين الاماراتيين العاملين في المؤسسات الحكومية . توفير الفرص والتجارب العلمية المميزه في المؤسسات التعليمية تمكن المهندسين الاماراتيين من تحسين مهاراتهم وكفاءاتهم بشكل يتناسب مع التغيرات السريعة ، وجعلهم قادرين على تحديث معايير التصميم للمدن الذكية داخل الدولة . إعتماد معايير التعليم والتطبيق بين قطاع العمل ومؤسسات التعليم الجامعي يؤدي الي جودة في الاداء الوظيفي للمهندس الاماراتي في تصميم المدن الذكية ، وتبادل المعلومات والافكار الابداعية بشكل يضمن الابداع والتفوق في العمل . لايمكن فصل القطاع الاكاديمي والمؤسسات العاملة في التعلم الذكي ، حيث يجب ان تكون هناك صلة ربط بينهم وبشكل متواصل لضمان الاداء الوظيفي للمهندس .

ان التوسع المستمر في ثورة الشبكات العنكبوتية اثر على نوعية الخدمات المقدمة للافراد والمؤسسات في الكثير من الدول ومنها دولة الامارات العربية المتحدة وخصوصا مدينة دبي، التي تعمل باسلوب طموح وابتكاري والذي انعكس بشكل ايجابي على الاقتصاد وتصرفات المواطنيين والمقيميين ، بما فيها سهولة التنقل بين المدن . تم ذلك من خلال المشاركة الفعالة والمستمرة من قبل المهندسين الطموحين " مهندسين المستقبل " الذين اكتسبوا خبرات العاملين في هذا المجال ونشروا هذه الثقافه بشكل واسع. ان التعلم المستمر والمواظبة على إكتساب المعلومات أصبحت شغفا للمهندس الاماراتي ، حيث ادرك ان الاستثمار الذكي ليس فقط في تقنيات الاتصالات وانما في التطور الاجتماعي والاقتصادي للافراد الذي يعزز جودة الحياة والاستدامة .

دفعت الحكومة وبشكل مكثف معظم المهندسين الاماراتيين العاملين في هذا المجال الي دورات تدريبية مكثفة تتعلق بتصميم المدن الذكية ، ليصبحوا قادرين على وضع اطار شامل يدير عملية التصميم والتنفيذ بجميع

جوانبها حسب ما يتمشى مع الاستراتيجية المعتمدة في هذا المجال . وبناءا على سياسية التعليم والتدريب المستمر للمهندس الاماراتي التي انتهجتها دولة الامارات من خلال استقطاب اكثر الناس كفاءة في هذا المجال لتدريب العاملين ، فقد اصبحت الدولة اكثر الدول تقدما في هذا المجال حيث اصبح المهندس قادرا على دمج الافكار الجديدة بطرق مبتكرة في مجال التصميم الذكي ، مستفيدا من كمية المعلومات المتوفرة في الشبكات الالكترونية ليتم ترجمتها على الواقع بتقديم تصاميم ذكية للمدن تتناسب مع متطلبات الحياة الجديدة المرتبطة بالذكاء الاصطناعي والتكنولوجي المتوفر .

دور الحكومات في تحفيز وتفعيل تصميم المدن الذكية

ان نجاح تصميم المدن الذكية يعتمد على التشجيع المستمر لمسيرة التميز ، الابداع ، الابتكار والبحث العلمي لجميع المهندسين الاماراتيين العاملين في مجال التصميم ، في القطاعين العام والخاص لخدمة الخطط التنموية التي تنتهجها الدولة . ان نهج ترسيخ وتعزيز ثقافة الابتكار في التصميم لدى المهندس الاماراتي في إعداد المواصفات للمدن الذكية تعزز القدرات البحثية في مختلف المجالات التخصصية التي تتناسب مع المتطلبات المعرفية ، مما يساعده على التغلب على التحديات وتحويلها الى فرص تساعد على خلق بيئة محفزة في الابداع والابتكار بين المهندسين .

يتوجب على المؤسسات الحكومية المتخصصة في قطاع التصميم الهندسي توفير منصة استراتيجية لتحفيز الابداع والابتكار والتميز في تصميم المدن الذكية ، باعتبارها اسس رئيسة لتحديد مواصفات حديثة لتصاميم المدن الذكية المعتمدة عالميا . ان ذلك يساعد على نشر هذه الثقافة بين المهندسين حديثي التخرج العاملين في جميع القطاعات من خلال التزامهم بالمسؤوليات الواقعه على عاتقهم ان ذلك يساعد المهندس الاماراتي على تحويل التحديات الي فرص مما يؤدي الي خلق حلول فعالة من شانها تحقيق الرؤية التي رسمتها الدولة في هذا المجال ، والهادفة الي بناء مجتمعات ذكية ومستدامة معتمدا على الابداع والابتكار. على المهندس الاماراتي ان يكون متميزا في المجالات المتعلقة بالتعليم والتصميم الذكي من خلال التقارب الفكري وتحفيز الطاقات الابداعية والتركيز على الامكانيات البحثية بالشكل الذي يؤدي الي تحقيق الهدف الاستراتيجي في هذا المجال المرتكز على الابداع والتحول والتطوير المستمر. يساعد ذلك على فهم وادراك المهندس للسياسات الادارية والتصميمية والتشغيلية للمشاريع المعتمده على افضل الممارسات الابتكارية والحلول السريعة.

مسؤولية المؤسسات الاكاديمية في تصميم المدن الذكية

تتحمل الجامعات والمؤسسات التعليمية بالتعاون مع المكاتب الاستشارية دورا كبيرا لتحقيق الاهداف الطموحة لمبادرة تصميم المدن الذكية وتحويل دبي الي المدينة الاذكى في العالم ، حيث كما ذكر سابقا بان المخرجات التعليمية للتخصصات الهندسية لها دور محوري في دعم هذه المبادرة ، التي يجب ان تتبنى مناهج التعليم الذكي

في الدولة من خلال تطوير المناهج والمقررات الدراسية التي تساعد على سقل المهارات الضرورية لمهندس المستقبل.

على المهندس الاماراتي ان يكون معززا بمهارات خاصة تعتمد على الابداع والتميز ، تتماشى مع اسس تصميم المدن مما يؤدي الي بناء مدن مدعمه بالمعرفة الذكية. كذلك يجب عليه ان يكون قادرا على التفكير والتحليل لتعزيز اليات التصميم لاعداد تصاميم ذكية للمشاريع التي يعمل عليها بعد تخرجه من الجامعة معتمدا على المفاهيم الحديثة في هذا المجال .

العمل التقليدي لمهندس التصميم الاماراتي

من اهم الادوار التي تقع على عاتق المهندس الاماراتي العامل في مجال التصميم في المؤسسات الحكومية هي تصاميم واعداد المدن بما فيها اعداد التصاميم الاولية لمشاريع هذه المدن ، ومن ثم العمل على اعداد التصاميم النهائية ليقوم اعضاء فريق عمله باعداد جداول الكميات والقياسات للمواد التي تستعمل لبناء المشروع .ثم يقوم فريق العمل باعداد الوثائق التعاقدية وطرح المشروع على شكل مناقصه.اضافه الي ذلك فهناك بعض المسؤوليات تتعلق بتطوير البنية التحتية للمدن وكذلك تصميم وتنفيذ بعض الاعمال الخاصة بترميم المباني القديمة ، وتحديث البعض منها بغرض الحفاظ على هويتها المعمارية ، اضاقة الي الحفاظ على المحيط البيئي للمدينة. هناك ادوار تتعلق في وضع وتطوير المعايير الخاصه لبناء المشاريع التي تتناسب مع متطلبات الانسان من خلال بعض المهندسين الاختصاصيين . ان الحداثة والاستدامة في اعداد تصاميم البناء تلقى ترحيبا واستحسانا من كل فئات المجتمع ، والتي تتناغم وتتناسب مع استراتيجية الدولة المواكبة للتغيرات التكنولوجية الحديثة المؤدية الي احداث تحول جوهري كبير في طريقة اعداد التصاميم وهي تصاميم المدن الذكية . سوف يكون هناك تغيير ملحوظ في المسار الوظيفي للمهندس الاماراتي ، حيث سيكون مواكبا مع التغيرات السريعة المتناسبة مع سياسة تصميم المدن الذكية التي يجب ان تكون متبعه في بيئة العمل الحالية والمستقبلية.

ان تعزيز الممارسة المهنية للمهندس الاماراتي يجب ان تعتمد على مواكبة السبل والاطر الحديثة للتطور التكنولوجي السريع ، مما يدعو الي اعداد برامج تخصصية لتاهيل المهندسين ، حيث يكتسبوا المهارات الضرورية لتتناسب مع طبيعة الاعمال والمسؤوليات الجديدة التي تاثرت بالثورات التكنولوجية السريعه . ان العمل على تخطيط مستقبل المدن الحديثة يقع على مسؤولية المهندسين الاماراتيين العاملين في هذا المجال ، فهناك تحديات كبيرة تواجه المهندس الاماراتي تتعلق في تصميم المدن الذكية التي هي من اولويات الحكومة واحدى الاستراتيجيات الرئيسية للدولة. على المهندس الاماراتي ان يكون مدركا لهذه التحديات التي تواجه التخطيط الحضري للمدن وتصاميمها الذكية ، فهناك العديد من التحولات ومن اهمها تصميم المدن الذي تعتمد على عدد من المحاور واهمها ، مساحات الطرق لايستيعاب عدد السيارات المستخدمة فيها ، كذلك الكثافة السكانية في هذه المدن وتنويع المناطق بما فيها المناطق الاقتصادية والترفيهية والسياحية. اما التحول الثاني فهو فهم تاثير

التصاميم الحديثة على الافراد في المجتمع وكيفية التعامل معها ، لينعكس ذلك على توفير احتياجات الافراد في اقل وقت ممكن بناء على اعداد تصاميم ذكية تساعد على سهولة الوصول من نقطة الي اخرى عند اعداد التصميم . يؤدي هذا الي تخفيف الازدحام واسعاد المستخدمين لهذه الطرق ، ويلعب عامل الابتكار دورا كبيرا في هذه المرحلة حيث يتوجب على المهندس الاماراتي ابتكار مسارات جديده تحت الارض كالانفاق المجهزة الكترونيا ، والذي يتطلب وجود بنية تحتية على المهندس ان يكون على خبرة كافية بالتعامل معها .

على صناع القرار خلق اليات تجمع بين دمج المهندسين والعاملين في تطوير الطرق والبنية التحتية مع الشركات المتخصصة في هذا المجال . اما التحول الثالث فهو التحول في طريقة العيش في المدن التي سوف يتم تصميمها او اعادة تصميمها بشكل ذكي ، والتي تؤثر على اسلوب الحياة الناتج عن تطبيقات الذكاء الاصطناعي في العمليات التصميمية . لذلك فان المهندس الاماراتي يجب ان يكون قادرا على التعامل مع البيانات وكيفية تصنيفها والية الحصول عليها ، حيث سيكون هناك كميات كبيرة من البيانات المتوفرة الناتجة عن انترنت الاشياء والتكنولوجيا الحديثة والتي تساعد على اعداد التصاميم الذكية للمدن .

اما اهم التحولات فهو طريقة استخدام الموارد في المدن ، حيث تغيير اسلوب الحياة داخل المدن يتطلب فهم طريقة الاستهلاك للموارد ، لتصبح اكثر كفاءة وتكون صديقة للبيئة . حيث سيعمل المهندس على توفير مصادر لانتاج الطاقة من اي مشروع يقوم بتصميمه ليصبح هذا المشروع مولدا للطاقة . يؤدي هذا الي انخفاض تكلفة الطاقة وزيادة الكفاءة الاستيعابية لتخزين الطاقة المنتجة من كل منزل ، وتوفير الشبكة الذكية لتوزيع الطاقة حيث يمكن اعتماد النظام اللامركزي لتوزيع الطاقة المعتمد على تكنولوجيا البلوك تشين ، مما يتطلب معرفة المهندس بطريقة اعداد التصاميم الخاصة بذلك والتي تتطلب التعامل الصحيح مع البيانات.

ان احدى التحولات الرئيسية الاخرى والتي قد تشكل تحديا رئيسيا للمهندس الاماراتي عند تصميمه للمدن الذكية ، هو كيفية تعامله مع الاراضي الزراعية والية توفير مساحات للزراعة لانتاج المحاصيل الغذائية التي تتطلب استخدام مدروس للمياه والطاقة . يتطلب ذلك تحليل البيانات المتعلقة بزيادة عدد السكان في المدن داخل الدولة ، الذي يتضمن توفير المحاصيل الزراعية الضرورية من خلال توفير الطاقة الضرورية وكمية المياه اللازمة لري وتطوير هذه المساحات من الاراضي . ان تطوير جودة الاعمال والبنية التحتية للمساحات والاراضي التي يتم تطويرها جزء رئيسي من مهام المهندس الاماراتي ، ليقع على عاتقه الكثير من التحديات التي يمكن تحويلها الي فرص لتصميم المدن الذكية داخل الدولة.

احد المسؤوليات الاخرى التي تقع على المهندس الاماراتي هي فهم وتطبيق التشريعات المتعلقة بتصاميم المدن الذكية ، والذي يعتمد على الحوكمة في العمل الحكومي حيث لا يمكن اعداد نماذج تصاميم داخل المدن دون حوكمة التي في دورها ستتمكن من توفير حلول وخدمات للسكن بالشراكة مع القطاع الخاص المعتمد على الابتكار والعصف الذهني. يجب على المهندس ان يكون ملما في اعداد وتصميم الخدمات التي تناسب سكان المدن

في ظل المعلومات والبيانات المتوفرة لديه، حيث يجب على المهندس الاماراتي ان يكون قادرا على فهم احتياجات المدن الحديثه ومدن المستقبل المعتمده على التصميم الذكي ، وكذلك عليه ان يواكب سرعة التغير التكنولوجي التي تؤثر على الاليات والسياسات الحالية للتصميم ، والتي يجب ان تكون اكثر فاعلية لمواجهة اي تحديات محتملة تؤثر على جودة حياة الناس والتصاميم الذكية . استخدام الحلول الذكية المتاحة المعتمدة على الذكاء الاصطناعي ستكون احد المهام الرئيسية التي تقع على مسؤولية المهندس الاماراتي عند تصميمه للمدن الذكية.

مفهوم المدن الذكية

ان التطور السريع الحاصل في مجالات التصميم وتقنية المعلومات ادى الي تطور متواصل في المعلومات والاتصالات ، مما انعكس على نوعية الانشطة والمجالات والمهارات التي يعمل بها المهندس ، حيث اصبح تنفيذ جزء كبير من المهام يعتمد على تقنيات والتكنولوجيا الحديثة . ان التطور التقني ساعد في تخطيط وتصميم المدن الذكية التي تعتمد على التقنيات .ان المدن الذكية تضم مجموعة واسعة من الشبكات الرقمية والتطبيقات الالكترونية ، وتقدم خدمات اقتصادية واجتماعية في عدة مجالات مثل التجارة والتعليم والعمل والترفيه ، فهي فراغ افتراضي للمجتمع ، يقوم الخدمات التي تتم عادة في الفراغ الفيزيائي للمدينة. (فريحات & حيدر,2003)

ان تصاميم المدن الذكية تعتمد على معايير واستراتيجيات مدروسة وتقنيات متعدده مرتبطة بالتطور التكنولوجي السريع. المدن الذكية هي نقاط البداية للوصول وتحقيق العالم المستدام والمعتمد على المجالات الاجتماعية والافتراضية ، وهناك عناصر عديده تعتمد وتتاثر بالذكاء الاصطناعي مثل تخطيط المدن وعملية النقل. ان مصادر الطاقة ، التعليم ومخرجاته ، مشاريع الابنية بجميع انواعها ، البنية التحتية وخدماتها تعتمد على تخطيط عمراني متكامل .حيث يتضح لدي المهندس الاماراتي بان مفهوم تصاميم المدن الذكية المستدامة يعتمد على النمو الذكي المرتكز على المعرفة والابتكار والنمو المستدام المعتمد على كفاءة وخبرة الموارد والتكافل الاجتماعي ، الناتج عن تحقيق النمو الشامل والمستمر في جميع القطاعات من خلال تكافل الحضارات. ان المهندس الاماراتي يجب ان يكون مدركا بان مكونات الشبكات الذكية للمدينة العمرانية المعتمدة على البنية التحتية لنقل المعلومات الذكية والتكنولوجيا المتقدمة بمعلومات الاتصالات تساعد في تطوير وتخطيط المدن ، حيث الرؤية الاستراتيجية للدولة المعتمدة على الخصائص متعدده مثل الاستدامة ، الابتكار ، المعرفة ومراكز البحث والتطوير. ولتحقيق هذه الاستراتيجية فقد صرح مدير عام ورئيس مجلس المديرين في هيئة الطرق والمواصلات بدبي عن انجاز 75 مشروعا ضمن برنامج المدينة الذكية والذكاء الاصطناعي ، توزعت بين مشاريع المؤسسة الذكية والبنية التحتية والمركبات الذكية وادارة البيانات والذكاء الاصطناعي والمواصلات الذكية المستدامة .(مطر الطاير ، 2019).

ان ذلك يؤدي الي مساهمة الهيئة بتحويل دبي لمدينة ذكية تحقق السعادة والرفاهية للسكان من خلال تقديم خدمات عالمية المستوى ، ونظرا لاهمية محور التنقل الذكي باعتبارة احد اعمدة المدن الذكية وضعت الهيئة راحة السكان والرفاهية العيش في دبي في قمة اولوياتها في تخطيط وتنفيذ المشاريع وتوظيف التقنيات الذكية لتقديم

خدماتها للمتعاملين اعلن مدير هيئة الطرق والمواصلات بان الهيئة ستقوم بطرح عدد من المشاريع الجديدة التي تتضمن تنفيذ محاور جديدة للطرق والبنية التحتية لتحقيق انسيابية في الحركة المرورية الي جانب تعزيز اسطول حافلات العامة لرفع كفاءة خدمة خطوط الحافلات بما يحقق السعادة لمستخدمين وسائل النقل الجماعي للعديد من الافراد من جميع الفئات المقيمة في الدولة .(مطر الطاير ، 2017).

من الاهداف الاستراتيجية لحكومة دبي في دولة الامارات العربية المتحدة اعتماد المؤسسات الحكومية الخدمية بالالتزام بمعايير التصاميم الذكية في مشاريعها من خلال المهندسين العامليين بها ، حيث ان الالتزام المؤسسي هو احد الاهداف لتحقيق الاستراتيجيات والمعتمد علي الزام هذه المؤسسات بتطبيق المعايير الخاصة بالمدن الذكية ، وهي نوعية الحياة الجديدة للافراد المبنية على السعادة ، البيئة الذكية في تعاملتها ، منظومة الامن والسلامة في المدن ، التقنيات الذكية ، وجود حكومة ذكية تسير الاعمال ، التنقل الذكي باحدث المواصلات ، الابتكار المستمر والمعرفة المبنية على الاستدامة القائمة على التواصل المستمر بين القطاعين العام والخاص. ان ذلك يؤدي الي جعل دبي مدينة من افضل المدن للعيش في العالم من خلال تجسيد رؤية القيادة الرشيدة بحرصها على الاهتمام بالانسان . جاء ذلك من خلال تصريح سعادة العضو المنتدب ، الرئيس التنفيذي لهيئة كهرباء ومياه دبي بمناسبة اعتماد الموازنه العامة لحكومة دبي بان القيادة الرشيده حرصت على الاهتمام بالانسان كونه حجر الاساس في مسيرة التنمية المستدامة مما يسلط الضوء على حرص حكومة دبي على الاهتمام بالتميز الحكومي والابداع والابتكار والبحث العلمي ، اضافة الي تطوير بنية تحتية حديثة تسهم في تحقيق خطة دبي 2021 بان تكون دبي المكان المفضل للعيش والعمل والمقصد المضل للزائرين .(سعيد محمد الطاير 2019).

تتميز المدن الذكية عن غيرها من المدن المعتمدة على التقنيات باستخدامها للادوات الرقمية كاداة للاستثمار الذكاء في حل المشاكل من خلال تركيزها على البعد الاجتماعي والبيئي ، معتمدتا في ذلك على مفهوم الاستدامة ، ويتم ذلك من خلال ادراك المهندس الاماراتي على تصوره لامكانيات وعناصر المدن المعرفية الهادفه الي تشجيع العلم والمعرفة وتوضيح تطبيقاتها على الخدمات الحكومية المقدمة ، وعليه ان يكون مدركا لنوعية هذه الخدمات ، و يجب ان تكون المناطق العمرانية التي يتم تصميمها بواسطة المهندسين الاماراتيين مدعمة بواسطة شبكات وتقنيات رقمية مستخدمة من قبل الافراد بطريقة ذكية معتمده على الاستدامة البيئية والاجتماعية .

ان ابعاد معايير التصاميم المدن الذكية مرتبط بشكل اساس بنظريات النمو العمراني التقليدية ، المعتمدة على النقل والاقتصاد والموارد الطبيعية ، ودمج هذه المعايير مع معايير التصميم الذكي يؤدي الي اقتصاد ذكي وحياة ذكية مطورة ناتجة عن حكومة ذكية ، وهي احد الاهداف المنظورة لتحقيق استراتيجية دبي في الدولة . لذلك على المهندس الاماراتي ان يكون مدركا لنتائج تطبيق هذه المعايير ومدى انعكاسها على تحقيق الاهداف الاستراتيجية من خلال التدريب المهني والعملي المستمر على هذه التطبيقات ، وفهمها بشكل صحيح بعد ربطها بمخرجات التعليم الجامعي اثناء دراسته الجامعية. حيث يجب ربط عملية التطوير والابداع والتدريب الذاتي للمهندس الذي يمارسه اثناء فترة عمله بالمؤسسات باسلوب ومقومات ومخرجات التعليم الجامعي ، الذي يجب ان يشجع الطالب

في كلية الهندسة على الاعتماد على نفسه في البحث عن الجديد وعن الابتكار والاختراع والممارسة المستمرة . ان التعليم والتدريب الهندسي الذي يمثل حالة ديناميكية مستمرة وليس حاله اجتماعية او اعتيادية .(راضي محسن الزبيدي ، 2002).

ان معايير تصاميم المدن الذكية يعتمد على تقنية جمع المعلومات والتي يتم تسجيلها على رقائق ذكية تخزن فيها المعلومات أو من خلال خطوط الياف بصرية لنقل البيانات بشكل سريع ، ويمكن معالجة وتحليل البيانات والمعلومات بواسطة ادوات معالجة تتواصل وبشكل مباشر مع الفراغات العمرانية ، حيث تعتمد المدن الذكية على مجموعة متنوعة من هذه البرامج ومن اهمها نظم المعلومات الجغرافية ، وهي عبارة عن مجموعة من البرامج يمكن للمهندس بواسطتها انشاء قاعده بيانات تعتمد على توزيع الاماكن في المدن وتحديد مساحاتها . ان اهم وظائف نظم المعلومات الجغرافية هي التمثيل المكاني والربط بين البيانات والاستفسار عن هذه البيانات حيث يمتاز نظام المعلومات الجغرافي بقدرته على ربط المعلومات وقواعد البيانات المرتبطة بالمكان مع القدرة الفائقة على تخزين واستدعاء وتحليل البيانات .(السعيد & ناصر احمد 2004).

ان هذا النظام يساعد المهندس على تحديد البيانات للمناطق السكنية او الصناعية التي يريد تصميمها وبشكل سريع ، وكذلك تحديد المواقع التي يصعب الوصول اليها ، مما يتيح سهولة التعامل مع بيانات هذه المواقع من خلال تطبيقات النقل الذكي ليتم انتاج مخططات وخرائط موقعية تحتوي على ادق التفاصيل المطلوبة للتصميم الذكي.

ان تصميم المدن الذكية يتيح العديد من الفرص لتطوير تطبيقات الكترونية متنوعة مثل تطبيق ما يسمى بالسياحه الالكترونية في المناطق العمرانيه السكنية والمناطق التاريخية و الاثرية التي تحتفظ بالتراث الاماراتي ، حيث يستطيع المهندس تطوير مخططات ثلاثية الابعاد بكامل التفاصيل الرقمية والصورية. كذلك يمكن تطوير جولات افتراضية مدعمه بتقنيات ثلاثية الابعاد من خلال مسارات الكترونية بصرية . احد الاضافات التي تدعم تصاميم المدن الذكية هي العمل على تصاميم المباني الذكية والتي تعتمد على الالكترونيات والشبكات التقنية ، حيث يتم تجهيزها باجهزة حساسة مثل الكمبيوترات ، الكاميرات ، والحساسات الالكترونية المعتمدة علي بيانات المغذية لهذه الاجهزه مما تساعد على راحة مستخدمي هذه الابنية .

تتيح الية التحكم الالي او التحكم عن بعد للمستخدمين بعمليات التكيف والاضاءه والري الداخلي للحدائق سهولة التشغيل والتحكم الذي يقلل مصاريف الاستهلاك ويسعد المستخدمين حيث يتم السيطرة على العديد من العوامل التي تزعج مستخدمين هذه الابنيه. تم تعريف المباني الذكية بانه مصطلح ارتبط باستخدام التقنيات الحديثة التي تدعم التصرف الالي المستجيب للمتغيرات وحدد مميزات المبنى الذكي على انه وسيلة تساعد الزوار والقاطنيين على التعرف على بصمة الصوت وملامح الوجه حيث يساعد على التغلب على معوقات تحديد الهويه. (على & خالد يوسف 2007).

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ما ذكر اعلاه يعتبر جزءا من تطوير منظومة العمل الحكومي ، حيث يتم التركيز على استخدام الوسائل الالكترونية الحديثة لتساهم في تطوير منظومة معايير المدن الذكية لتقديم الخدمات من خلال قنوات متعدده ، حيث يتم توفير الوقت والتكلفة في هذه الخدمات . ان خدمات الحكومة الالكترونية تعتبر عنصر اساس لتنمية المدن الذكية ، فان الية تطبيقها تحدد الية العمل في المدن التي يتم تصميمها مع توفير بيئة عمل ذكية ، وهناك العديد من الخدمات التي تقدمها الحكومه الذكية مثل تقديم كافة الخدمات الحكومية للمواطنيين الكترونيا مثل تراخيص البناء والمخططات الموقعية للمبنى عبر شبكات الانترنت وكذلك تساهم في تبادل المعلومات والمراسلات بين الادارات الحكومية بمختلف مستوياتها .(يوسف وائل محمد 2007).

معوقات تصاميم المدن الذكية

ان قلة وضعف المكونات الاساسية لتقنية المعلومات تشكل تحديا رئيسيا امام المعايير التطبيقية لتصاميم المدن الذكية ، حيث توافر المعلومات الضرورية ليس بالشيء السهل ويشكل عائقا ملحوظا للمهندسين المستخدمين لهذه المعايير ، مما يؤدي الي تاخير ملحوظ في التنمية العمرانية او التنمية مشاريع البنية التحتية للمدن من خلال تطبيق معايير التصميم الذكي.

ان عدم تطابق وتوافق المخرجات التعليمية في المؤسسات التعليمية في معظم الدول لا يتناسب مع ما يتطلبه سوق العمل ، ولا يتناسب مع الاهداف الاستراتيجية لهذه الدول ، حيث يشكل هذا تحديا كبيرا للمؤسسات القائمة على تحقيق استراتيجياتها باستخدام التصاميم الذكية في مشاريعها ويؤدي الي نقص في الكوادر المؤهلة لتطوير واستثمار تقنيات المعلومات. وللتغلب على هذا التحدي الرئيسي يجب تطوير خطط وبرامج تدريبية للمهندس وبشكل مستمر لرفع الكفاءات والمهارات التي يجب ان يتمتع بها ، من خلال تعاون مشترك بين المكاتب الهندسية المتخصصة في مجال التصميم والمؤسسات التنفيذية وجمعية المهندسين الاماراتيين في الدولة . ان تعزيز دور المكاتب الهندسية في عجلة التنمية من خلال تطبيق اسلوب مدروس للاستفادة من الكوادر الهندسية وتوظيفها لتدريب المهندسين.(ضياء الدين توفيقي ، 2004).

احد التحديات القائمة والملموسة في هذا المجال " المصداقية في التعامل " "وصحة المعلومات المتوفرة" على الشبكات المعلوماتية حيث تضارب الاسماء والعناويين للعديد من اسماء الاشخاص والمؤسسات الوهمية والتغيرات المستمرة لهذه الاسماء ، يؤدي ذلك الي تضارب في المعلومات وعدم الثقة والمصداقية في اعتماد التصاميم التي تتطلب حفظا لملكيتها. ان تنفيذ استراتيجية تطبيق الذكاء الاصطناعي في تصاميم المدن الذي يتطلب من المهندس الاماراتي تحديد دقيق للمعوقات والتحديات ودراستها بشكل مفصل وايجاد الحلول والبدائل المدروسة لكل مشكلة . ان ذلك يساعد على تحويل المدن القائمة الي مدن ذكية حيث يساعد ذلك على اختيار التطبيقات الذكية المناسبة حسب الاهداف المناسبة للمدينة المراد اعداد تصاميمها بالاسلوب الذكي وامكانية

تطبيق التصاميم المعتمدة على ركائز ومعايير التطبيقات الالكترونية . ان ضعف البنية الاساسية لتقنية المعلومات تشكل عقبة رئيسية امام تطبيقات تصاميم المدن الذكية ، لان ذلك يتطلب كلف اضافية ناتجة عن اجور التدريب المستمر للمهندسين واجور الاستعانة بالمؤسسات العالمية المتخصصة في هذا المجال ، وان عدم وجود اطار قانوني للتحكم بطريقة التعامل مع البيانات وطرق تطبيقاتها يسبب نقص المهارات والكفاءات المتميزة لتنفيذ هذه التطبيقات.

ولتغلب على العديد من التحديات فان المؤسسات المتخصصة في تقديم الخدمات الاستشارية في هذا المجال (التصميم الذكي) يجب عليها ان تدرك بان المجالات التخصصية في التدريب المستمر لابد ان تعتمد على البحث المستمر ومواكبة التقدم التكنولوجي في مجالات عديدة يعتمد عليها المهندس الاماراتي اثناء ممارسة عمله ، لان ذلك يعزز من خبرته واداءه في العمل وتحديث معلوماته ومنحه الثقة في قدراته على اتخاذ القرار، معتمدا بذلك على خبرات عديده ومنوعة في ادارة التنمية في المدن العمرانية والاعتبارات البيئية للمشاريع المستقبلية ، مركزا على تطبيق معايير الاستدامة العالمية وتقييم البعد الاجتماعي للتصميم الحضري المرتكز على التطبيقات الالكترونية والذكاء الاصطناعي حيث تبدا هذه المرحلة من المهندس الذي يشكل عجلة العمل الهندسي ، فمن خلال الارتقاء بكفاءته وتطوير قدراته المعرفية ومهاراته الفنية ، فانه يمكن توظيف ما يتاح من امكانيات علمية وتكنولوجية بأقصى مرور لتطوير واقع العمل الهندسي في دول المنطقة.(على محمد السواط & هاشم عبد الصالح 2002).

على المهندس الاماراتي ان يكون فاهما ومدركا لمتطلبات وتطبيقات المدن الذكية والمشاكل والتحديات التي تواجه تطبيقات التصاميم الذكية ، ومبادئ الاستراتيجية والتشريعات المطلوبة لتحويل المدن القائمة الي مدن ذكية مع الفهم الكامل لالية وبناء وتصميم المدن الذكية بشكل غير تقليدي ، ولا يخلى الامر من وجود معوقات وصعوبات التي يجب التغلب عليها وتحويلها الي فرص وتحسينات لانجاز العمل بطريقة افضل تتناسب مع توجيهات ورؤية الحكومة الرشيده في دبي حيث صرح سمو الشيخ حمدان بن محمد بن راشد ال مكتوم بان الحكومة ستمكن المنصات المجتمعية للابتكار في تصميم حلول مبتكرة للتحديات والمعوقات ، فريادة المدن في المستقبل ترتكز على مدى مرونة تشريعاتها على استخدام التكنولوجيا المجتمعية في تصميم حلول غير تقليدية .(سمو الشيخ حمدان بن محمد بن راشد ال مكتوم, 2019).

تعتبر مدينة دبي في دولة الامارات العربية المتحدة من اكثر المدن التي شهدت تطورا سريعا في النمو العمراني وركزت في العقدين الاخيرين على تطوير البنية التحتية باحدث المواصفات والمعايير العالمية ، واستقطبت العديد من الخبراء والمهندسين وكذلك المستثمرين للاستفاده من خبراتهم في تنفيذ استراتيجية الدولة ، حيث أسست المدينة بيئة عمل مدعمة بقوانين وتشريعات لحماية كل من يعمل بالامارة في جميع القطاعات. ركزت استراتيجية الامارة على العمل في البنية التحتية بما يتناسب وطبيعة التحول السريع من النظام التقليدي الي النظام الالكتروني حيث ان تحويل مدينة دبي الي مدينة ذكية في الاطار الاستراتيجي الذي تبنته حكومة الدولة بعدم الاعتماد على النفط كمورد رئيسي للاقتصاد بل التركيز على العوامل الاقتصادية والتجارية للمدينة .(جاسم محمد & مجدي 2001).

وكان المحرك الرئيسي لتنفيذ هذه الاستراتيجية من خلال الاستفاده من تقنيات معلومات الشركات العالمية التي تم استقطابها ، وتم تأسيس افرع كثيرة لها في مدينة دبي للانترنت التي تم تاسيسها لهذا الغرض ، ونتج عن ذلك زياده في المؤشر الاقتصادي . كذلك تم التركيز على استدعاء الخبرات التي تتمتع بمهارات عالية في هذا المجال وتعزيز الثقة بين القطاعات الحكومية والافراد والمؤسسات العاملة في هذا المجال من خلال الدعم المتواصل لاكمال البنية التحتية للمدينة والتغلب على كل التحديات التي تواجه المؤسسات المتخصصة في مجال التصميم المعتمد على تكنولوجيا المعلومات في ذلك الوقت . كان للمهندسين الاماراتيين دور كبير للاستفاده من الخبرات التخصصية التي تم استقطابها من خلال نقل المعرفة وتبادل الخبرات وخصوصا المهندسين العاملين في القطاع الحكومي حيث بدات ملامح التحول في المدينة الي مدينة الكترونية وخصوصا في القطاع الحكومي الذي قدم ولا زال يقدم افضل الخدمات للمؤسسات والمشاريع والافراد.

أصبح هناك قاعدة بيانات متوفرة لدى الجهات الحكومية في متناول جميع الموظفين مما يسهل عليهم سرعة اتخاذ القرار لتنفيذ المشاريع المقدمة من الافراد او المؤسسات الاستثمارية. لقد ساعد هذا الانجاز على تسهيل الاجراءات المقدمة والمتميزه بدقة المعلومات التي تحتوي على الدقة في كل اجراء يتخذ من خلال التطبيقات الالكترونية السريعه . كان للتعليم الالكتروني احد الاهداف التي تم التركيز عليها من الحكومة حيث اثمرت وحققت المؤتمرات والشراكات بين المؤسسات التعليمية والقطاع الحكومي عن نتائج ايجابية تتعلق بدمج اساسيات التعليم بقطاع التكنولوجيا الذي يعتبر احد ركائز تصميم المدن الذكية . تم نشر ثقافة التصميم الذكي بالجامعات وتحديدا كليات الهندسه بجميع تخصصاتها بهدف اعداد جيل حديث من المهندسين قادرين على استخدام جميع التطبيقات الالكترونية التي تساعدهم على اعداد تصاميم ذكية.

ان انضمام هذا الجيل من المهندسين للعمل في القطاع الحكومي يعزز الاداء على أعلى المستويات في منظومة العمل الالكتروني الحكومي بامارة دبي ، حيث قامت حكومة دبي بتشكيل فرق عمل لعشرة مشاريع تطويرية لها علاقة بالتصاميم الذكية في الجهات الحكومية ضمن مبادرة " في دبي نتعلم " التي ينفذها برنامج دبي للتميز الحكومي للامانة العامة للمجلس التنفيذي لمواكبة الوتيرة المتسارعة للمتغيرات العالمية وضمان الحفاظ على الانجازات المتحققة في اطار المسيرة التنموية الشاملة لامارة دبي ورصدها في موقع الكتروني متخصص بالمقارنات المرجعية . هدف هذه المبادرة الي نقل وتبادل المعرفة في القطاع الحكومي الالكتروني ورصد مستويات الاداء والوقوف على المشاريع المتقدمة والمتطورة في مختلف القطاعات من خلال الدعم الذكي والتكنولوجيا المطبقة التي تساعد مع تطوير نهج العمل الجماعي بروح الفريق الواحد.

تهدف هذه المبادرة الي تعزيز ثقافة التعلم المؤسس وتسخير افضل الممارسات المحلية والعالمية من خلال المعايير الذكية المعتمدة عالميا ونقل وتبادل المعرفة في القطاع الحكومي في امارة دبي . ويتم تطبيق مشاريع المقارنة المرجعية من قبل فرق عمل هندسية من كل جهة حكومية مشاركة يتم تدريبها بشكل متخصص

والاشراف على انشطة التعلم من افضل الممارسات العالمية. أكد سمو الشيخ حمدان بن محمد بن راشد ال مكتوم ولي عهد دبي رئيس المجلس التنفيذي سأتابع شخصيا منظومة العمل الحكومي في دبي ونتائج مستويات الاداء للوقوف على تقدم مشاريع وخطط التطوير والوصول الي اعلى مستوياته في مختلف القطاعات للحفاظ على تكامل عناصر منظومة العمل الحكومي ، كذلك اكد مواصلة العمل على اعداد عقول قيادية مبدعة وقادرة على ترجمة رؤيا القياده الحكيمة.(سمو الشيخ حمدان بن محمد بن راشد ال مكتوم , 2019).

لقد حقق عدد كبير من المهندسين الاماراتيين العاملين في القطاع الحكومي انجازات كبيرة جدا في التصاميم الذكية بالتعاون مع عدد كبير من المهندسين الاختصاصيين في هذا المجال حيث يتم تطوير البنية التحتية لشبكة الاتصالات وانشاء مدينة محمد بن راشد للتقنيات الحاضنة لكثير من مجمعات البحث والتطوير الالكتروني ، بغرض الاستدامة وكذلك قرية المعرفة التس تستقطب طاقات ابداعية وتخصصية وتحتوي على مراكز تدريبية وتعليمية. أما مدينة دبي للانترنت فهي معلم أساسي في الادارة واستقطبت العديد من خبراء التكنولوجيا والانترنت. ومن أهم الانجازات التي حققتها الامارة في هذا المجال هو مجال النقل الذكي ، حيث تم رفع كفاءة شبكة الطرق والجسور والمواصلات من خلال ربطها بنظام الكتروني موحد قائم ومصمم على تطبيقات ذكية عالمية ان ذلك ساعد على تقليل الازدحام وضمان انسيابية حركة مرور السيارات والتحكم بالاشارات الضوئية وإعطاء الاوليات لحركة المرور بالاتجاهات المتاحه من خلال الربط الالكتروني.

ان عملية التطوير والتعليم للمهندس الاماراتي قادرة على تطوير الية حديثة للتصميم الذكي للمدن مما يساهم في تحقيق الهدف الاستراتيجي ، حيث تتجلى الابداعات والطاقات من الافراد المتخصصين. لقد نجحت دبي في انشاء مراكز تعليم الكترونية مرتبطة مع مؤسسات ابحاث عالمية لنشر ثقافة التصميم الذكي بين الافراد وخصوصا المهندسين والمؤسسات الحكومية القائمة على تنفيذ المشاريع المصممة. ان انشاء مشاريع داخل منطقة دبي الحرة للتكنولوجيا والمكون من مراكز تعليمية متخصصة في مجال المعلومات يهدف الي تشجيع التعليم الالكتروني المبني على أسس التعليم التقليدي ، المرتبط بالذكاء الاصطناعي والذي يؤدي الي الابداع والابتكار في اعداد التصاميم الذكية.(على عبد الرؤوف ،2007).

الخاتمه

ان تحقيق الاهداف الاستراتيجية التي حددتها الحكومة والمتعلقة باعتماد منهجية تحويل دبي الي مدينة ذكية عالمية، من خلال اعتماد المعايير العالمية لتصاميم المدن الذكية على ايدي مهندسين اماراتيين متخصصين في هذا المجال وكذلك المهندسين العاملين في القطاع الحكومي ، يتطلب التركيز على تفعيل الجهود والاتفاقيات الموقعة بين المؤسسات الحكومية ومؤسسات التعليم العالي ، الي يجب ان تركز على مخرجات التعليم في هذا المجال ، كذلك تحديث البرامج التدريبية للمهندسين في هذا المجال الذي يتطلب التركيز على استراتيجيات محدده لتفعيل خطط التدريب المطلوبة التي تتناسب مع طبيعة العمل في مجال تصاميم المدن الذكية. ان ورش العمل

والندوات والمحاضرات المستمرة التخصصيه المنتظمة، تضمن تأهيل عدد كبير من المهندسين الاماراتيين القادرين على التعامل مع التغيرات المتعلقة بالتطوير التكنولوجي السريع ، واثرها على اعداد تصاميم ذكية لمدن الدولة مع الحفاظ على الهوية العمرانية الاماراتية للدولة ، والتي تؤثر بشكل ايجابي على التواصل الاجتماعي للسكان وحفظ البيئة من اي تاثيرات مناخية . ان الجمع بين الحداثة، الاستدامة ، الذكاء الاصطناعي ، التعلم الذكي والتكنولوجيا يتطلب العمل وبشكل متواصل مع خبرات تخصصية وذلك لضمان نقل الخبرات وكسب المعرفة على المستوى المحلى .

على المهندس الاماراتي ان يكون قادرا على دمج المخرجات التعليمية المبنية على نظريات حديثة مع الاساليب العلمية القابلة للتطبيق المكتسب من البرامج التدريبية المكثفة التي تطرحها المؤسسات المتخصصة في هذا المجال ، لضمان التمكن من تطبيق المعايير العالمية لتصميم المدن الذكية ليكون له دور فعال في عملية التنمية المستدامة .تم التاكيد على اهمية دور الجمعيات الهندسية في دول المنطقة بتحملها دور كبير في رعاية المهندسيين وتطوير قدراتهم من خلال البرامج التدريبية المقترحة والتي تعمل على تقديم كل ما هو جديد في عالم الهندسة .(بدر ملبس الزايدي ,2004).

ومن خلال التركيز على تطبيق ما تم ذكر اعلاه ، فان المهندس يصبح قادرا على ادارة وتطبيق معايير التصميم للمدن الذكية من خلال :-
- فهم وتحديد المحاورالتي تدعم تصاميم المدن الذكية المعتمدة على اساسيات تنمية المدن كالمعرفة والاقتصاد.
- التغلب على التحديات والمعوقات التي تواجه تطبيقات المعايير المتعلقة بالتصاميم مع تطوير الية معتمدة على
    المستوى الدولة لضمان توحيد التطبيقات والمتعلقة بالتصاميم الذكية.
- التركيز على دمج معايير الاستدامة المتوافقة مع المعايير العالمية بعد التغلب على المشاكل المتعلقة بالبيئة والبنية التحتية، من خلال تصنيف المعلومات مع التركيز على صحتها ودقتها قبل تحويلها الي بيانات الكترونية.
- زيادة جوانب المعرفة المتعلقة بابعاد المدن الذكية والمرتبطة بالتطوير العمراني وتطوير البنية التحتية والخدمات والطرق والاتصالات.
- التركيز على فهم الجوانب القانونية في هذا المجال ، والمتعلقة في خصوصية استخدام البيانات والمعلومات وتداولها بين الافراد والمؤسسات.
- المواكبة المستمرة للتطورات السريعة ومتابعة التوجهات الدولية التي ترتكز على التنمية المستدامة للمدن لتحقيق استراتيجية واضحة لمدن المنطقة.
- التركيز على دقة البيانات والمعلومات اثناء اعداد التصاميم والتي هي جزء من الية التطبيق التي يتم اعتمادها قبل واثناء عملية التصميم لضمان نتائج ملموسة عند التنفيذ .
- التواصل المستمر للمهندس الاماراتي مع المؤسسات المتخصصة في مجال تقنية المعلومات والحصول على شهادات الاحتراف في هذا المجال .

على الدوائر الحكومية التي تضم عدد كبير من المهندسين الاماراتيين الواعدين والمؤسسات التعليمية ان تعمل جاهدة وبشكل متواصل على تطوير برامج تدريبية مدروسة تتواكب وتتوائم مع التطور التكنولوجي السريع ، وذلك لتوظيف الوسائل والحلول التكنولوجية الذكية لزيادة مؤشر السعاده لسكان مدينة دبي وباقي المدن في الدولة . التركيز على خطط ومنهجيات تعتمد على البيانات الصحيحة لتطوير معايير التصميم ، تعتبر من الاوليات الهامه لتحديث الخدمات المقدمة في مدينة تضم اكثر من 200 جنسية . ان تصميم الخدمات الجديدة والذي يعتبر جزءا من التصاميم الذكية للمدن ، يضمن تعزيز الثقافات بين افراد المجتمع بجميع فئاته حيث تعتبر البيانات جزء لتكون معيارا اساسيا في اتخاذ القرار لضمان سعادة الافراد في المدينة .

على المهندس الاماراتي ان يكون مدركا بان نتائج التصاميم الذكية تسعد المجتمعات والافراد والمؤسسات العاملة في الدولة ، حيث يجب ان يتم اعتماد تقنيات حديثة ومعايير معتمدة تعزز من تحقيق استراتيجية الدولة. ان تصميم واعداد الية فعالة لتنفيذ الخطة الذكية ، يجب ان تتلائم مع حاجيات المجتمع الاماراتي ، حيث على المهندس الاماراتي ان يكون مدركا لنوعية الخدمات التي يجب ان تكون فعالة وقابلة للتنفيذ ، ويتم تحديثها بشكل مستمر من خلال التاهيل والتدريب المستمر للمهندس ، والعمل مع شركاء لديهم الخبرة والثقافة في تصميم المدن الذكية .

من اهم المخرجات الرئيسية التي يجب على المهندس الاماراتي التركيز عليها اثناء دراسته الجامعية ، واثناء عمله هي كيفية التعامل مع التطبيقات الذكية وفهم ثقافات المجتمعات الاخرى التي تساعد على انتاج تصاميم ذكية متنوعة كذلك متابعة نتائج الخدمات المقدمة من التصاميم الذكية الحالية المعمول بها المبنية على بيانات ، ومقارنتها مع المعايير الحديثة المكتسبة . اضافة الى ذلك هو البحث عن ادوات واليات تساعد في تطوير خدمات التصميم الذكية ليتم تنفيذ المشاريع المعتمدة على بيانات صحيحة ودقيقة .

التزام المهندس الاماراتي بمعايير المدينة الذكية التي تعتمد على بنية تحتية بيئية ذكية ، وتوفير رفاهية مجتمعية للسكان وحياة من نوع جديد ومميز ، من خلال تواصل مستمر مع افراد اذكياء وتقنيات ذكية تساعد في التنقل الذكي تحت اشراف حكومة ذكية ملتزمة ببناء اقتصاد قوي يعتمد على الابتكار والتكنولوجيا والمعرفة والاستدامة.

تنفيذ الرؤية الحكومية التي يجب ان تكون واضحة المعالم لدى المهندس الاماراتي ىتعتمد على تحديد استراتيجية يمكن العمل من خلالها بشكل واضح وتهدف الي تطبيق المعايير المعتمدة في اعداد التصاميم من خلال التطبيقات الالكترونية الحديثة المتوفرة التي تجمع بين الاستدامة والابداع . ان قياس دينامية المجتمعات ومستقبل تقدمها تقاس بمدى ما تتيحه لابنائها من فرص لتنمية سماة الابداع والابتكار فيما بينهم. (حبيب ادم & جيهان عثمان 2018) .

ومع الفهم الصحيح لكيفية التعامل مع مكونات وشبكات البنية التحتية المتوفرة وعدم اهمال عامل المحافظة على تراث المعماري والبيئي للمدينة اثناء الترويج السياحي للتراث الاماراتي الذي يتم تصميمه بالتكنولوجيا الرقمية المبنية على التصاميم الذكية. وكذلك التركيز على مساحات الخضراء المستدامة في المناطق الذكية لتخفيف الانبعاثات السامة داخل المدن من خلال تطوير انظمة نقل صديقة للبيئة تستعمل على طرق مصممة بمعايير ذكية.

التوصيات

ركزت الدراسة في هذا البحث على دور ومسؤولية المهندس الاماراتي في كيفية تطبيق المعايير العالمية التي ترتكز عليها اسس تصاميم المدن الذكية ، من خلال اعتماد الية ممنهجة تتواكب مع التطورات التكنولوجية ، وقواعد بيانات صحيحة مرتبطة بتطوير البنية العمرانية والاقتصادية والبيئية ، وطريقة الاستقاده من التقنيات الحديثة في تخطيط مدينة دبي القائمة ومدن دولة الامارات العربية المتحده . يتحمل المهندس الاماراتي مسؤولية كبيرة في تحقيق استراتيجية حكومة دبي، الهادفة الي جعل دبي اذكى مدينة في العالم من خلال التصاميم الذكية التي تمارسها المؤسسات الحكومية والخاصة ، حيث يجب ان يكون مدركا لمفهوم واساس المدينة الذكية ومكوناتها ومتطلباتها وطريقة اداءها ومعايير تقييمها على المستوى العالمي . ياتي ذلك من خلال الاطلاع المستمر وتبادل المعلومات مع المدن الاخرى التي قامت بتطبيق هذه التجربة ، ليكون قادرا على وضع الية معتمدة متخصصة في تصاميم المدن الذكية ، وتحويل المدن القائمة الي مدن ذات تقنيات ذكية.

ولتحقيق ما تم ذكره فان المهندس الاماراتي يتوجب عليه الالتزام بالتوصيات التاليه:

1- المواكبة المستمرة مع المتغيرات السريعة لتقنية المعلومات وشبكات الاتصال المتعلقة بتصاميم المدن ، من خلال الالتزام ومتابعة خطط التدريب وورش العمل التي تفرضها المؤسسات الحكومية بالشراكة مع المكاتب الاستشارية وجمعية المهندسين الاماراتيين.

2- التواصل مع المؤسسات الدولية المتخصصة في مجال التدريب المهني الذي يركز على تصميم المدن الذكية ، وخاصة مع المؤسسات التي وقعت اتفاقيات شراكة طويلة الاجل من اجل نشر المعرفة على المستوى الفردي والمؤسس لهذا النوع من التطبيقات.

3- العمل المستمر على تنمية الفكر الابداعي وثقافة الابتكار والاختراع مستفيدا من تطبيقات التقنية الحديثة لتطوير المعايير المعمول بها والوصول الي اعلى المواصفات والمقاييس العالمية لتصميم المدن.

4- رفع التوصيات الهامه الي صناع القرار في مؤسسات التعليم العالي والمؤسسات الجامعية من خلال المؤسسات التي يعمل بها المهندس ، لتحسين المخرجات التعليمية بكليات الهندسة بجميع تخصصاتها لتتواكب مع سياسة الحكومة " التطبيقات الالكترونية الضرورية المتلائمة مع التصميمات الذكية للمدن ".

5- المتابعة والتواصل المستمر مع مراكز الابحاث العلمية المتخصصة في مجال تصاميم المدن الذكية ، والتعرف على المدن التي نفذت هذا النوع من المشاريع على المستوى العالمي" تصاميم المدن الذكية " والاستفادة من خبراتها في تطبيقات التكنولوجيا والاخذ بتوصيات الدروس المستفادة في هذا المجال .

6- المطالبة برصد ميزانيات محدده لتوريد برامج تصميم ذكية متعلقة بالمدن تزيد من تحفيز الابداع في الابتكار في هذا المجال، وتطبيق هذه البرامج على مشاريع مختلفة بالدولة مع تقييم الاداء الدوري لهذه البرامج والذي يصاحبه تقييم المهندسين بشكل منتظم.

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Ethics and Technology – IOT Track

The usage of Machine Learning and Artificial Intelligence for Healthcare application in UAE

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ABSTRACT

The increasing interest in healthcare knowledge of data has heightened the need for Artificial Intelligence (AI) and Machine Learning (ML) algorithms and tools suitable to predict decisions in the health domains. AI, specifically the sub-fields of the machine and deep learning, provides optimal cost-effective options to expand the universe of knowledge and solutions in healthcare. In this context, the main aim of this paper is to present a research study, extending AI and ML algorithms to empower healthcare practitioners and academics to understand and decide for serious health problems. With the introduction of the AI/ML, we can accumulate, analyse, and elaborate on all the structured and unstructured data collected and obtain valuable insights. The combination of AI and ML is a research area that presents exciting challenges for the future of healthcare. These new challenges are related to the application of AI/ML algorithms into the healthcare ecosystem. In this paper, we initially present a study of the applied machine learning algorithms for healthcare. We present the most commonly used methods to answer different types of questions in healthcare analytics. Based on the type of questions answered, there is another useful way to define ML algorithms. There are two types of ML algorithms, supervised and unsupervised training algorithms. Methods that require input data with known label are called a supervised training algorithm, and these that do not require prior knowledge of what answers are expected are called unsupervised. The majority of the ML algorithms applicable to healthcare are supervised learning algorithms. For supervised learning algorithms, we need to focus on data fidelity, especially for the training data. This algorithm is particularly challenging in healthcare when unstructured data is critical, and data comes from multiple sources. Also, we present best practices for successful ML algorithms providing different use cases.

Keywords: Artificial Intelligence, Healthcare, Machine Learning

1. Introduction

The rise of Big Data, Machine learning (ML) and Deep learning (DP) [11] techniques and technologies have led to a new generation of automation, knowledge generation and prediction capabilities. Advances in computing capacity and power have enabled the collection, storage, analysis and transportation of vast amounts, and types, of data in order to produce specific and precise insights across industries worldwide. The healthcare sector, which invests heavily in research on a system as complex as the human body, has and will continue to benefit from the implementation and integration of ML into industry-wide systems and practices.

Reasons for generating insights from big data using machine learning could be organizational, cognitive, technical and operational. Using approaches that go beyond rules-based deductive reasoning, traditional systems engineering and descriptive analytics, machine learning provides cost-effective solutions to expand the universe of knowledge and solutions in healthcare. Solutions generally fall under the following broad categories:

1) Automation of repetitive tasks that require labor and may not always be done with precision due to human limitations- cognitive, physical or emotional.
2) Data reduction via learning and prediction.
3) Generation of new computational biomarkers by finding patterns that are not visible to the human eye.

Shifting through the full range of architectural options available for use is not always easy, as information on the Web could be too general, too technical or mathematical and not necessarily applicable to the healthcare sector. This paper provides a conceptual description of crucial technologies within machine learning and several applications of these concepts to healthcare use cases, in a step-by-step manner. Best practice implementations and management techniques are also provided to help with a smooth and robust deployment of a machine learning architecture in the respective environments.

2. Artificial Intelligence in UAE

Artificial Intelligence (AI) [12] and Machine Learning adoption and deployment proliferated since "The imitation game" and since Turing asked the question: "Can machines think?" The machine learning algorithms have been improved over time, the amount and availability of data proliferated, and the exponential growth of the computer processing power are essential enables fueling the AI adoption and acceleration. Artificial intelligence could be a significant opportunity to improve the UAE economy.

The UAE government is the first country in the world to create a Ministry of AI and the first country in the Middle East to create an AI strategy [7]. The AI strategy was launched in October 2017 that feeds into the UAE Centennial 2071 plan. The strategy aims to enhance the government performance and efficiency in nine pillars: transport, health, space, renewable energy, water, technology, education, environment, and traffic as depicted in the following figure 1. As a result, the costs across the government will decrease, the economy will flourish, and the UAE will be positioned as a global leader in the AI Application.

Figure 1: UAE AI Strategy (Source: AI Strategy [17])
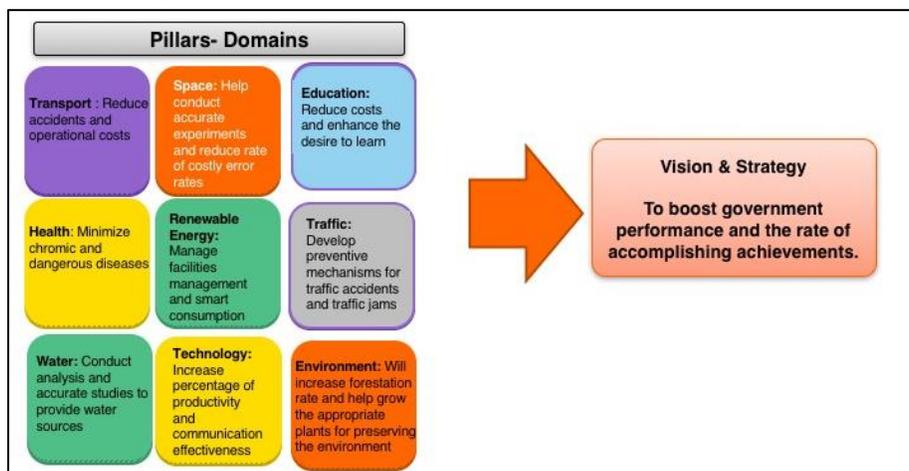
There is no doubt that AI improves productivity by solving complex problems, which delivers a pool of opportunities, but also risks and challenges. How the UAE decides to act to these threats will impact the economy and the society for years to come.

The implications of AI on the various ways in which society works and lives are significant as it contributes to the job market disruption. AI will automate a lot of human tasks; hence, many jobs will disappear, many jobs will enhance, and many foresee that new - unknown yet – will be created.

As AI shifts the demand from many job types to new unknown ones, upskilling and training is a lifelong necessity. Therefore, the upskilling pillar should be added as a vital part of the UAE AI Strategy.

The government should adequately prepare the people for the future workplace in two steps. Firstly, the curriculum in schools should be adjusted to include electives such as computer science, data analysis, deep learning, neural networks, statistics and all AI-related topics. Such a change requires thorough education and upskilling for teachers as well to be able to build a generation ready to navigate in the AI-driven world. Secondly, organizations should mandate employees to undertake training in data analysis. Artificial Intelligence (AI) could help to boost diversification and growth in the next decade. The government is keen to seize the opportunity; especially that UAE has crafted a national AI strategy, created the UAE AI Council, and appointed the world's first Minister of State for Artificial Intelligence, H.E. Omar Sultan Al Olama [2] who defines the Artificial Intelligence as:

> *"AI will impact every single sector we want to be the hub for AI in Government globally. We want to be providing ground for the technology. Our society is ready and willing to be a part of the future."*

The UAE's national AI strategy is focused on expanding the role of AI in nine pillars: transport, health, space, renewable energy, water, technology, education, environment, and Financial Services.

3. Artificial Intelligence and Machine Learning: Definitions

Artificial Intelligence [11] is defined as a set of algorithms giving a computer, analysis and decision-making capabilities that allow it to adapt intelligently to situations by making predictions based on data already acquired. Machine learning [11] is a subset of AI that focuses on providing algorithms with the ability to learn how to complete tasks without explicit instructions, allowing them to adapt in the presence of new data as depicted in figure 2.

Figure 2: Relationship between AI-ML-DL (Source: Authors)
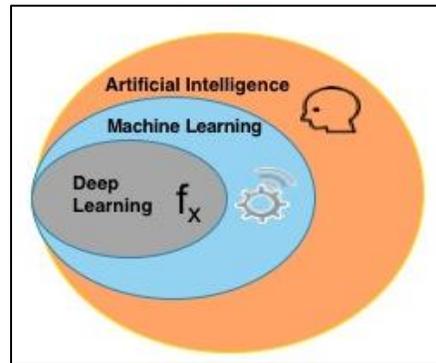
Deep Learning [11] is an advanced type of machine learning adept at identifying abstract or complex patterns in data by using a multilayered artificial neural network. It is called "deep" because it has more layers than simple machine-learning approaches, which allows for more complex processing.

4. Machine Learning – Data Sources

The selection of the machine learning algorithm is always dependent on the type of data that we have and the question that is trying to answer. The question may be as broad as "Can we categorize these data", or something specific like "Is X a side effect of Y?". A list of common questions and the machine learning way to go about answering them is discussed in the second part of this chapter. The first part introduces the types of data and learning algorithms that can be utilized to make sense of them. There are two types of data structured and unstructured as described in the following sections.

4.1 Structured Data

Structured data [12] is highly organized, tabular and can usually be fed into a machine-learning algorithm as it is, without extensive data cleaning or pre-processing. It comes from sources such as relational databases (i.e. SQL), spreadsheets, log files, sensors, and medical devices. Unstructured data requires extensive parsing, and while the sources of this type of data are abundant, not all of them can be collected or analyzed effectively.

4.2 Unstructured Data

The most common sources of unstructured data [12] are media, i.e. images, video, and audio files, text documents that are not organized in a consistent way, ranging from scholarly journal papers to webpages returned by a typical search query to twitter feeds, and databases meant for storing unstructured data such as NoSQL. The high demand for extracting insights from unstructured data has led to the development of several machine learning toolkits that provide audio, image, and unstructured text processing capabilities. Some of the top new ML trends in healthcare involve the processing of unstructured data: Diagnosis using Medical Imaging, Patient query processing using natural language processing tools, Extracting Insights from crowdsourced medical data, and Robotic surgery using video stream processing.

5. Machine Learning Algorithms

Machine learning (ML) algorithms [4] can be supervised or unsupervised and can be used for classification or regression purposes.

Input data is always divided into training and test data before feeding it into an ML algorithm. The purpose of training data is to train the weights or values of the chosen algorithm, and the test dataset is used to ensure that the algorithm works well for sensed data also. An implementation is considered biased if it ignores significant deviations in data and too variant if it is too sensitive to insignificant variations in data. There are several approaches to achieving a balance between the two that depend on the algorithm used, data quality and size, as well as target questions, asked, or insights expected. Details are left out; however, a list of references is provided at the end of the paper.

5.1 Supervised Learning

Supervised learning is used when the data is labelled, i.e. there is a specific output value for a specific set of input values. The algorithm learns to predict output value from the given input values. For the supervised, we have the following learning algorithms.

5.1.1 Linear (and polynomial) Regression

The goal of the linear regression algorithm [1] is to generate a best-fit line of n-degrees through all the data points (1st-degree polynomial fitting is called linear fitting). There is a way to do this without machine learning using matrix multiplication – to get one calculation, entirely accurate best-fit curve. However, as the number of data points and features increases, matrix multiplication becomes infeasible and linear regression, which uses an algorithm called gradient descent. The user provides data entries composed of input features, output labels, and if required, the degree of the best fit line.

In the healthcare sector, an example of regression [14] is predicting the cost of manufacturing a drug, some of the input data 'attributes' could be 'name of drug', 'primary chemical compound cost', 'secondary compound cost', 'number of labs able to produce the final drug'. The output 'attribute' would be the known cost of the drug. The user can subset the attributes to only include features that influence the cost, for example, the 'name of drug' may be irrelevant but its composition and the number of labs that have the instruments required to produce the final drug may be relevant.

The algorithm starts with random weights, or parameters defining the best-fit function. The most challenging part of regression algorithms is gradient descent, which iteratively seeks to *minimize* a cost function, which is the difference between predictions and actual output. Parameters that can be tuned to increase the efficiency or accuracy of this model include: the learning rate, called alpha and momentum. A high value for alpha may result in fewer iterations but non-convergence to a single best-fit line, so it is usually recommended to decrease alpha for later iterations. Momentum is the rate at which alpha increases or decreases – if the algorithm detects that its values are consistently moving in a single direction, it then moves in that direction faster. Optimization techniques like Adam can sometimes be applied that use a 'look-ahead' mechanism to adjust

momentum or learning direction. Similar optimization algorithms and hyperparameters (alpha and momentum) exist for logistic regression, as described in the next section.

5.1.2   Logistic Regression

Logistic Regression [1] is used for classification purposes, and the goal here is to generate a best-fit line dividing the data points into a fixed number of classes, specified by the output data. Binary logistic regression generates a single line that divides the data into two classes. This function also uses gradient descent, and the cost function is only slightly different. Multi-class classification is an iterative implementation of binary logistic regression that produces dividers for each pair of classes and consolidates results before presentation or visualization. Also, the user can specify the degree of curve fitting using polynomial classification APIs, if the data seems to be more conducive to a curved divider.

5.1.3   Decision Trees

The decision tree algorithm [12] progressively creates a 'dependency tree' by splitting the data on the variable that 'best divides' the data at each iteration. It determines the best dividing node by aligning the probability distributions of each feature in the input dataset to that of the output data and selecting the input feature with the most similar occurrence pattern. Error is calculated using standard probabilistic methods comparing predictions to outputs. Another type of decision tree is Random forests in which runs the algorithm on several 'random' subsets of the data, and their results are then consolidated to determine the best tree. Random forests are therefore more resilient to variations in new input data. Another technique used to improve the generalizability of decision trees is boosting.

5.1.4   Probabilistic Graph Models

These models [11] are used to express a conditional structure between probabilistic states or events. These graphs can be learnt or constructed by experts. However, the data used to determine probability values of nodes in the graph cannot be the same data used to construct the conditional, fixed dependencies between the nodes. The most common category of such graphs, called Bayesian Networks, are directed acyclic graphs, i.e. have a directional flow of states. Markov models and Neural networks are both subclasses of Bayesian networks. Sometimes contextual knowledge about data can allow one to infer definite relationships between the data, which allows one to use a more targeted model. Hidden Markov Models (HMMs) that assume the existence of 'in-between' states that cause the probabilistic distribution of the defined states and Kalman filters that assume a continuous state space are subclasses of Markov models that are effective for specific use cases. For example, Kalman filters are used for object recognition in dynamic environments, and HMMs are used to predict potential hidden causes for measurable effects.

5.1.5   Time Series Analysis

Time series analysis [1], as opposed to linear regression, allows one to the group and analyze data according to various time intervals like days, weeks, seconds, months. It is usually used for forecasting and relies on its past observations as features. Conventional techniques are Moving Average computations, and Exponential Smoothing applied on top of moving average computations, which is used to exponentially decrease the weight of past observations when added to present observations.

The Auto-Regressive Integrated Moving Average (ARIMA) model is a generalization of several time-series models which computes a best-fit curve using regression, differencing and moving average computations. Differencing refers to computing the difference between consecutive values and using layers of these as extra "features", and moving average refers to the average values over consecutive time intervals. The regression then includes the moving average of values at all differenced levels to compute the next value in the time-series. Several variations of this algorithm, like seasonal differencing, and optimizations such as

Box-Jenkins have been used to produce desired results. Root mean squared error is also used to compare model performance.

5.2 Unsupervised Learning Algorithms

Unsupervised learning is used in the absence of output values, to infer inherent structure from the given input data.

5.2.1   Clustering

Clustering [12] is the iterative method that calculates relative distances between data points along each dimension and creates groups of data points that are "close" to each other. Calculating similarity measures can be a useful step before making predictions. The number of groups, features or dimensions along which the clustering is done is up to the user. The K-means and K-medoids algorithms define data means and medians, respectively as clusters centroids. Hierarchical clustering builds a tree, grouping data points into smaller clusters with decreasing intra-cluster distance at each level. Clustering can be hard, ensuring that every point belongs to a single cluster, or soft – each point belongs to several clusters at varying percentages. Distribution and density-based models also exist that extrapolate their data points to include an entire region of the mapping space. These are useful in situations where data proximity in terms of the mapped features may not necessarily be as relevant as the identification of a distributional relationship between features.

In the healthcare sector, for example, two data points corresponding to two different diagnoses may be part of the same distribution along with the symptom A versus symptom B axis. While the diagnoses may be predicted using k-means clustering, the distribution clusters, containing much larger datasets, include the two points, may reveal parity between the value of symptom A and the importance of it as a feature.

5.2.2   Association rules

Association rules [12] are defined by antecedent, and consequent pairs (i.e. if <antecedent>, then <consequent>) and are also used to calculate similarity measures and the group frequently occurring data points together. A-priori, FP-growth and Context-based rule mining, among others, are algorithms used to do mostly the same thing, only differing in technical implementations and micro-efficiencies. In order to select 'interesting' rules from all possible ones, constraints and thresholds are encoded such as support (occurrence frequency of the antecedent), and confidence (the validity of the rule), among others.

5.2.3   Topic Modelling

Frequently used in text mining, this technique abstracts out underlying semantic structures in a document or any data that is based on intricate underlying patterns. Algorithms such as Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA) are used to extract frequencies of words and distributions of topics and create clusters of topics and words. This technique is known for categorizing unstructured textual data, such as medical journal papers and crowdsourced information publicly available on the Web. This method captures greater context than regular 'frequencies of words' methods, but still less context than a Recurred Neural Networks (RNN). However, it is computationally way faster than an RNN, so it is preferred for basic categorization,

especially if the dataset is massive. The area of natural language processing often uses extra data from another source to augment analysis. The Semantic Web has stored links between semantically related words. The word2vec library contains a vectorized numerical notation for words such as semantically related words are geometrically close to each other.

6. Artificial Neural Networks (ANNs)

Neural network [11] implementations, especially deep networks, are the most computationally expensive to train but can be used for the widest variety of relationship inference problems. ANNs refers to a large number of parallel processing units that are in some way connected to one another. These units, called neurons, weigh the inputs they receive and produce different outputs (excited or inhibited) depending on the activation function being used. The most commonly used activation functions are Sigmoid, Tanh and ReLu [11]; the first two functions output values in proportion to the signal received, and the later produces zero when an inhibiting signal is received. Like in regression, these the input units of a neural network start out with random weights. Backpropagation is the learning algorithm used to 'backpropagate' deviations in output, or error.

Iterations of forwarding and backward propagation finally yield a convergent solution of the optimal weights. It may not always pay off to connect every neuron to every other neuron. Apart from being inefficient, some connections may receive too many inhibition signals that they die off, unpredictably severing data flow along specific pathways before convergence. This is referred to as the vanishing gradient problem and mainly affects deep networks. To avoid this problem, the number of intermediate layers, called hidden layers, between input and output layers, are kept to a minimum. Some use cases may also contain an inherent structure that could be used to model a relatively sparsely connected neural network. This would increase the likelihood of convergence on the correct weight values.

Specialized neural networks such as convolutional NNs (CNNs) and recurrent NNs (RNNs) [10] are used for spatial and temporal pattern recognition. CNNs are commonly used for image segmentation in a non-continuous state-space; i.e. object detection in different angles. RNNs are used for keeping track of context, in areas such as natural language processing. RNNs can be modified such that their neurons contain memory cells that, instead of merely passing down a weighted modification of its value, decide whether to update the adjacent neurons. The memory cell also decides whether to update its own value during backpropagation or not. The interaction of a neuron with its own memory is encoded and controlled with a second activation function. RNNs that implement this functionality include GRUs (Gated Recurrent Unit) and LSTMs (Long-Short-Term-Memory) [11].

6.1   Artificial Neural Networks

Instead of using backpropagation, ANNs for unsupervised learning form probabilistic relationships between adjacent nodes (and previous values of the same nodes when using RNNs) [11]. This method is used for classification purposes and also to pre-tune initial values of a supervised learning neural network model, almost as a normalization phase.

Dimensionality reduction techniques [11] such as Principal Component Analysis (PCA) or Generalized Discriminant Analysis (GDA) are used as preprocessing steps to mitigate inherent

dependencies in the input data. While they may cause some data loss, not pre-processing the data may cause the model to become more complicated for no reason and result in convergence or visualization issues. This step can be used prior to the implementation of any algorithm, supervised or unsupervised, but the dimensionality reduction techniques are inherently unsupervised – they use algebraic techniques to reduce input data features and dimensionality.

6.2   Outliers

When its causes are known, can be safely ignored when analyzing a particular use case. However, outliers can also be valuable pathways to acquiring new knowledge, that may affect research, diagnosis, treatments, everything. Anomaly detection is useful not just in fraud detection but also in discovering rare diseases (i.e. auto-immune diseases), potentially dangerous side effects, hidden environmental causes, and may contain clues about the functioning of specific chemical structures.

Best Practices for Machine Learning Algorithms

1. Start with simple, individual models, before trying out more complex optimizations, models or integrated architectures.
2. Try many algorithms before deciding on the best one: consider efficiencies, future use cases and maintenance and scalability requirements.
3. Treat the data with suspicion: look out for systematic biases, errors, inconsistencies, unexpected results and outliers.
4. Normalize, scale and adjust data according to goals and respective models in order to place boundaries around the variance of data and minimize noise.
5. Iteratively validate the data on subsets to be able to isolate errors quickly.
6. Correlation is not causation: keep track of hidden factors and always be on the lookout for more data that have the potential to strengthen or weaken previous patterns.
7. Keep track of model changes.
8. Monitor ongoing performance. Set up a feedback loop and alarm system – maintenance may not always be required at convenient hours.
9. Use models and APIs that make sense and are easy to understand.
10. Do not be fooled by standard accuracy measures. Set expectations for precision and recall values before implementing the model – the standards for these are only based on organizational goals.

7. Healthcare Use Cases

The data analysis lifecycle defines analytics process consists of essential activities including framing the business problem, gathering data, processing data, selection of ML algorithm, build the model, validate the model and operationalize the model. Typical uses cases using in healthcare are the following:
1. Disease Detection, Measurement and Research
2. Treatment/Drug Recommendation, Research
3. Automated Patient Diagnosis, Patient Support
4. Care Provider Support in Clinical and Organizational tasks
5. Insurance Fraud Detection, General Anomaly Detection

For all the uses cases, the individual patient health care records are the baseline for the machine learning algorithms. They used as the primary context for evaluating a patient, drug, treatment plan, or facility and resources plan. All these data are stored in reachable servers as it is managed per organisation.

7.1 Use Case #1: Disease Detection

This use case is disease detection [3,13] using machine learning algorithms. The main question to be answered is: *"Given certain symptoms, what is the likelihood that person X has disease A or may suffer from disease B in the future?"*

Simple predictive analytics such as probability relating groups of symptoms to diagnosis can sometimes be the only thing needed to predict a diagnosis. Heart failure or sepsis detection are acute conditions that can be detected using simple probabilistic models and a relatively small amount of data [9]. However, the prediction of such conditions may require more sophisticated models trained using more data sources. A set of symptoms may point to several different diagnoses, at which point it becomes necessary to include features such as duration and severity of symptoms, illness history, genetic predispositions, living/working conditions. For simple cases, decision trees may work well to produce a hierarchy of significant factors that ultimately point to the diagnosis. Logistic regression can be used to concretize a functional rule for segregating values in features as per expected results. Linear regression can be used to define thresholds for identifying abnormalities in lab results, which is a useful tool for relatively inexperienced practitioners when dealing with different groups of patients with different conditions.

Machine learning models can get more complex for unknown diseases if a set of symptoms has not been seen before, as it becomes difficult to predict diagnosis without generating some sort of a model for individual symptoms within the sets also. Association rules, probabilistic graph models and neural networks work well in such scenarios. Association rules narrow down the set of symptom combinations to the ones that are considered likely above a certain threshold. Probabilistic mapping of outcomes could be attached to 'sticky' sets of symptoms that often appear together to influence the diagnosis. New features such as the severity of diagnosis could be formed by isolating common symptoms from rare ones. The interaction of rare symptoms with common ones and other features that are in line with the resulting diagnosis could be modelled using a neural network, to predict current or future probable illnesses. Patient illness history could be used with discrete-time series forecasting models to determine the time taken for one illness to cause or convert into another. This is useful information for risk assessments, used by hospitals as well as insurance companies.

7.2 Use Case #2: Treatment/Drug Plan for the patient

This use case is the treatment/drug plan for the patient using machine learning algorithms. The main question to be answered is: *"What treatment plan will be most suitable for a certain person with disease A? Can we segregate patients requiring longer-term treatment and those that have a high risk of readmission from the rest?"*
Clustering methods [12] can be used to initially group patients according to similarity along several dimensions such as age, gender, race, and genetic data. Treatment evaluation data for other similar

patients with disease A can then be used to identify sets of consecutive or parallel treatments that most benefited each phase of the disease.

Let us look at an example of data analytics lifecycle. Raw evaluation data may be in the form of medical prescription lists, where subsequent prescriptions determine the effectiveness of a prescription. Groups of patients getting similar prescriptions could first be clustered for separate analyses. However, because clustering requires prior feature extraction, this could be an expensive option. Instead, topic modelling methods that use words themselves as individual "features" and sentences or paragraphs as data entries could be utilized for grouping. NLP techniques [11] could be used to determine relationships between words (i.e. cause, treatment, expected effect) in statements made in prescriptions. These key relationships, as well as new features such as 'effectiveness of treatment' can be constructed using simple statistical methods. Then, a deep Bayesian or neural network could be trained that identifies correlations and patterns between these features, so that a better treatment plan can be constructed for future patients of similar conditions. Risk prediction is a crucial aspect of treatment plans that is dependent on individual patient data as well. Separate models can be constructed for analysis of joint datasets, the output of which could be fed into other models as features, building a more robust, context-rich model architecture.

7.3 Use Case #3: Rare Diseases

This use case is the treatment of rare diseases using machine learning algorithms [12]. The main question to be answered is: *"What are the causes of disease X and its effects? How does disease X influence other parts of the human body or trigger other diseases in the system?*

The machine learning models defined for the use cases above can also be applied for disease-specific data, and even along with patient and treatment specific data. Knowledge of the workings of a disease directly influences diagnoses and treatments; however, models built solely using patient and treatment data may not be able to identify underlying causes and effects of diseases. Therefore, it is essential to build 'base' models using specific data about a disease, acquired from publicly accessible Web pages, internal databases or subscription journals. The importance of parsing these kinds of unstructured data is once again highlighted in this use case, not just for identifying broad correlations but also for extracting underlying context. While logistic regression may be a better fit for time-sensitive acute disease detection, semantic analysis using NLP and deep neural networks [11] for modelling multi-layered relationships are most useful for chronic disease management.

7.4 Use Case #4: Using Chatbots for personal assistance

This use case is the usage of Artificial Intelligence Chatbots for personal assistance of the patients. The main question to be answered is: *"Can we automatically route patient calls or patient records to the required doctor, can insurance procedures or readmission procedures be taken care of automatically?*

Call and support centres have been taken over by automated agents and robots in several other industries, i.e. hospitality, entertainment, retail. Emergencies in healthcare, however, prohibit complete automation when it comes to appointment scheduling and treatment support. Optimizations in place today include keyword parsing using NLP that help redirect calls to the right support professional and automated database population using values from online forms.

Further improvements could be made by training a simple decision tree to route patient files or calls to the relevant doctor or nurse based on availability, testing requirements, history of appointments, among others. An automated support line could be online 24/7 that answers any general, semantically sound queries about a disease or treatment. Readmission and other costs could be forecasted using a combination of logistic and linear regression or time-series analysis. Insurance fraud detection is a massive topic that several organizations have successfully implemented. Depending on the evasiveness of fraudulent activity, relevant models could comprise of probabilistic models, regression models as well as neural networks.

8. Healthcare Data Tools

All use cases above can be enhanced by using decipherable unstructured data from images, videos, and audio files, described below.

8.1 Image, Video and Audio source data

Medical Imagery is enormous these days. Precision cameras are akin to having a second set of eyes which can be used for object detection, movement detection and measurement, and be integrated with the learning models discussed above. Video processing models can be trained to produce radiology reports and provide independent analyses of patients based on these reports or other physical symptoms. Micro-cameras attached to controllers that are less sensitive to slight movements can be used to assist in surgeries; in fact, autonomous surgeries where there is a low latency feedback loop between the camera, surgical controllers and the processors have already been performed to high standards on pics [5]. OCR is used widely to convert images of documents to the actual text that can be parsed. Surveillance cameras can be used to ensure workplace procedure adherence, safety and security of medical crew and patients. Convolutional NNs, Hidden Markov Models and Kalman filters are optimal models used for image and video processing [11].

Audio-processing models can be trained to listen to, understand and follow commands without one needing free hands to type or click on something. Having voice controls connected to mechanical processes are especially useful in surgeries. Voice recognition, along with semantic processing, can be used to re-evaluate a patient in terms of severity of symptoms and required resources. Some other applications include dictation and clinical note transcription, as well as automated documentation and interpretation of clinical encounters. Voice technologies are most useful when it comes to call center resource management, assisting in things like agent coaching, information assistance, patient query processing, as well as providing recommendations and coaching. Hidden Markov models and specialized Recurrent NNs, especially LSTMs [11] are relevant models for audio processing. These technologies can also be integrated with wearable technology data, as described below.

8.2 Wearable, or mobile (referring to portability and cellphone) technology data

Patients can get help without waiting for call centre or doctor's appointment and be alerted of symptoms before things get worse. For example, changes in blood pressure, vision changes, or fluctuations in readings from attached devices such as pacemakers can be sent over a network to an expert, or even analyzed on a local device, in order to provide timely feedback. Devices can be trained on patient data to build models of device-specific data. They can be trained to provide

information based on queries, store reports in a compressed form, report abnormalities and escalate emergencies.

Online reviews of physicians, drugs, treatments, hospitals: Which doctor is better for X treatment? Where is disease X expert located? Who has the least number of readmission requests (because of solving the problem, not because of lousy experience)? This use case is most similar to search engine optimization and benefits the most from simple models such as logistic regression, simple Bayesian networks and other such classification and probabilistic models. This use case need not be implemented by medical practitioners only, individual organizations that have access to medical profiles, and crowdsources reviews will also be able to build such a system.

9. Healthcare Research Opportunities

9.1 Genomic data

Analysis of such data needs sophisticated algorithms that can answer questions like what is this new gene supposed to do? To answer this question, one may look for relationships between this gene and other genes. What parts of this gene are present in other genes? Clustering can be used to identify the broad group of genes that the new gene belongs to and association rule mining can be used to align certain features of genes as a way of dimensionality reduction, for further focused analysis. Decision trees are helpful in creating a hierarchical context with which to evaluate further properties of the gene. Deep learning can be used to test a wide range of gene triggers on a large pool of genes to identify similarities and differences. Regression and time-series analysis can be used to predict latency in gene expression or likelihood of mutation.

9.2 Drug data

Constituents and Effects: Questions like can we increase the potency of a specific ingredient of a drug and minimize the effects of another ingredient, or how to minimize the side effects of a particular drug? The first question requires trying out combinations of chemicals and dosages and measuring the normalized difference in magnitude between the desired effect and an undesired effect. The second question requires thorough testing of a drug on various bodily configurations, and based on that data, classify subsets of configurations according to their reaction to the various effects of the drug. Given the combinations of configurations and combinations of effects, this demands a deep learning framework. Iterative analysis, such as this also requires a recursive learning framework.

10. Conclusion

This paper examined different algorithms of Machine and Deep Learning as a subset of Artificial Intelligence with a particular emphasis in healthcare sector using some individual use cases. Healthcare sector is recognized as one of the priorities in GCC and defined in its strategic vision of each country. In particular, this paper explained the importance of machine learning and deep learning as tools that can enhance human progress in this area.

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Smart Cities Track

Concurrent Generation of Power and Water from Waste – A Case for Policy Reforms

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Abstract

India is among the top two populous countries in the world with 1.35 billion people. It generates an enormous amount of garbage with a daily per capita generation of municipal solid waste in India ranging from about 100 grams in small towns to 500 grams in large towns (Source: India 2025- Environment, Shaheen Singhal, Planning Commission, Government of India), totaling close to 300 million tons of municipal solid waste annually. With the rapid transformation and fierce consumerism, the waste generation is feared to multiply several times and will severely test an already strained waste management system in India. Added to this, India faces water shortages in general and has experienced the biggest water crisis in the current year of 2019. The country is thus, urgently seeking solutions on how to enhance water availability. The policy research paper suggests an innovative technology solution to produce power from waste and integrate the process technology to desalinate seawater and make it potable water concurrently. The research paper describes the innovation, technology and mechanics of the integrated technology founded on detailed evaluation and feasibility study for Chennai. The city is one of the four top metro cities of India and faces the double whammy of growing garbage and declining potable water supply. It reports empirical data and the functioning of a full-scale implementation of WtE technology in Jabalpur(smart City), Madya Pradesh. The twin technology solution, however, faces a full-scale suite of managerial and policy challenges threatening to restrict the adoption and diffusion so necessary for urban and metro smart cities in India. The research paper, therefore, concludes with a ten-point policy reform agenda.

Keywords:
- *Innovating waste to energy (WtE) generation*
- *Sea to Potable water*
- *Smart City*
- *Policy reform agenda*

The Background

Electricity has become the fundamental driving unit for any activity in the current day scenario. While the world is hungry for power, the supply inadequacy and stability are still the most gnawing problem. Worse, the consumable water – another important resource that drives the whole living and ecosystem, is depreciating in its availability. The twin shortages cannot be overlooked for long.

Paradoxically, what is available in abundance in today's world is consumption garbage or waste. Every country produces garbage in growing volume. Global annual waste generation is expected to have a whopping 70% increase from 2.01 billion tonnes in 2016 to 3.4 billion tonnes by 2050.

(Source: What a Waste 2.0, Silpa Kaza, Perinaz Bhada-Tata, Frank Van Woerdern, World Bank Group).

Since every material has a preset calorific value, the municipal solid waste too has a considerable degree of high carbon and organic content left in it. Clearly, the waste has huge potential that hasn't been harnessed for its large heat value. For instance, it is estimated that Chennai - one of the top four metros of India and a population of over seven million people, produces municipal waste of 5000 metric tons per day (http://www.chennaicorporation.gov.in/departments/solid-waste-management/index.htm#solid). The storing capacity of two major waste deposition areas Perungudi, Kodungaiyur in Chennai have maxed out. Chennai has not much land left to store new waste dump yards. This has raised a lot of questions and concerns on how to dispose of the waste. It is been projected that by 2047 around 1,400 sq.km of landfill area will be needed for dumping the municipal solid waste which is equivalent to a combined area of three of most populous cities in India in landmass: Hyderabad, Mumbai & Chennai (Sustainable Solid Waste Management in India 2012 , Ranjith Kharvel & Annepu).

Exhibit 1: Municipal solid waste generation of various Indian cities in 2016. (Solid Waste Management in India, Utkarsh Patel, ICRIER, New Delhi)
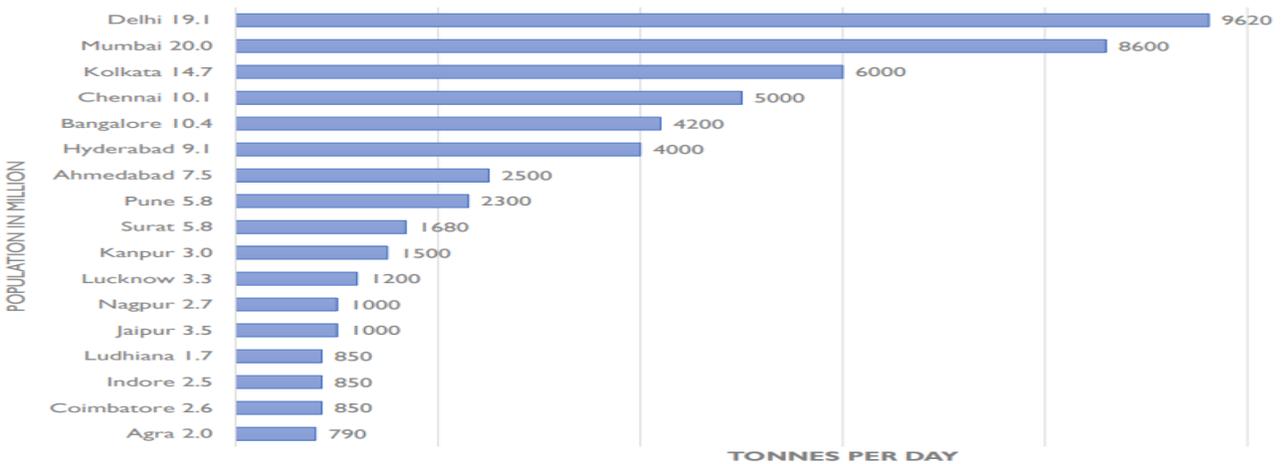
Water scarcity or shortage, as mentioned before, is the second most pressing hurdle for a developing country. As per a study conducted by Niti Aayog (formerly Planning Commission of India), the demand will exceed supply by a factor of two by 2030. The projections show, 6% of GDP will be lost by 2050 due to water crisis. (Composite Water Management Index, NITI Aayog, August 2019). Presently, about one-third of the world population of 6.8 billion lives in water-scarce areas. Analysts estimate that by 2025, about half of the world population will have to live in water-scarce areas (Report, World Health Organization). Solutions such as water transfer or dam construction are helpful but inadequate, making water shortage as critical as climate change.

Exhibit 2: Water stress level and utility across India (Composite Water Management Index, Niti Aayog, August 2019).
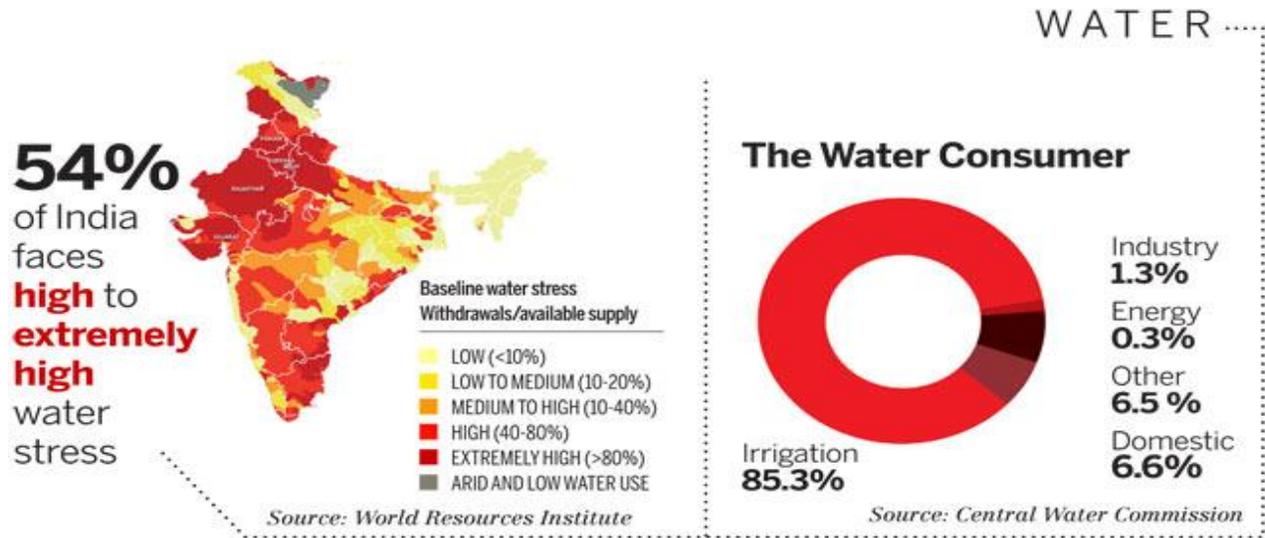
Exhibit 3: Supply and demand projections of water in BCM (2008,2030) in India. (Composite Water Management Index, NITI Aayog, August 2019).
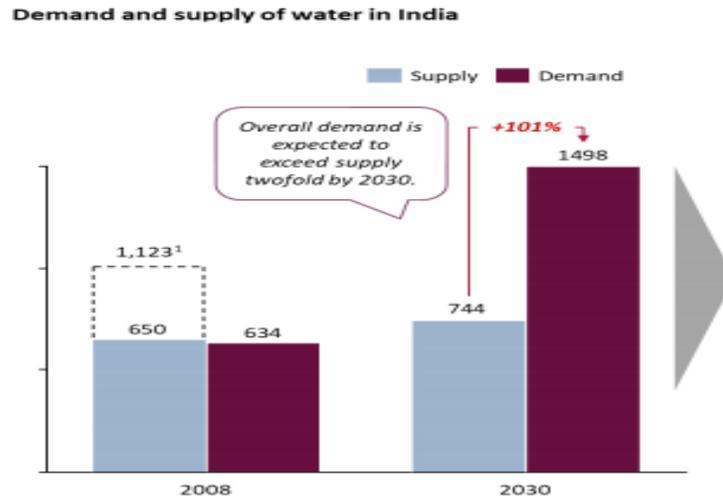
Similar to municipal solid waste, seawater too is available in abundance. A possible solution, therefore, is to explore technology that transforms what is wasteful but available in abundance to produce into what is essential but in short supply. In our context, we need a technology that uses waste as a fuel to produce power and replace or reduce the use of conventional fossil fuels such as coal that anyways pollutes the environment.

The technology group that uses waste as fuel to generate steam and produce power electricity is known as waste to energy or WTE technologies. The technology hugely helps to empty the wasteland and produce power. Thus, WTE technologies provide a solution to our first order crisis- the energy inadequacy to satisfy the power demand. Recently, innovations are underway testing possibility that the hitherto only waste to energy (WTE) technologies also work to purify seawater and produce potable water at the same plant concurrently.

The remaining part of the research paper documents this technological breakthrough, key elements and analyses the financial and managerial considerations while implementing the augmented innovation.

An Augmented Innovation

The process begins with the collection of waste all over a city and transporting it to specially created waste dumps. Once there, the waste of all types is collectively taken to an incineration chamber where they are completely burnt. This fires up the boiler where water is used as the fluid of the system. Exhibit 4 below maps the dynamic technological innovation that integrates energy production from waste to a simultaneous purification of seawater into potable water.

In a conventional power plant, the heat energy so produced converts water into steam which is sent to a turbine. After the low-pressure steam is released from the turbine in the proposed twin technology contribution, the steam at the outlet is equally partitioned and diverted to a condenser and a de-aerator. At the condenser, the cooling seawater is brought around 303k. Due to the heat absorbed from the steam, the seawater outlets temperature raises to 313k. Now at the de-aerator, the exhaust steam is de-aerated and along with the condensed water is pumped back to the boiler. The flue gas obtained is sent to baghouse filters and electrostatic precipitators (ESP). This results in the conversions of a very large pile of waste into ash and dust particles that get accumulated in the baghouse filters. The waste is thus reduced to only 5% of the previous volume as a result of this process and hazardous solid wastes are converted into non-hazardous particles.

Furthermore, this results in a cleaner flue gas too. Since the steam passes through the turbine, a fall in the temperature and pressure occurs. The residue of the bottom ash that remains after the combustion is processed through toxin destructive conveyor to make it non-hazardous and can now be safely put into landfills or recycled as construction aggregate. Meanwhile, the power generated from the turbine shaft is used up to generate electricity that is sent to power sub-stations. This is distributed to the locations nearby through power grids.

Exhibit 4: Map Integrating Waste to Energy and water desalination:
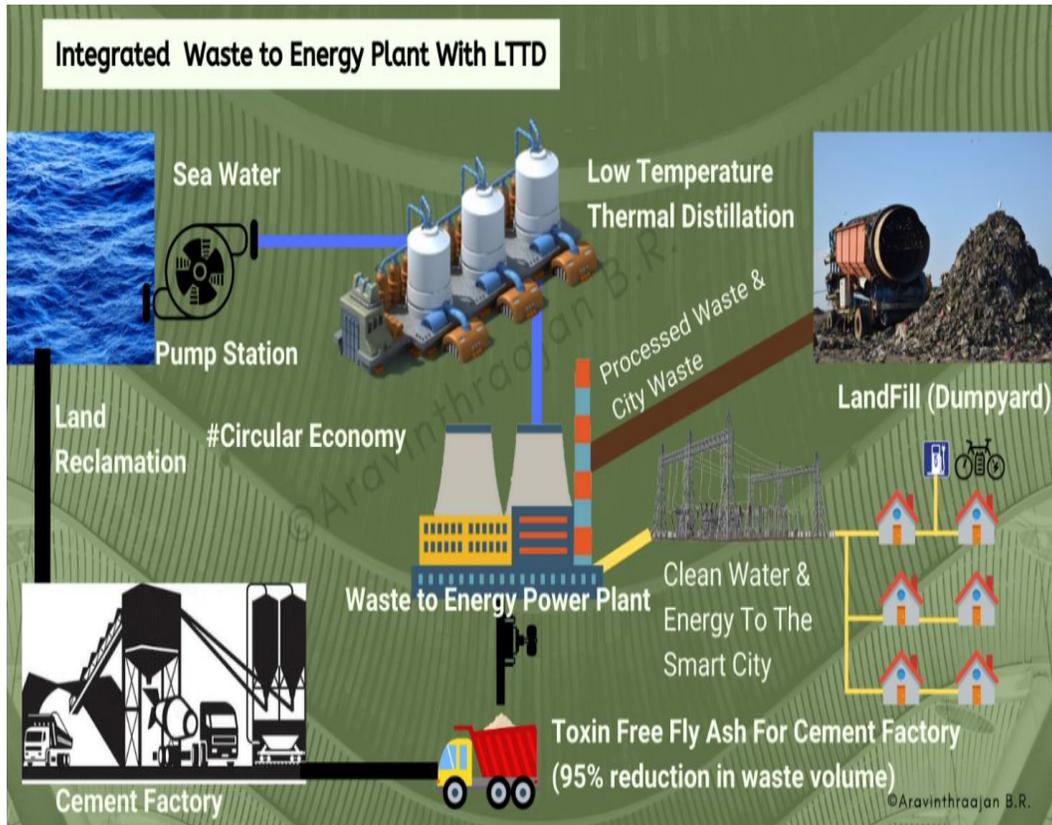
The seawater at elevated temperature is sent to the low-temperature desalination process (LTTD) where the temperature difference is used to convert into the necessary purified water as a result of repeated expansion and condensation. The Technology works on the principle of utilizing temperature gradient between two water bodies to evaporate the warmer water at low pressure and condense the resultant vapor with the colder water to obtain fresh water. The working of the plant is under sub- atmospheric pressure hence a vacuum pump is used as an aid. The other major components are flash evaporation chamber, condenser, pumps and the pipeline required for the incoming and outgoing of the water. The major advantage LTTD provides is the ability to operate the plant at a very low-temperature gradient as low as 8-12C˚. The clean water is finally pumped and sent for storing. Furthermore, value adding process such as the minerals and additives could be added.

Feasibility Study for Chennai

As mentioned before, Chennai produces 4.5 million metrics tons of garbage for collection and removal. Headed by a Superintendent Engineer, the solid waste management department of Chennai looks after the removal of solid waste. Night conservancy is being carried out in all important roads and commercial areas of the city. Door to door collection of garbage is prescribed in all zones. The process results in huge waste collection and accumulation at dump yards. As per the data published by Chennai municipal corporation, almost 78% of the waste so

collected are substances with high calorific values and thus, have the potential to be used as a combustible fuel (Greater Chennai Corporation Report, 2019). The incineration process, however, desires that the waste substances are segregated as per their low to high calorific value. The higher the gross caloric value the better the efficiency of the process.

The composition mix (Exhibit 5(a) &5(b)) makes it clear that the major portion of the waste is organic and combustible materials which make it an ideal substance to be used as fuel. Perungudi and Kondungaiyur are the major dump yards in Chennai where the city waste is brought and collected. Both of them are on the verge of closing to any further waste receipt as they have reached maximum capacity. Perungudi is merely 4.3 km away from the coastal line which makes it easier to access the seawater and ideally suited to implement the technology so described. Kondungaiyur is also an equally feasible location.

This makes it quite apt for the requirement as both waste and seawater would accessible easily. Exhibit 6 below summarizes the features that make them ideal locations for implementing the integrated technology to produce power from water and convert seawater into potable water.

Exhibit 5(a): Physical composition of the waste substances. (Greater Chennai Corporation Report, 2019)
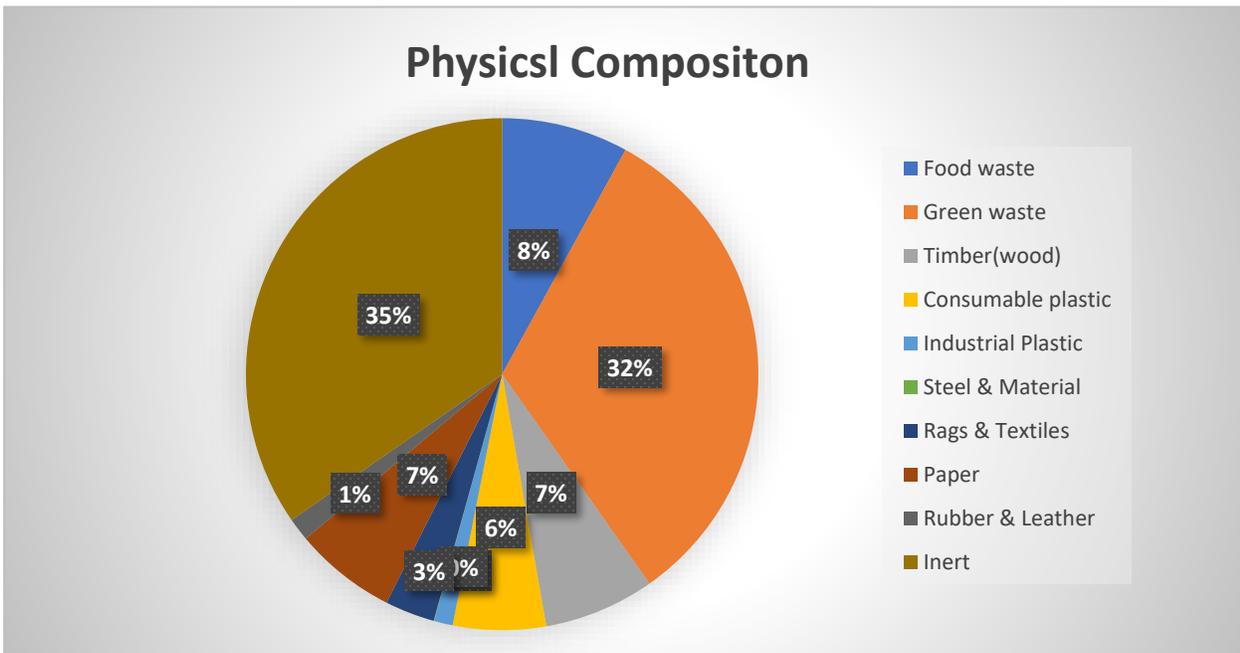
Exhibit 5(b): Chemical composition of the waste substances. (Greater Chennai Corporation Report, 2019)
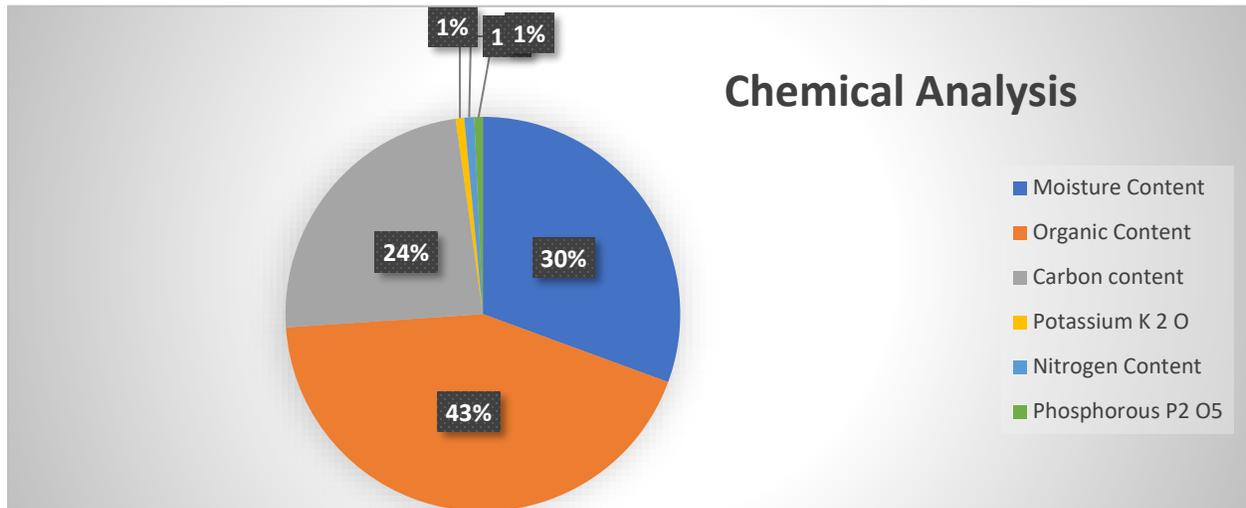
Exhibit 5(c): Sources and categories of the waste generation. (Greater Chennai Corporation Report, 2019)
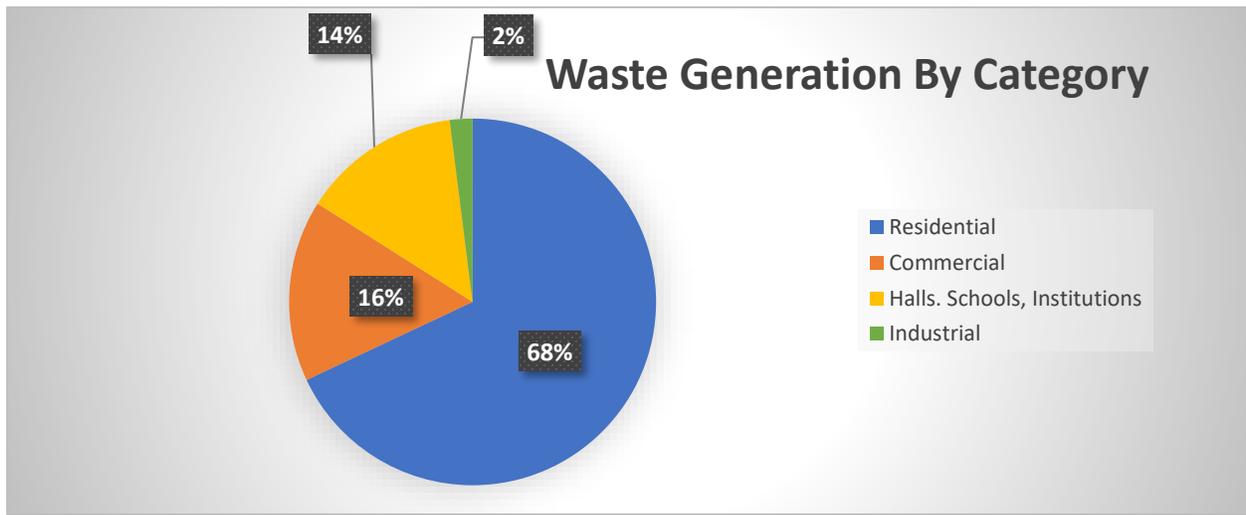
Exhibit 6: Technology Site Features

Location	Perungudi	Kodungaiyur
Extent	Area around 200 acres. (Restricted)	Area around 269 acres.
Total number of years in use	More than 30 Years	More than 35 Years
Neighborhood	Within 0.5 KM (formed after dumping)	Within one K.M (are in existence)
Daily Waste disposed	2400 tons to 2600 tons	2600 tons to 2800 tons

Exhibit 7: Thermal capacity each of landfill holds

Location		Kodungaiyur	Perungudi
Daily MSW Dumping	MTPD	2400	2800
Calorific Value of MSW	kcal/kg	1650	1650
Thermal Capacity	MW	192	224

Exhibit 8: Investment & generation cost for each landfill

Generation Cost			
Investment - Power Plant	Million Rs.	3795	3960
Investment - LTTD Plant	Million Rs.	179	187
Investment – Total	Million Rs.	3974	4147
Generation Cost of Power	Rs./kwh	3.93	3.93
Generation Cost of Water	Rs./Liter	0.04	0.04

Exhibit 9: Possible revenue generation from each of landfill

Revenue			
Annual Operating Hours	hrs.	7800	7800
Cost of Power Sold to Grid	Rs./kwh	6	6
Cost of Fresh Water Sold to Metro Water	Rs./Liter	0.1	0.1
Annual Generation-Power	Million Units	289	302
Annual Generation-Water	Million Liters	1458	1521
Total Revenue – Power	Million Rs.	1737	1812
Total Revenue – Water	Million Rs.	146	152
Total Revenue - Power + Water	Million Rs.	1882	1964

Exhibit 10: Summary calculations

Chennai	Requirement	Generation/ Elimination	Gap Met
Water	215 MLD	15.97MLD (4 Units)	7.4 %
Waste	5200MTD	4940 MTD removed	95%
Energy	300 MU	8.219 MU Generated	2.7%

Since heterogeneous waste is available in the landfills across the dump yards based on the thermal capacity the financial evaluations have been calculated. The methodology adopted for the calculation is the consideration of the per-unit cost generation and the cost of the water per liter. The data is collected from the local DM water producers and the tariffs are adopted as per the tariff TNEB for NCEs. The generation cost is assessed as per the thermal calculations and the cost of production with respect to the Opex and Capex involved.

The Implementation validated that the integrated technology yields a host of managerial and organizational benefits some of them are listed below.

- Circular economy- the complete utilization of waste promotes a circular economy in the country.
- Ease of Operation- This will increase the efficiency of the operation of this plant as waste availability won't be an issue for power generation.
- Development of water and energy security in the nation – If more plants of this technology, are set up, it multiplies the twin benefits of reducing water sacristy and usage of coal.
- Increase the viability of the waste to energy power plants in India – Implementations of these policies will promote the waste to energy business in India.

One of the successful pilot implementations of WtE plant in India is at Jabalpur which is a 600TPD plant. The plant has a capacity of 66500 kg/hr. steam generation which can produce about 11.5 MW of power. In the Indian scenario, the major issue with regards to using waste as fuel is the low calorific value. It is mainly due to the heterogeneous nature of the waste which is a result of waste not being segregated at the point of collection. This ambiguous nature of the fuel input results in the uneven production of electricity and makes the process inefficient. Furthermore, due to the improper estimation of waste generation in the city by the municipal corporation results in the wrong selection of the size of the plant. In the case of Jabalpur, India's waste estimation provided by the municipal corporation provided was 600 tons per day. But the actual waste generation in the city turned out to be only 380-400 tons per day.

This resulted in the need for exporting waste from Bhopal which incremented the operational cost. Despite the barriers posed, the plant is able to produce around 8.5 MW at peak load. This proves the potential the WtE technology holds in being the ideal solution to tackle the increasing MSW generation in Chennai. Also, with the increase in water scarcity and depletion of the water table in Chennai, implementations of such technologies are the need of the hour. But only if the policy

changes mention below are brought about, the viability of such investment intensive projects can be justified.

Furthermore, the payback period for the above estimation is 2.11 years with a plant life of 25 years. It is evident from the insights generated from the calculation that the twin technology could have a major contribution in terms of potable water generation and the waste elimination while generating a nominal amount of energy production. Hence the implementation of such integrated solution would be advantageous in a smart city as this would create a circular economy in which sustainability and self-sustenance is ensured.

Need for Policy Reforms- Ten Point Agenda

Clearly, Jabalpur's implementation is successful with regards to WtE technology and seems to have validated the need and accomplished mission and mandate. However further adoption and diffusion require several policy measures. Some of which are outlined below:

1. Mandate segregated collection of city waste by municipal corporations or outsource waste collectors: The main challenge in the waste to energy industry is the heterogeneous nature of the waste that results in now gross calorific value (1650 kcal/kg). It reduces the overall efficiency of the plant. In countries like Japan, Sweden, Netherlands etc. the calorific value of waste is as high as 3500 kcal/kg which is as good as bituminous coal. A policy change must mandate therefore all municipalities in India to collect waste in a segregated manner through a series of incentives and punishments for noncompliance.

2. Proactively Adopt and Incentivize Private entrepreneurs: Waste to energy technology integrated LTTD requires a high investment in which private players may not be too ready to invest in India hence government must play a major role in promoting it. A basic duty of the government is to provide public services that ensures the quality of life. As our Prime Minister Narendra Modi noted recently, "We reached Mars. No PM or Minister went. It was the people who did it, our scientists who did it. So, can't we create a Clean India?" (https://www.mygov.in/newindia/wp-content/uploads/2017/08/newindia330924_1505029463.pdf). With the success of Swachh Bharat Abhiyan, it is clear that the government is indeed pursuing clean India. This technology will promote cleanliness with an added economic factor.

3. Project better city waste generation: Federal and state governments must encourage and train the municipal corporations for demand projections of waste generation. This major factor decides and majorly impacts the need, feasibility, capacity utilization and operational cost of the WtE plants.

4. Subsidize garbage transportation freight cost and reward waste utilization: This will increase the project viability as it will help in the reduction of the operational cost of that plant, which is a challenge to date.

5. Mandate Advanced waste segregating and refinement separators at the various landfill sites: Since dumpsites in India occupy a very large area and most of its components are in muddy nature, it is important for waste clearing and segregation to prevent land pollution and increase the net GCV of the waste. This will furthermore increase the efficiency of the WtE plant.

6. Mandate auxiliary power for landfill waste segregation: This will eliminate the use of diesel engines which again emits greenhouse gases. Furthermore, diesel consumption(diesel engines operated on an average of 8 Hr/day) is a major cost operational cost. This could be avoided.

7. Reward public systems of waste disposal: In Norway to promote the waste disposal amongst the public, provides rewards. India could study and adapt own system to reward such behavior. With time this methodology will motivate and promote the sense of responsibility amongst people.

8. Use IoT to Monitor flue gas emission: This will promote regulation and pollution check for these power plants.

9. Promote Fly ash toxin elimination and Reuse: Toxin destructive conveyors are used in japan which is then quality checked by the government of Japan and sold to cement industries. Indian government should play an active role in quality assessment and sale of the treated fly ash. This will result in creating a circular economy where even end life of the waste has value.

10. Mandate solar and afforestation in all waste yards, sea reclamation and landfill sites etc. This will reduce the operational cost and will help in aiding process such as heating and lighting in the premise of the plant.

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Solar Photovoltaics an Alternative Energy Conservation Measure for 132/11 kV Substation Building Services Energy Demands.

Shoeb Khan, Shaikhah Al Kindi [1]

Abstract

400/132 kV & 132/11 kV Substations, connecting Power Generation to End Users via complex network of Cables and Overhead lines, are nodal to Electrical Gird by stepping up and down voltage level as per grid requirement (1). Harsh environmental conditions of UAE causes substation to be indoor type and requires ancillary services such as Ventilation, Air-conditioning and lighting to sustain and maintain indoor conditions suited to its key electrical equipment's. These ancillary services borrows energy from the substation low voltage network for it operations. Multiple Passive and Active Energy Conservations Measures(ECM) are deployed to minimize energy consumption of these ancillary services, which includes a) Enhanced building envelope with improved Heat transfer coefficient (U-W/m2k) b) Light control using motions sensors c) Energy efficient HVAC equipment's and LED lights. Mentioned ECM's reported an average 15.3% energy savings over ASHREA 90.1-2010 baseline when modelled for three EXPO 2020 substations (2). However, these measures are not solely sufficient for significant reductions and necessitate an alternate ECM strategy to curb ancillary energy demands. Dubai Electricity and Water Authority Transmission Power (DEWA-TP) aligns its strategic objective, "Minimize Environmental Foot Print" (3), with Dubai Clean Energy Strategy 2050, and promotes use of renewable energy in transmission substations. Hence, use of solar energy as an alternative ECM with the objective to minimise substation ancillary services energy demand is proposed, studied and implemented in three 132/11 kV substations i.e Sustainability, Opportunity and Mobility which provide power to Dubai EXPO 2020 site. Substation annual energy demands followed by solar energy resource onsite availability for given geospatial locations are evaluated and suitable Photovoltaics (PV) system is modelled to abridge the demand and resource within the given constraints. Proposed PV models promises net reduction in energy demand by 33%, 22%, 22%, for Sustainability, Opportunity and Mobility S/s respectively over baseline (4).

Keywords: DEWA, Solar Photovoltaic, Electrical Grid, Renewable Energy, Alternative Energy Conservation Measure.

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Supervised Classifier Based Intrusion Detection System for Smart Home IoT Devices

Syed Abbas Ali, Musawar Ahmad[2]

Abstract

The increase in Internet of Things (IoT) devices collecting information that is sensitive in nature requires due importance and attention as it can impact our daily lives. These devices simplify and automate everyday tasks in a Smart Home but there are numerous security weaknesses. Existing security measures are unable to protect smart devices and show vulnerability towards IoT infrastructure, default settings, and loose configuration to attract intruders. This paper proposes a supervised Intrusion Detection System (IDS) to detect cyber-attacks on Smart Home IoT networks. The study is based on a smart home test bed consisting of seven commonly used IoT devices such as: Fridge, Garage Door, GPS Tracker, Modbus, Motion Light, Thermostat and Weather Sensors. The efficiency of the proposed IDS is assessed by using seven attacks from four attack categories such as: Backdoor, Denial of Service (DoS), Injection, Password, Ransomware, Scanning and Cross Site Scripting (XSS). The performance of the supervised learning algorithms J48, PART, Naïve Bayes, and Bayes Network gives an accuracy of: 97.80%, 97.80%, 99.04%, and 99.83% respectively. This demonstrates that the proposed IDS can identify and inevitably differentiate between types of attacks on a Smart Home IoT network.

Index Terms:

Internet of Things (IoT), Smart Homes, Intrusion Detection System, Supervised Machine Learning Classification, TON_IoT Dataset.

Introduction

Smart home Internet of Things (IoT) devices[1] have a growing presence in modern housing. Knowledgeable thermostats, smart switches with energy tags, doorbells fitted with video cameras, smart baby interactive monitors, and fluorescent lights controlled with voice commands, smart shades of windows, and smart speakers are all increasingly available. These devices are connected with sensors and connected to the Internet to collect and communicate data with end users.

Security is among the most important challenges faced in smart home IoT devices. The devices that are accessible from anywhere through the Internet remain unprotected against various intrusions. Therefore, maintaining security in the network of IoT devices is very important. Some of the important security aspects are given below [2-7]:

Privacy of data: The data which is collected by devices in a smart home scenario and is transmitted among the receiving and sending nodes is under threat by Man in the Middle attacks. The confidentiality of data can be compromised.

Integrity: The data can be changed in the process of its transmission. The accuracy of the messages should be preserved in the complete process of its transmission.

Availability: The availability of resources is vital at the critical time of transmission. The data communication channel can be overloaded to restrain or slow down communication.

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Authenticity: The devices and data need to be accessible to authorized users only. The procedure of verification needs to be error free to ensure that only authorized users access the devices or information.

Non-repudiation: The process of communication must ensure that receiving or transmitting device leave their footprints.

An intrusion detection system (IDS) is a security measure that works mainly in the network layer of an IoT system. An IDS positioned for an IoT system should be able to analyze packets of data and generate responses in real time, analyze data packets in different layers of the IoT network with different protocol stacks, and adapt to different technologies in the IoT environment [2].

An IDS that is designed for IoT-based smart environments should operate under rigorous circumstances of low processing capability, fast response, and processing of high-volume data. Therefore, conventional IDS's may not be suitable for IoT environments. IoT security is an issue where an up-to-date understanding of the security vulnerabilities of IoT systems and the expansion of consistent mitigation approaches are required.

Types of Intrusions in Smart Home IoT Devices

Following are some malware intrusions in Smart Home IoT devices'.

Sink-hole Intrusion: This type of intrusion involves the corrupted node attracting unintended data flows towards it. In order to create this intrusion, the corrupted node attracts all nearby nodes to deliver their respective data through the corrupted node by posing pseudo low costs. The intruder causes the attack by incorporating a pseudo node within the transmission system [2].

Worm-hole Intrusion: In a worm-hole intrusion, the corrupted node generates a virtual path between two nodes. The malicious node behaves as a forwarder between two original nodes. The corrupt nodes falsely pose that they are only one-hop far from the base station. This type of intrusion is used to influence two different nodes in proximity by dispatching data messages among them [3].

Selected Forwarding Intrusion: The corrupt node behaves like an authorized node but on a selected basis, it sinks certain data messages [3].

Sybil Intrusion: The corrupt node consists of more than one identity. The route determining protocol along with detection program are targeted by the corrupt node. [4].

Hello Flood Intrusion: The routing protocol transmits the hello message to share its existence to nearby nodes. The nearby node, which receives this hello message considers that the source node is in proximity and therefore, includes the corrupt node to its nearby nodes list [4].

DoS Intrusion: By denying availability of resources to nearby nodes, the malicious node causes resource loss in the network. When multiple nodes cause such intrusion, it is termed as DDoS. It often impacts the available resources, bandwidth and processing duration etc.

Backdoor: A backdoor is typically a concealed method of bypassing normal authentication or encryption in an embedded device. Backdoors are most often used for securing remote access to a device or obtaining access to privileged information like passwords, corrupt or delete data on hard drives, or transfer information within networks.

Distributed Denial of Service: A distributed denial-of-service (DDoS) attack is a malicious attempt to disrupt normal traffic of a targeted server, service or network by overwhelming the target or its surrounding infrastructure with a flood of Internet traffic.

Injection Attack: Injection attack allows an attacker to stream untrusted input to a program, which gets processed by the decoder as part of a command or query which modifies the sequence of execution of that program.

Ransomware: Ransomware is a type of malware from crypto virology that threatens to publish the victim's data or permanently block access to it unless a ransom is paid. While some simple ransomware may lock the system in a way that is not difficult for an expert individual to reverse, more advanced malware uses a technique called crypto viral force, in which it encrypts the victim's files, making them inaccessible, and demands a ransom payment to decrypt them.

Scanning Attack: A scanning attack sends client requests to a range of server port addresses on a host, with the goal of finding an active port and exploiting a known vulnerability of that service. Scanning, as a method for discovering exploitable communication channels, has been around for ages.

Cross-Site Scripting (XSS) Attack: These are a type of injection attack in which malicious scripts are injected into otherwise benign and trusted websites. XSS attacks occur when an attacker uses a web application to send malicious code, generally in the form of a browser side script, to a different end user.

Password Attack: an attack that takes advantage of the users using common words or phrases and short passwords. The hacker uses the list of common words, the dictionary, and tries to guess the passwords. The usual common passwords are a combination of words and numbers before and after the text.

This research aims to develop an efficient, accurate and intelligent system that provides a practical and effective solution for securing future large scale IoT networks. An Integrated Intrusion-Detection System that works independent of smart home IoT protocols and network structure, and requires no prior knowledge of security threats.

This study uses efficient machine learning algorithms to detect anomalies. On the basis of its detection process, it will be able to tailor its performance and anomaly detection capabilities according to the changing behavior of the attacks.

Types of Intrusion Detection Systems

Signature Based IDS

In signature-based approaches, IDSs detect attacks when system or network behavior matches an attack signature stored in the IDS's internal databases. If any system or network activity matches with stored patterns/signatures, then an alert will be triggered.

Anomaly Based IDS

This technique is also known as event-based detection. This technique identifies malicious activities by analyzing the event. Firstly, it defines the normal behavior of the network. Then, if any activity differs from normal behavior then it is marked as an intrusion. In this approach, a malicious node can be detected by matching the current protocol specification with previously defined protocol state. This approach detects attacks more efficiently than signature based IDS.

Data set and Classification Tools

1. TON_IoT datasets are used for this study.

2. Dataset attributes are filtered with Feature selection "Standardize".

3. Classification Classifier PART, J48, Naïve Bayes, Bayes Network are applied.

4. WEKA 3.9.4 (Waikato Environment for Knowledge Analysis) is used for data analysis reports

5. Different testing options are compared for improved results.

Process of Proposed Intrusion Detection System
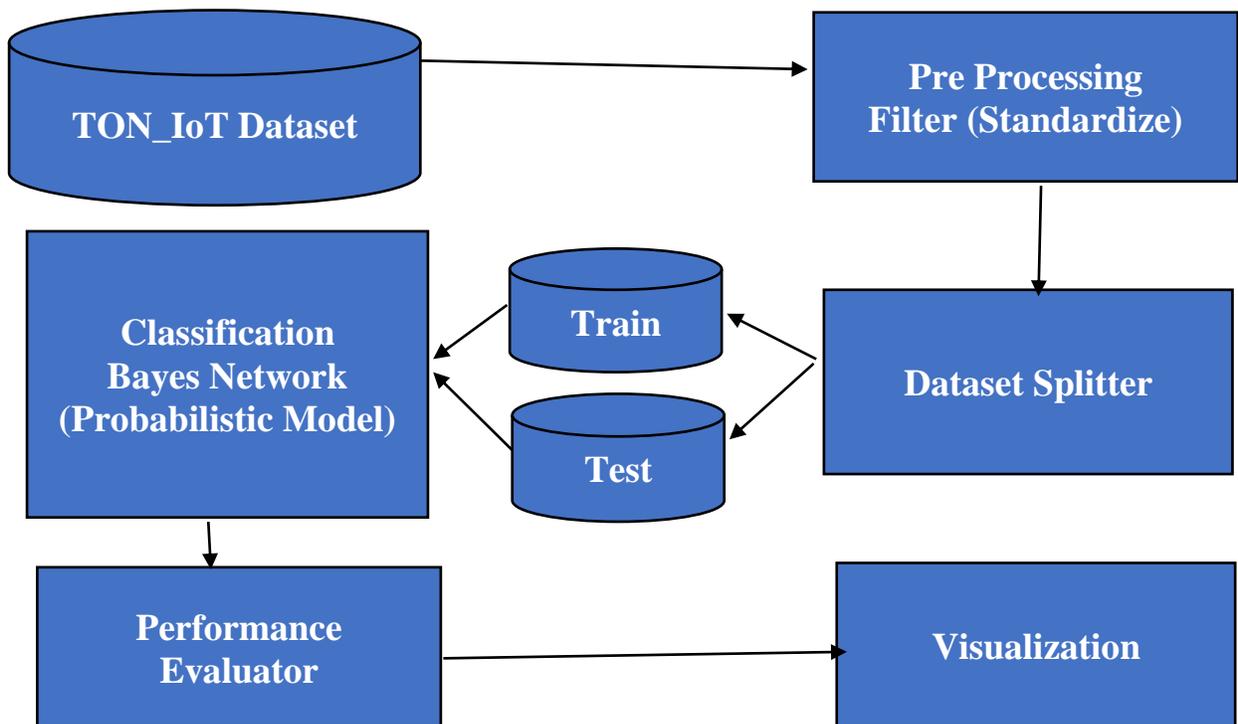
Figure 1: Architecture of Proposed Model for Intrusion Detection System

Dataset (TON_IoT)

The TON_IoT data sets[8] were collected from a realistic and large-scale network designed at the IoT Lab of the UNSW Canberra Cyber, the School of Engineering and Information technology (SEIT), UNSW Canberra @ the Australian Defense Force Academy (ADFA).

Different hacking techniques, such as DoS, DDoS and ransomware, were launched against web applications, IoT gateways and computer systems across the IIoT network. The datasets were filtered to generate standard features and their label. The entire datasets were processed and filtered in the format of CSV files to be used at any platform. This dataset contains over 650K instances categorized into eight classes namely: Normal, Backdoor, Denial of Service (DoS), Injection, Password, Ransomware, Scanning and Cross Site Scripting (XSS).

Results and Findings

Lightweight algorithms that take less time to build the model are implemented for training and then run on test data for evaluating performance. Performance parameters in terms of correct and incorrect classifications produced by each algorithm are shown in table 1 and time taken to build training model is shown in figure 2.

Classifier	Total Number of Instances	Correctly Classified Instances	Incorrectly Classified Instances	Correctly Classified Instances in %age	Incorrectly Classified Instances in %age
J48	650242	635967	14275	97.8047 %	2.1953 %
PART	650242	635934	14308	97.7996 %	2.2004 %
Naïve Bayes	650242	643986	6256	99.0379 %	0.9621 %
Bayes Network	650242	649120	1122	99.8274 %	0.1726 %

Table 1: Comparative Analysis of IoT_Weather Dataset Classifier Results

Time Taken to Build the Model (s)
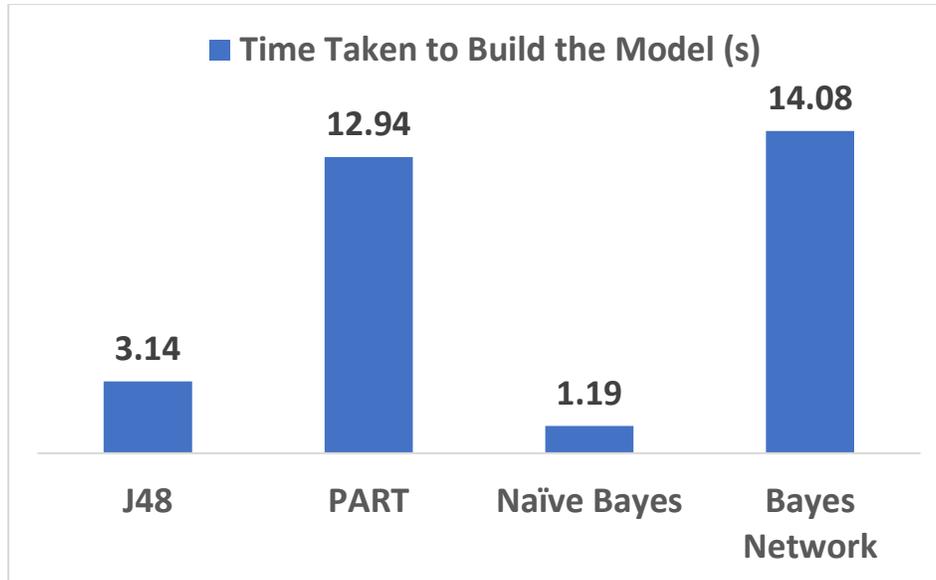
Figure 2: Comparison of time taken by Classifiers to build the model

Naïve Bayes Algorithm has taken least time of 1.19 seconds to build the model whereas Bayes Network has taken the most time 14.08 seconds to build the model. Highest accuracy of correct classification of instances of intrusion detection is achieved by Bayes Network and this algorithm also gives least inaccuracy in classification of instances of intrusion detection

Incorrectly Classified Instances in %age
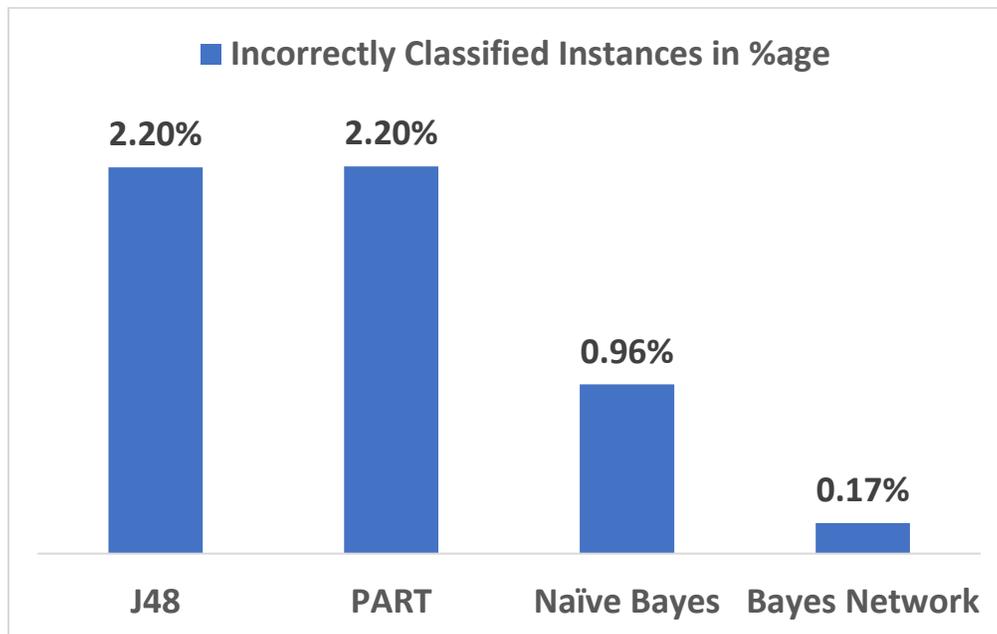
Figure 3: Comparison of Incorrectly classified Instances of Different Classifiers

Analysis of Confusion Matrix

A confusion matrix is a summary of prediction results on a classification problem. The number of correct and incorrect predictions are summarized with count values and broken down by each class. The confusion matrix shows the ways in which the classification model is confused when it makes

predictions. It gives an insight not only into the errors being made by the classifier but more importantly the types of errors that are being made. It is this breakdown that overcomes the limitation of using classification accuracy alone.

```
=== Confusion Matrix ===

       a       b       c       d       e       f       g       h   <-- classified as
  559718       0       0       0       0       0       0       0 |      a = normal
       0   35641       0       0       0       0       0       0 |      b = backdoor
       0       0   14367       0     815       0       0       0 |      c = ddos
       0       0    9726       0       0       0       0       0 |      d = injection
       0       0       3       0   25712       0       0       0 |      e = password
       0    2865       0       0       0       0       0       0 |      f = ransomware
       0       0       0       0       0       0     529       0 |      g = scanning
       0       0       0       0     866       0       0       0 |      h = xss
```

Figure 4: Confusion Matrix of Intrusion Detection Class Wise of J48 Classifier

Confusion matrix of J48 (Decision Tree) is unable to classify Ransomware and XSS attacks. Algorithm is confused between Backdoor and Ransomware attacks, DDoS and injection attacks, DDoS, Password and XSS attacks.

```
=== Confusion Matrix ===

       a       b       c       d       e       f       g       h   <-- classified as
  559718       0       0       0       0       0       0       0 |      a = normal
       0   35641       0       0       0       0       0       0 |      b = backdoor
       0       0   14334       0     848       0       0       0 |      c = ddos
       0       0    9726       0       0       0       0       0 |      d = injection
       0       0       3       0   25712       0       0       0 |      e = password
       0    2865       0       0       0       0       0       0 |      f = ransomware
       0       0       0       0       0       0     529       0 |      g = scanning
       0       0       0       0     866       0       0       0 |      h = xss
```

Figure 5: Confusion Matrix of Intrusion Detection Class Wise of PART Classifier

Confusion matrix of PART algorithm is almost identical to that for J48.

```
=== Confusion Matrix ===

      a       b       c       d       e       f       g       h   <-- classified as
 559718       0       0       0       0       0       0       0 |    a = normal
      0   35544       0       0       0      97       0       0 |    b = backdoor
      0       0   13369     593    1220       0       0       0 |    c = ddos
      0       0    2627    7099       0       0       0       0 |    d = injection
      0       0       0       0   25712       0       0       3 |    e = password
      0    1238       0       0       0    1627       0       0 |    f = ransomware
      0       0       0       0       0       0     529       0 |    g = scanning
      0       0       0       0     478       0       0     388 |    h = xss
```

Figure 6: Confusion Matrix of Intrusion Detection Class Wise of Naïve Bayes Classifier

Confusion matrix of Naïve Bayes algorithm is able to classify all types of attacks. However, it is confused between Backdoor and Ransomware attacks, DDoS and Injection attacks, DDoS, Password and XSS attacks, Backdoor and Ransomware attacks, Password and xss attacks.

```
=== Confusion Matrix ===

      a       b       c       d       e       f       g       h   <-- classified as
 559274     214      99      16       4      98       8       5 |    a = normal
      0   35570       0       0       0      71       0       0 |    b = backdoor
      0       0   14853      39     290       0       0       0 |    c = ddos
      0       0      80    9646       0       0       0       0 |    d = injection
      0       0      38       0   25657       0       0      20 |    e = password
      0      71       0       0       0    2794       0       0 |    f = ransomware
      0       0       0       1       0       0     528       0 |    g = scanning
      0       0       0       0      68       0       0     798 |    h = xss
```

Figure 7: Confusion Matrix of Intrusion Detection Class Wise of Bayes Network Classifier

Confusion matrix of Bayes Network algorithm is also able to classify all types of attacks with slightly higher level of overall precision. There is a nominal confusion of normal instances with all types of attacks. This algorithm has achieved a less confused matrix. Therefore, an IDS based on Bayes Network or Naïve Bayes algorithms are potential candidates to be used in IoT devices for smart homes.

Conclusions

Machine learning algorithms are the best tools to classify cyber attacks for intrusion detection system correctly. There are many algorithms of different categories but looking at the working scenario of smart home IoT devices that are having limited capabilities, a lightweight, efficient, correct and variant algorithm "Bayes Network" has produced a high percentage of accuracy of intrusion detection. Four lightweight algorithms (J48, PART, Naïve Bayes, and Bayes Network) were applied on "IoT_Weather" file of "TON_IoT" dataset obtained from a collection of different IoT devices. It is shown through this study that machine learning algorithms can play an important role in detecting intrusions in IoT devices. Training and testing of dataset file using 10-fold cross

validation test option worked effectively as compared to other testing and training options of percentage split or dataset provided for training separately. The classification model of supervised algorithm (Bayes Network) managed to produce results according to the types and nature of attacks and was able to address the diverse nature of attacks of smart home IoT devices.

The detailed study of different algorithms and their comparative analysis has shown their performance and working. It is required to further investigate the nature of the attacks by analyzing the record level behavior of the data used to in the classification model to decide for the type of the attack. The confusion matrix should be studied in further detail to set any criteria to identify its type of attack clearly. Dataset can be expanded or divided and filtered into date wise sub-sets to reduce data volume for training algorithms for higher speed and performance. Deep learning algorithms can be used on small dataset files to avoid complexity and high time of processing. Different rules can be set on the basis of type of data to further improve the dataset identification of anomalies.

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Water Leak Inspection in Residential Villas

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Abstract

Water leaks consume various amount of water thus contributing to water scarcity. It is very essential to control water leaks in order to reduce the pressure on water resources. Residential water leaks are most commonly found in faucets and showerheads, toilets, walls, ceilings and outdoor piping systems and tanks. Currently, there are many technologies that aid in identifying water leaks such as acoustic techniques, tracer gas method and fiber optics. Material piping, pipe age and diameter, motion of soil, pressure of water and water hammer hit can increase the probability of water leaks. When controlling water leaks, electricity consumption will be reduced as well since less power will be consumed to pump the water. other advantages of controlling water leaks include reduction of maintenance and operation costs, reduction of damage to personal properties and economic benefits such as increasing the GDP. Besides, some difficulties might arise when identifying water leaks such as the interference of the water table during the inspection. This paper will focus on technologies used in identifying water leaks in residential villas, steps taken to indicate water leaks and benefits of controlling water leaks. Mainly primary data will be used which will be obtained from a site visit to a specific villa in order to perform water leak inspection.

Introduction

The demand of water is increasing rapidly due to population growth, climate change, water leaks and other unsustainable practices. Nowadays, regulating the amount of water consumed is becoming an issue. Recently; scientists and technicians are giving attention to water leakage problems. According to studies conducted by EPA, water leakage in residential villas consume 1 trillion gallons of water each year which is equal to annual water consumption in 11 million villas. It is estimated that 10 percent of villas waste up to 90 gallons of water daily because of water leaks. On average, residential water leaks waste 10,000 gallons of water annually which is the amount of water used to cleanse 270 laundry loads. Residential water leaks are most commonly found in faucets and showerheads, toilets, walls, ceilings and outdoor piping systems and tanks (EPA, 2019; Hanson, 2017). This paper will focus on causes of water leaks in piping systems, methods used in identifying leaks and benefits of controlling water leaks.

Literature Review

Emirate of Abu Dhabi has performed a water leakage inspection pilot project for 150 residential villas. The breakdown of water consumption for these villas is shown in figure 1 in which 882 liters of water is consumed daily indoors excluding leakage, 673 liters of water is used daily in landscapes and 124 liters of water is lost daily due water leakage. The study found out that 10 percent of villas that were involved in this project lost water 5.5 times more than other villas that had water leaks. Besides, the study couldn't identify the causes of high rates of water leaks (Regulation & Supervision Bureau, 2014).

Figure 1: Breakdown of Water Consumption
Source: Regulation & Supervision Bureau, 2014
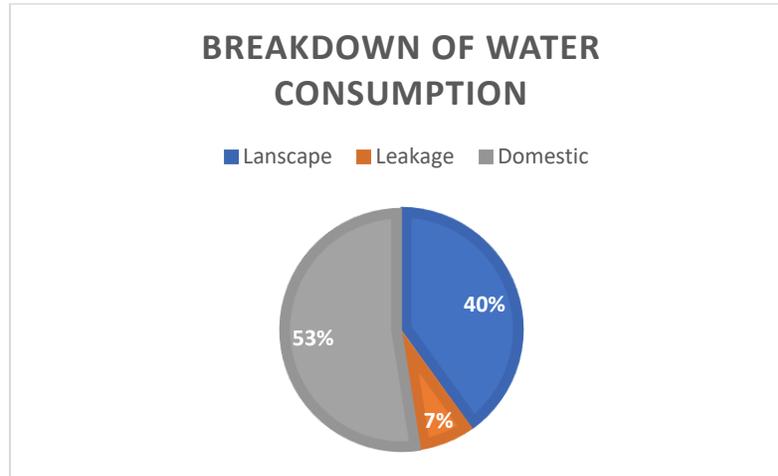
The material of the pipe is an important parameter that must be taken into consideration. Recent studies indicated that galvanized pipes caused 55% water leak accidents, polyethylene pipes caused 37% water leak accidents and asbestos pipes caused 8% of water leak accidents. However, the usage of asbestos pipes is banned in some countries since they contaminate water and cause serious deadly illness. Another important factor is the age of the pipes in which experiments have shown that galvanized pipes can last up to 15 years while polyethylene pipes can last up to 16 years. After this period, the pipes must be replaced to prevent water leakage accidents. Moreover; as the pipes age, water losses can reach up to 50% of the total water entering the network.

The diameter of the pipe is another parameter that must be considered. As the diameter of the pipe increases, the hydraulic pressure decreases; therefore, the chance of water leak is less. Furthermore, a large pipe diameter means a thicker shell thus the pipe resistance against pressure and environmental elements increases. Also, when the pressure of the water is too high, the chances of water leak accidents are higher. In addition, the motion of the soil around the pipe might increase pressure and cause the pipe to crack which can be caused due to earthquakes or sliding grounds. Wrong installation of pipes by unprofessional workers might cause leaks if joints were not completely sealed. Pipes and joints can crack as a result of water hammer hit and the hit can become stronger if the pipe is corroded. Furthermore, weak pipes are subjected to cracks if they are clogged. Pipes are affected by temperatures if the material used doesn't withstand high or low temperatures; especially plastic pipes. As the temperature increases, the resistance of the pipes decreases and pipes might freeze when temperatures increase thus causing tension in the pipes (Saghi and Ansari, 2015).

It is very important to control water leaks to manage water resources which prevents water scarcity. Controlling water leaks decreases the pressure on desalination plants thus reducing harmful emissions that cause climate change. Moreover, controlling leaks means that less water will be pumped into pipes; therefore, less fossil fuel will be burnt to generate the pumping power. In USA, 55 water service providers were able to control more 63,000 miles of pipes that had leaks and saved 66.5 billion gallons of water in a year.

This amount of water can supply 1.9 million Americans in a year. Moreover, managing water leaks benefits the economy since technologies can be developed to analyze leaks, water auditing can be performed, and leaks can be fixed and monitored. The adoption of these practices aids in saving money in the future, conserving water resources and boosting economic growth. Investments in this sector also creates social benefits since people will get employed.

In USA, it is estimated that jobs in this sector will increase by 40% when compared to across the board tax cuts. Also, this sector will increase job opportunities by more than five times when compared to temporary business tax cuts. A study revealed that investment of $10 billion in water leak detection industry will increase USA's GDP from $13 to $15 billion, job opportunities will increase from 150,000 to 220,00 and 6.5 to 10 trillion gallons of water can be saved (Center for Neighborhood Technologies, 2013)

It's important to manage underground leaks to prevent flooring damage. Leaking pipes in walls can moisten the surrounding area and cause mold growth thus leading to health issues. Discoloration in walls and bad odors indicated mold growth. Exposure to mold can cause eye and skin irritation, wheezing, nasal stuffiness and allergic reactions. This might also be costly to occupants since furniture and other properties might get damaged (Environmental, Health & Safety Department – University of Washington, 2017). Employees working in offices of Pacific Northwest, USA were suffering from health problems such as respiratory illness and neurobehavioral symptoms due to mold growth in walls caused by leaking pipes.

Employees were moved to other working environments and five samples were taken to conduct tests. Results showed that concentrations of bacteria and fungi (Penicillium and Aspregillus versicolor) were high. Also, contaminants can enter leaking pipes and cause risks to the public health. Moreover, the symptoms were less relevant when the employees moved to another working environment (Sudakin, 1998). Experiments were conducted in distribution networks of University of Enna; Italy and it was interpreted that soil contaminants intruded pipes that had negative pressure tests due to cracks. Pipes were pressurized to get rid of the contaminants; however, most of the contaminants remained in the pipe and were transferred to users. The test results elaborated that the concentration of contaminants reached 2 g/L and this means that people who used the water were highly susceptible to health issues (Fontanazza et al., 2015).

Leaks can be analyzed by using different advanced technologies some of them are:

- Vibration and Acoustic Techniques

  - LeakfinderRT
  Which consists of acoustic sensors such as computer, hydrophone, accelerometer and wireless signal transmission. Sensors are installed in two different locations. This technology functions as cross-correlation which measures the similarities of waveforms when time lag is enforced thus the leak sound is analyzed. Besides, this technology can't identify the size of the leak (Zangenehmadar, 2014).

➢ Smart Ball

Is considered as a new technology which consists of multiple sensors such as accelerometer, temperature sensor, magnetometer, power source and ultrasonic transmitter. All these sensors are located in the core which is covered by outer shell. The outer shell acts as insulation to prevent noises. The smart ball is inserted into the pipes and can record data up to 12 hours. In this method, the receiving sensor finds the location of the smart ball by interpreting the arrival time of the acoustic signal thus identifying the location of the leak (Zangenehmadar, 2014).

➢ Listening sticks

This method is used in areas were water leakage is suspected and this stick is put over the suspected area to listen for the leak. Adding to that, the time delay is calculated based on the speed of the sound in the pipe. Besides, this technology can't be used for plastic pipes and pipe access is required (Zangenehmadar, 2014).

- Combined Ultrasonic Inspection
  ➢ This technique is useful in identifying cracks and metal loss simultaneously by using innovative sensors. High frequency is applied to pipelines repeatedly. Besides, access to the pipe is needed to conduct the test (Zangenehmadar, 2014).

- Acoustic Fiber Optics
  ➢ Fiber optics are placed in the pipes and are connected to a system where optical data can be obtained. This system consists of laser in which light is directed through the fiber. Light is reflected since acoustic waves produces stress on the fiber and the reflected light is interpreted by the system. Besides, this technology is costly (Zangenehmadar, 2014).

- Tracer Gas
  ➢ The tracer gas (H_2N_2) has low specific density that's why it penetrates quickly in all materials. If a pipeline has a crack, the tracer gas rises vertically in which it can be detected by using gas check. This technology can detect small leaks due to the quick reaction. Very low concentration of hydrogen (0.5 ppm) can detect small leaks as $5 \times 10\text{-}7$ mbar l/s (Vtech, 2010).

Site Inspection to Identify Water Leaks

Water saving devices were installed in many villas and those devices include aerators, nozzles for watering gardens, efficient showerheads and tank bags. Those devices regulate the flow of water by increasing pressure and using less water. The devices save 15-30% of water. Besides, in some of the villas the devices were installed but still there are water losses. As a result, a task of water leak inspection was assigned, and the first steps performed were the following:

- Identification of high-water consumption villas in which no saving were achieved after the installation of water saving devices

- Site inspection to check the efficiency of the water saving devices, to ensure that the devices were not removed and to check if the customer included swimming pools or water fountains in his villa.

The first two steps were fulfilled and a specific villa that had efficient water saving devices was chosen for water leak inspection. Water saving devices were installed on March 2017. Before the installation of water saving devices, the customer had high water consumption; however, in the same year water consumption kept increasing in most of the months. By the end of the year, the customer decided to remove the agriculture to reduce water consumption. Adding to that, the consumptions of 2019 are higher than the consumptions of 2018.

After that, a site visit was conducted to investigate the pipes and pressure gauge was used in testing all pipes in order to identify pressure losses due to leaking pipes. Lines with pressure loss were inspected with the tracer gas method to identify leaks. The following pipe sections were tested with pressure gauge and tracer gas:

- **Section 1**
Pipe section from the supplied water to the main tank
  - No pressure drop was noted

- **Section 2**
Pipe section from main tank to main house tank
  - Pressure drop was noted

- **Section 3**
Pipe section from main tank to second house tank
  - Pressure drop was noted

- **Section 4**
Pipe section from the main tank to the irrigation tap
  - No pressure drop was noted

The pressure drops in section 2 and 3 were due to the leaks in the outlet of the main tank. The main tank itself had a leak in the bottom. Adding to that, all buried pipelines were inspected, and no leaks were identified. The leaking tank and its outlet pipe connection were recommended to be replaced. Moreover, leaks will be repaired, and water consumption will be monitored to ensure that the leak is controlled.

Conclusion

To conclude, controlling and managing water leaks is vital to save water since enormous amount of water is lost due to unknown leaks. Material of the pipe, pipe age, pipe diameter, water pressure, soil motion, and water hammer hit are factors that might cause water leaks. Adding to that, nowadays; there are advanced technologies that analyze water leaks and they include acoustic techniques, acoustic fiber optics, combined ultrasonic inspection and tracer gas. Many benefits can be achieved when water leaks are controlled. Those benefits include; reduced water and electricity consumption, reduced operation and maintenance costs, reduced damages to personal properties, reduced contamination risks, prevention of mold growth and economic and social benefits such as boosting the GDP and increasing job opportunities. Besides, some difficulties can arise when locating water leaks such as access to test points, interference of environmental conditions such as moister and water table when using acoustic techniques, identification of pipe location and the presence more than one leak in the same pipe since the technologies are programmed to locate one leak in a single pipe.

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The Future of Work and Play Track

Assessment of Entrepreneurial Intensity and Internal Environment for Corporate Entrepreneurship - The Case of a Governmental Entity at an Emirate in the UAE

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Abstract

This paper assesses one of UAE's emirate's large governmental organization's Entrepreneurial Intensity using the qualitative data from (1) the literature, and (2) from one of the authors of this paper who works at THE ORGANIZATION. Using the Entrepreneurial Intensity Grid, THE ORGANIZATION was categorized between dynamic and periodic/discontinuous. This paper also uses CEAI tool to quantitatively Diagnosis THE ORGANIZATION's internal Entrepreneurial Environment. THE ORGANIZATION scored high in Management Support at 3.94/5, average in Work Discretion at 3.13/5, low in Rewards and Reinforcements at 2.92/5, low in Time Availability at 2.87/5, and the lowest in organizational Boundaries at 2.35/5, which overall indicated that THE ORGANIZATION is not ready for individual entrepreneurial activity and in parallel cannot start planning and implementing their corporate entrepreneurial strategy. Although top management at THE ORGANIZATION is endeavoring to spread transformational spirit, mid-level managers proved to be not supportive of that. The traditional policies, procedures, and jobs were also analyzed as a reason for THE ORGANIZATION's current corporate entrepreneurial status.
THE ORGANIZATION has the capabilities to become revolutionary at the entrepreneurial intensity grid by resolving the snags identified in this paper, continuous diagnosis using CEAI, and finally planning and implementing a proper corporate entrepreneurial strategy upon refinement of the CEAI results.

1. Literature Review

Corporate entrepreneurship is a term used to describe entrepreneurial behavior inside established midsized and large organizations (Kuratko, and Morris, 2018). Organizations who aims to achieve competitive advantage and want to become leaders at the market they serve should pay great deal towards corporate entrepreneurship. Where can be defined as a set of actions aiming towards achievement of goal(s), another term that is strategy for entrepreneurship can be defined as a set of actions aiming towards corporate entrepreneurship. Hence, to set up and apply a strategy for entrepreneurship you need to know where you are today in that perspective and wither your company have the necessary resources and ready mentally. Entrepreneurial Grid is a tool where a company can measure their entrepreneurial intensity considering factors like frequency, innovation, proactiveness, and risk level of entrepreneurial initiatives. Entrepreneurial grid can be used by a company to measure level as an entrepreneurial organization.

Figure 1 - Entrepreneurial Grid
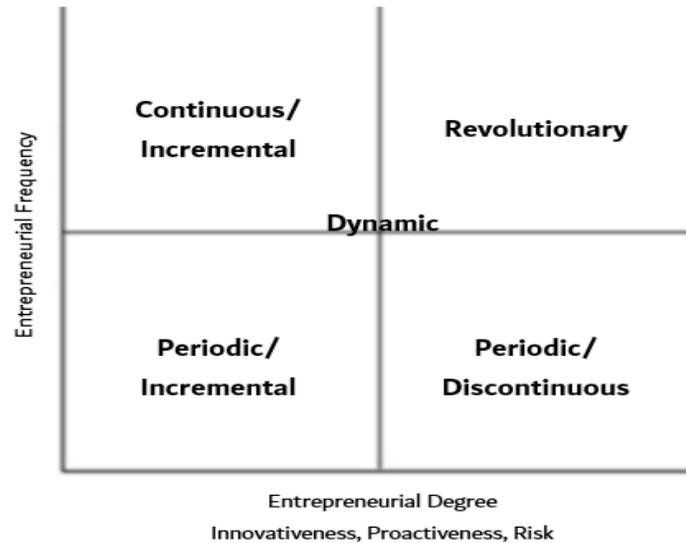
From there, and after using the entrepreneurial grid, a company can set their goal on where they want to be in the entrepreneurial grid and when, by building a strategy that will take them there. But not all companies are capable of building and applying a strategy for entrepreneurship, organizations should be packed with the necessary resources and mentality. To measure a company's capability to apply a strategy for entrepreneurship, Kuratko, Hornsby and Covin (2014) have introduced a tool for measuring five different dimensions of that aspect, which are top management support, work discretion and autonomy, rewards and reinforcement, time availability, and organization's boundaries.

To sum up, organizations should see where they are at the entrepreneurial grid, determine where they see to be at what point in the future. Then measure their ability to implement a strategy for entrepreneurship, refine their ability until they are ready, and finally apply a strategy for entrepreneurship.

2. About THE ORGANIZATION

The organization is one of the most important governmental entities at one of the emirates of the UAE, it operates with more than 3,500 employees from 33 different nationalities. The Organization is dramatically transforming, and the structure of the company is changing as new departments are created and others are merged. One of the Organization's core values is passion for customers. They strive to develop a long-term customer relationship by consistently delivering quality, innovation, and business values that meet or exceed their customers' expectation. With around 1.5 million customers. The Organization is working hard to delight every customer, every time.

The Organization provides variety of services that can be divided to paid and free services. In addition, there are some mandatory products and others are optional for customer.

The Organization is the only provider of its core service in that emirate. It also owns 100% of the market when it comes to licensing related contractors and consultants. In commodities, the Organization's products are popular among the residents of the emirate and has plans for further expansion.

3. THE ORGANIZATION's Entrepreneurial Intensity and Climate Assessment

3.1 EI Assessment on the Entrepreneurial Grid

To get a fair idea to assess the entrepreneurial intensity at THE ORGANIZATION we interviewed an employee at THE ORGANIZATION's executive office. From the perspective of entrepreneurial frequency, we found that THE ORGANIZATION is doing fine but not enough for us to place it above average at the chart, as it had completed two entrepreneurial projects in this year which we thought was fair for a governmental entity especially that they have plenty more in the pipeline and are working on different initiatives to source creative entrepreneurial ideas.

Considering some of their entrepreneurial projects, we thought that it was fair to say that THE ORGANIZATION is above average when it comes to innovation level. We also thought that THE ORGANIZATION is doing great in terms of proactiveness with all the idea sourcing initiatives outlined by the interviewee and the change-oriented leadership we sensed at THE ORGANIZATION. Risk level wise, we think that Interviewee have justified why we shall consider the high level of risk implementing entrepreneurial projects at THE ORGANIZATION considering the money invested and the reputation of a big government entity such as THE ORGANIZATION. Based on the above, we plotted THE ORGANIZATION on the Entrepreneurial grid in **Error! Reference source not found.**.

Figure 2 - THE ORGANIZATION on the Entrepreneurial Grid
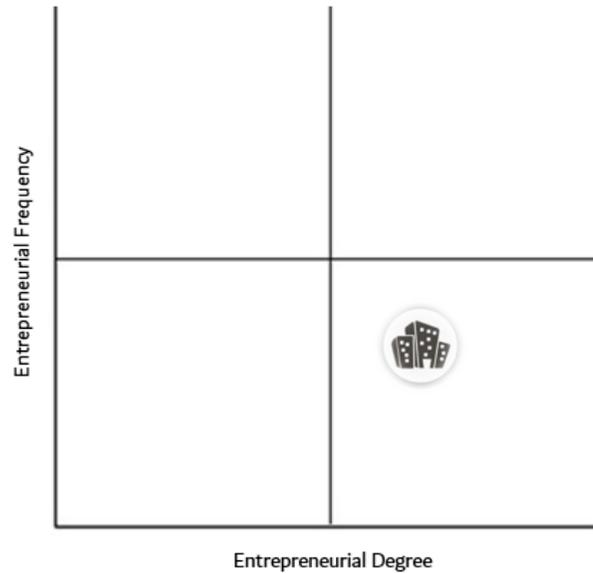
3.2 Company Vision and Overall Corporate Strategy for Entrepreneurship and Innovation

THE ORGANIZATION's vision is to reach international recognition. As for their mission, it is to utilize teamwork, positive attitude and high standard of service in a fun environment to create value and make a difference. In addition to the remarkable initiatives by THE ORGANIZATION's top management to nourish innovation and in parallel entrepreneurial environment discussed, THE ORGANIZATION is purpose-led organization with focus on re-imagining new service value-added innovations that build brand equity and bring durable lifetime customer value and advocacy. In 2019, THE ORGANIZATION was awarded for its unique workplace and environment. Being a continuous innovative learning organization, THE ORGANIZATION aspires to inculcate a high-trust and high-performance culture. THE ORGANIZATION aims to ensure sustainable holistic growth by balancing the People, Planet, and Profit triad.

3.3 Company Structure and Levels of Management

THE ORGANIZATION is more than halfway moving from structured hierarchy government organization towards flat and flexible organization structure, focusing more on teams and small units than the old big hierarchal departments. Top management is directing their focus towards women and youth empowerment as well as upskilling employee's knowledge management skills.

3.4 Entrepreneurship Climate & Culture

To measure THE ORGANIZATION's entrepreneurship climate and culture we applied the CEAI test developed by Kuratko, Hornsby and Covin (2014). CEAI diagnosis the organization's entrepreneurial environment based on five dimensions; where each dimension gets a score from 1 to 5 based on the average of the participants' overall responses, as per Kuratko, Hornsby and Covin (2014) the higher the score the better, where a low score on any dimension suggests the need for

development towards improvement to facilitate the establishment of an entrepreneurship strategy in the firm, and high scores indicate that a company's environment sufficiently supports innovative activities and the implementation of a corporate entrepreneurship strategy. Since it was not further explained by (Kuratko, Hornsby and Covin, 2014), we decided that any score above 3.25 is high, values between 3 and 3.25 are average, and scores equal to or below 3 are low.

We didn't categorize the scores further because the highest score was around 4 on the completed surveys, and we wanted to highlight for THE ORGANIZATION the dimensions where they got average or low scores as we believe that those need to be worked on more than those that were evaluated high and need some refinement.

The survey was open for two working days on www.surveymonkey.com, answered by 53 participants. The average response time was around 9 minutes. Two responses were discarded as the first one was a test, and the second skipped more than half of the questions. For those who skipped maximum of three questions we gave the score of 3 to the questions they skipped (i.e. we considered the answer as Not Sure). To further assess the reliability of the data, the highest standard deviation of the scores under each dimension didn't exceed 0.69, which also indicated the consistency of THE ORGANIZATION's employees' perception of the different corporate entrepreneurial dimensions. See the data in **Error! Reference source not found.**.

The survey was inducted in THE ORGANIZATION's headquarters only as it is the birthplace of innovation and entrepreneurship at THE ORGANIZATION, and since THE ORGANIZATION has a flat organization structure, and to insure the participants their responses are totally anonymous we didn't separate the responses of managers and subordinates.

3.4.1. Top Management Support

The role of a leader is essential to the corporate entrepreneurial environment. CEAI included 19 questions for measuring top management support. The average overall rating for the first dimension in THE ORGANIZATION is 3.94, implying relatively adequate support for the innovation-related activities from the top management.

Figure 3 - Top Management Support related questions (Kuratko, Hornsby and Covin, 2014)

Section 1: Management support for corporate entrepreneurship

—   1. My organization is quick to use improved work methods.
—   2. My organization is quick to use improved work methods that are developed by workers.
—   3. In my organization, developing one's own ideas is encouraged for the improvement of the corporation.
—   4. Upper management is aware and very receptive to my ideas and suggestions.
—   5. A promotion usually follows from the development of new and innovative ideas.
—   6. Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.
—   7. The "doers on projects" are allowed to make decisions without going through elaborate justification and approval procedures.

— 8. Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.
— 9. Many top managers have been known for their experience with the innovation process.
— 10. Money is often available to get new project ideas off the ground.
— 11. Individuals with successful innovative projects receive additional rewards and compensation beyond the standard reward system for their ideas and efforts.
— 12. There are several options within the organization for individuals to get financial support for their innovative projects and ideas.
— 13. People are often encouraged to take calculated risks with ideas around here.
— 14. Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not.
— 15. The term "risk taker" is considered a positive attribute for people in my work area.
— 16. This organization supports many small and experimental projects, realizing that some will undoubtedly fail.
— 17. An employee with a good idea is often given free time to develop that idea.
— 18. There is considerable desire among people in the organization for generating new ideas without regard for crossing departmental or functional boundaries.
— 19. People are encouraged to talk to employees in other departments of this organization about ideas for new projects.

Table 1 - THE ORGANIZATION's attributes' scores in Management Support

Dimension	Dim Score	Q. No.	Score	
Management Support	3.94	Q1	4.31	↑
		Q2	4.25	↑
		Q3	4.41	↑
		Q4	4.39	↑
		Q5	3.51	↑
		Q6	4.22	↑
		Q7	3.59	↑
		Q8	3.84	↑
		Q9	3.98	↑
		Q10	3.35	↑
		Q11	4.00	↑
		Q12	3.18	↔
		Q13	3.80	↑
		Q14	3.82	↑
		Q15	3.90	↑
		Q16	3.69	↑
		Q17	4.10	↑
		Q18	4.10	↑
		Q19	4.41	↑

As per the scores' evaluation criteria we set, 18 questions under this dimension got high scores (i.e. that is above 3.25), which indicated that top management is not old fashion when it comes to work style, they welcome ideas from employees to enhance work style, they consider THE ORGANIZATION's employees as a source of innovative ideas that will benefit the business and they recognize, encourage and award those who contribute to THE ORGANIZATION's innovation mission.

Not only this, but also, they endeavor to facilitate the journey of those contributors, and treats them positively upon failure of execution. The top management also make sure that they hire employees with innovation expertise. They allocate budget for innovation endeavors, and they make sure a healthy interdepartmental communication is in place not to limit the minds of the innovators to their fields only. In the other hand, they got an average score regarding making available variety of options to finance individual's innovative ideas towards the improvement of THE ORGANIZATION.

As per the interviewee at THE ORGANIZATION – "*the employees receive several recognitions from time to time, including Special Recognition from Chairman through social media or mail specifically boosts and uplifts the morale of an individual and in parallel enhances their longevity.*"

3.4.2. Work Discretion and Autonomy

Work discretion is essential to have a flourishing innovative environment that leads to entrepreneurial success. Some environments kill the spirit of innovation by ways that support the manager to stand by the door, wait for the employees to punch in, introduce a log bog for the employees to jot down the reason of the short leaves taken even after submitting them in the online system, interfere in the decision making with regards to implementing new and positive change in the workplace, and forbid any authority of the employees to plan and execute the work to the extent that irritate the employees and make them feel detached from the work environment.

THE ORGANIZATION scored on Discretion a 3.13 which is average as per our scoring criteria. The highest score was 3.6, and the lowest was 2.6. This indicates that THE ORGANIZATION is somehow weak at empowering the employees and giving them some freedom to decide on their tasks. THE ORGANIZATION needs to improve and strengthen work discretion in order to create an organic environment for innovation.

Figure 4 - Work Discretion related survey questions (Kuratko, Hornsby and Covin, 2014)

Section 2: Work discretion

— 20. I feel that I am my own boss and do not have to double check all of my decisions with someone else.
— 21. Harsh criticism and punishment result from mistakes made on the job.
— 22. This organization provides the chance to be creative and try my own methods of doing the job.
— 23. This organization provides the freedom to use my own judgment.
— 24. This organization provides the chance to do something that makes use of my abilities.
— 25. I have the freedom to decide what I do on my job.
— 26. It is basically my own responsibility to decide how my job gets done.
— 27. I almost always get to decide what I do on my job.
— 28. I have much autonomy on my job and am left on my own to do my own work.
— 29. I seldom have to follow the same work methods or steps for doing my major tasks from day to day.

Table 2 - THE ORGANIZATION's attributes' scores in Work Discretion

Work Discretion	3.13	Q20	3.27	↑
		Q21	3.55	↑
		Q22	3.04	↔
		Q23	3.41	↑
		Q24	2.88	↓
		Q25	2.73	↓
		Q26	3.29	↑
		Q27	2.96	↓
		Q28	3.06	↔
		Q29	3.06	↔

THE ORGANIZATION's employees scored their organization high in 4 out of the 10 questions related to work discretion in the survey. A high score of 3.55 to question 21 impressively indicated that employees at THE ORGANIZATION are treated properly if they make mistakes. Having room for mistakes gives THE ORGANIZATION's employees a push to learn from them rather than being afraid of making them. Another high score of 3.41 in question 23 related to level of freedom employees enjoy in making judgements on work situations. This score is good, and it goes in line with insightful decision making. If employees are encouraged to practice decision making, their judgement will be stronger, and it will reflect positively on the employee and it will ripple across the firm (Bryan, 2019). Similarly, but not as strongly, question 20 scored 3.27, and question 26 scored 3.29 which we considered a little high as per this research evaluation criteria, but note that they missed the average score range by very little.

Hence, to some extent in THE ORGANIZATION, the employees can make decisions and feel they are bosses on themselves. They can also decide how the tasks they are assigned to are done to a certain level, but they do not have the complete authority and autonomy over their tasks. It reveals that employees are free to plan and organize their tasks, but to a certain extent they are obliged to do the same work.

Yes, they can decide the how, but not the what, this was analyzed looking at the low scores of questions 24, 25, and 27. While average scores for Q22, Q28, Q29 showed that employees feel they are not in total control to decide for themselves. Furthermore, they feel that the organization does not help them utilize their maximum abilities, creativity, potential to do the work.

Analyzing this dimension was a dilemma for the authors of this paper, as the score of it as per our evaluation criteria was low, yet it had some positive aspects necessary for healthy corporate entrepreneurial climate. This dilemma started to untangle when we analyzed the results of the organization's boundaries dimension in section 0 and figured the main reason of why the employees cannot be creative even though they may feel like they are their own bosses.

3.4.3. Rewards and Reinforcement

Rewards grow a big percentage of employee's motive and integrity to perform and innovate (Kuratko, Hornsby and Covin, 2014). Even though there are different types of reinforcements that managers can offer and support employees with, at the end it benefits the corporate entrepreneurial environment. THE ORGANIZATION scored on rewards and reinforcement dimension an average of 2.95 where the lowest score was 1.5 and the highest was 4.17. This implied that THE ORGANIZATION is not doing the demanded critical job in the rewards scale and in employees' reinforcement. Score 2.95 is low as per the scores' evaluation criteria we set in this research, and as per the survey it refers to Not Sure or less.

Hence, THE ORGANIZATION's employees mostly couldn't declare whether they do really get the motivation to innovate or not. Employees rated this specific dimension with low scale as they are not aware of how the organization arranges, builds, develops and systemizes the reinforcement strategy and plan. This scoring results means that more effort should be occupied by management to enhance clearer rewards strategy, thus employees arrange and perform based on that. As a result, workers can choose where they want to position themselves in the rewards program

Figure 5 - Rewards and reinforcement related survey questions (Kuratko, Hornsby and Covin, 2014)

Section 3: Rewards/Reinforcement

— 30. My manager helps me get my work done by removing obstacles and roadblocks.
— 31. The rewards I receive are dependent upon my innovation on the job.
— 32. My supervisor will increase my job responsibilities if I am performing well in my job.
— 33. My supervisor will give me special recognition if my work performance is especially good.
— 34. My manager would tell his/her boss if my work was outstanding.
— 35. There is a lot of challenge in my job.

Table 3 - THE ORGANIZATION's attributes' scores in Rewards and Reinforcements

Rewards/ Reinforcements	2.92	Q30	2.75	↓
		Q31	3.04	↔
		Q32	2.84	↓
		Q33	2.71	↓
		Q34	3.49	↑
		Q35	2.71	↓

Only one of the six questions related to this dimension scored a high of 3.5 as per our evaluation criteria. This question 34's score implied that the employee knows that his/ her work won't be attributed to someone else and he/ she will get the credit of their achievement. This also reveals positive competence in THE ORGANIZATION's internal environment.

Questions 30, 31, 32, 33 and 35 scored low between 2.7 to 3.04. This places a question mark on how managers/ supervisors at THE ORGANIZATION translate the top management's message we analyzed in section 0 to their subordinates. It also reflects the standard work procedures employees follow which will be further discussed in section 0. The reinforcement behavior of managers/ supervisors appears to be weak at THE ORGANIZATION.

Employees don't seem to feel challenge in their work which reflects a routine day to day tasks, they seem to have no clear idea of the rewards strategies adopted by management, there is a kind of misunderstanding on when and what is expected from them to be rewarded. Analyzing this dimension, we clearly observe a weak relationship and harmony between managers and employees, and maybe managers and top management.

3.4.4. Time Availability

Innovative entrepreneurial ideas require time to be brainstormed, studied, researched, tested, and pitched, then maybe implemented. The most dominant practice about having a job is to complete, be evaluated, and be compensated for the responsibilities listed in the job description an employee signs when they join a firm. Obviously, such ordinary practice won't produce an innovative entrepreneurial environment; as traditional job descriptions would not have areas related to innovation and entrepreneurship and in parallel time won't be structured accordingly. Unfortunately, THE ORGANIZATION's score came low in relative to this dimension, and we can generally say that THE ORGANIZATION's employees are mostly tight on time and the working hours they have are merely enough to complete their day to day duties.

Figure 6 - Time Availability related survey questions (Kuratko, Hornsby and Covin, 2014

Section 4: Time availability

— 36. During the past three months, my workload kept me from spending time on developing new ideas.
— 37. I always seem to have plenty of time to get everything done.
— 38. I have just the right amount of time and workload to do everything well.
— 39. My job is structured so that I have very little time to think about wider organizational problems.
— 40. I feel that I am always working with time constraints on my job.
— 41. My co-workers and I always find time for long-term problem solving.

Table 4 - THE ORGANIZATION's attributes' scores in Time Availability

Time Availability	2.87	Q36	2.92	↓
		Q37	3.14	↔
		Q38	2.88	↓
		Q39	2.84	↓
		Q40	2.37	↓
		Q41	3.04	↔

None of the six questions under this dimension got a high score, which highlights a critical problem THE ORGANIZATION should look into. It appears that the workload per employee is high and could even be not enough to complete the day to day tasks. From a different perspective, where questions 37 and 41 got an average score, employees seem to be not sure about the ratio between working hours and workload, and maybe occasionally finding a slice of time to discuss problem solutions with the team.

3.4.5. Organizational Boundaries

As we have described in section 0 the ordinary most dominant job structure would never be supportive of corporate entrepreneurship. If employees are enjoying a high level of certainty about their duties, then they are not in an entrepreneurial corporate. To enhance corporate entrepreneurship, an organization should focus less on setting up unbeatable policies and procedures and focus more on cultivating flexibility.

An entrepreneurial environment demands flexible policies that focus on the vision and the mission of the organization rather than how work should be done and such flexible policies and procedures organizes the desired innovation process. Although we learned in section 0 that employees at THE ORGANIZATION feel like their own bosses, and they can decide how to do their job, they scored THE ORGANIZATION the lowest in this dimension compared to all the other dimensions, which reflected a set of strict rules that employees should abide to performing their day to day tasks.

Figure 7 - Organizational Boundaries survey related questions (Kuratko, Hornsby and Covin, 2014)

Section 5: Organizational boundaries

— 42. In the past three months, I have always followed standard operating procedures or practices to do my major tasks.
— 43. There are many written rules and procedures that exist for doing my major tasks.
— 44. On my job I have no doubt of what is expected of me.
— 45. There is little uncertainty in my job.
— 46. During the past year, my immediate supervisor discussed my work performance with me frequently.
— 47. My job description clearly specifies the standards of performance on which my job is evaluated.
— 48. I clearly know what level of work performance is expected from me in terms of amount, quality, and timelines of output.

Table 5 - THE ORGANIZATION's attributes' scores in Organizational Boundries

Organizational Boundaries	2.35	Q42	2.04	↓
		Q43	2.41	↓
		Q44	1.96	↓
		Q45	2.73	↓
		Q46	3.22	↔
		Q47	2.22	↓
		Q48	1.90	↓

It was evident from the scores of the seven questions under this dimension that THE ORGANIZATION falls short in this area, especially having a traditional performance evaluation criteria and methods, having traditional job descriptions with routine day to day tasks and high level of certainty. Operations are managed by set rules and procedures that limits flexibility and in parallel creativity. From a different perspective, supervisors seem to frequently discuss the employees work performance, but unfortunately based on traditional procedures and traditional certain evaluation criteria.

3.4.6. THE ORGANIZATION's Overall Corporate Entrepreneurship Environment

Table 6 - All dimensions scores for THE ORGANIZATION

Dimension	The Organization's Score	
Management Support	3.94	↑
Work Discretion	3.13	↔
Rewards/ Reinforcements	2.92	↓
Time Availability	2.87	↓
Organizational Boundaries	2.35	↓

Table 7 - Summary of THE ORGANIZATION's evaluation for different attributes

High	Average	Low
1. Top Management Support	1. Financing individual innovative ideas	1. Employees can't decide what to tasks to work on
2. Employees have room for mistakes	2. Employees are not in total control to decide for themselves	2. Weak reinforcement behavior of managers/ supervisors towards subordinates
3. Employees have freedom in making judgements on work situations	3. Organization does not help employees utilize their maximum abilities, creativity, potential to do the work.	3. Employees don't feel challenge in their work
4. Employees can make decisions and feel they are bosses on themselves	4. Employees are not sure about the ratio between working hours and workload	4. Employees have no clear idea of the rewards' strategies adopted by management
5. Employees can manage how to complete their tasks	5. Employees occasionally find time to discuss problem solutions with the team	5. Workload per employee is high
6. Positive competence in The Organization's internal environment	6. Supervisors frequently discuss the employees work performance	6. Traditional performance evaluation criteria and methods followed
		7. Employees have traditional job descriptions with routine day to day tasks and high level of certainty
		8. Operations are managed by set rules and procedures that limits flexibility and in parallel creativity

THE ORGANIZATION scored high in Top Management Support, average in Work Discretion, and low in Rewards and Reinforcements, Time Availability, and Organizational Boundaries.

The first major finding we have concluded was that employees at THE ORGANIZATION are granted freedom when performing their duties, but to a limit that is not autonomous. They can organize their time and tasks and finish them in a manner they deem they are suitable as discussed in section 0. Yet tasks and duties are like a daily routine for the average worker at THE

ORGANIZATION, they are governed with rules, polices and operational procedures to complete their work under a tight time as discussed in sections 0 and 0.

Secondly, the contribution from mid-level managers and supervisors towards corporate entrepreneurial leadership was rated weak as discussed in section 0. There are huge efforts and enthusiasm from top management towards transforming THE ORGANIZATION into an entrepreneurial organization; this was evident from the interview and the answers analyzed from the survey. Such entrepreneurial environment requires enablement of the individual and in parallel individual contribution towards corporate entrepreneurship (Kuratko, Hornsby and Covin, 2014). But this enthusiasm of the top management doesn't move through mid-level management to individuals.

4. Recommendations for Increasing Corporate Entrepreneurship level

Taking this test and carefully going through the results is the first step towards Increasing Corporate Entrepreneurship level at THE ORGANIZATION. Corrective actions should be planned, tested, implemented and controlled to enhance the contribution of individuals towards corporate entrepreneurship. This diagnosis should be undertaken over and over until finer results are reached, and from there become prepared for individual entrepreneurial activity and ready to plan and implement a corporate entrepreneurial strategy.

We suggest that THE ORGANIZATION should discard the traditional policies, procedures, job descriptions, and employee evaluation criteria and methods. Those standard tracks built by consultancies won't take THE ORGANIZATION beyond the standard. These traditional boundaries should be replaced with innovative ones that encourage new way of work, different evaluation standards, innovative guides that make the employee feel the challenge in their job, feel the achievement, and spare time for innovation and entrepreneurial contribution.

Empowering employees results positively as it establishes rapport, creates a strong sense of belonging and loyalty, increases productivity, and the level of motivation to achieve what is beyond the maximum potential. Hence, we recommended to reduce excessive oversight by eliminating punch in and outs as it leaves the employee feeling untrusted. In addition, it is more important to give freedom for the employees to decide what they are best at with regards to the tasks they are assigned to do, and work on them at their convenience while taking into consideration to finish the tasks within the time constraints. It's also important to support employees to take decisions even though it is risky and learn from their mistakes.

Mid-level managers and their subordinates can attend special trainings in innovation, and corporate entrepreneurship. Leadership training will be critical for mid-level managers to successfully translate the top management corporate transformational message to their subordinates. Furthermore, it is always good to learn from benchmarking with the most successful entities.
Richard Branson, the billionaire founder of Virgin Group believes strongly in empowering the employees. In one of his blogs he said: *"companies should give their teams freedom to make their own decisions and express themselves"* (Bryan ,2019). In addition, he introduced a new policy for the employees to take unlimited paid leaves to capture their loyalty and support them to work

efficiently and with desire to give the best. He also assures that employees will not abuse this policy as they will feel more respected.

Recommended Possible Initiative Upon Readiness to Adopt A Strategy for Entrepreneurship

Monthly gathering for THE ORGANIZATION's employees to assemble a competition designed as a workshop, where they form different groups and each group has diverse employees from different departments and sections to come out with an innovative complete idea in 4 hours. This competition contributes in solving 4 dimensions' issues. Firstly, time availability, where a special time will be giving for critical thinking and innovating. Secondly, top management; as managers and supervisors will be part of the group, thus no hierarchy presence. Thirdly, rewards and reinforcements as a big valued reward is offered for the winner. Lastly, Organization's boundaries would be eliminated by way of no policy or management acceptation needed immediately for the idea crafted, besides employees from different sections meet and build relationship with each other. Thus, the idea that would be generated could deliver its voice and reaches quickly without abandon instructions.

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Appendix 1

CEAI Data – THE ORGANIZATION's Employees Responses
Table 8 - Unreversed Data

Table 9 - Scores Calculation after data reversing

Respondent	Management Support	Work Discretion	Rewards/ Reinforcements	Time Availability	Organizational Boundaries
1	4.42	2.9	3.33	3.00	2.86
2	3.63	3.1	2.83	2.50	3.14
3	3.42	3.2	2.33	3.50	2.14
4	2.89	3.1	2.50	3.50	3.71
5	2.79	2.3	2.67	3.50	3.14
6	3.95	3.4	3.00	3.00	2.14
7	3.89	3.2	3.17	3.00	2.14
8	4.21	3.4	2.83	2.67	1.71
9	4.26	2.7	2.67	3.50	2.57
10	3.68	3.6	3.33	2.17	2.57
11	4.16	1.9	3.00	3.17	2.86
12	4.16	3.7	2.50	2.67	2.43
13	4.11	3	4.17	3.67	2.57
14	3.79	2.6	3.17	2.67	2.14
15	2.05	3	2.33	2.83	4.00
16	4.16	3.7	3.50	2.17	1.71
17	4.37	3.5	3.67	3.17	2.71
18	3.84	3.3	2.50	2.67	3.29
19	4.21	2.6	2.50	3.33	1.57
20	3.74	3.1	2.50	3.00	2.00
21	3.84	3.5	2.83	3.00	2.29
22	4.00	2.9	2.17	3.83	2.43
23	3.47	3.4	2.50	2.17	2.43
24	3.05	3	3.33	2.17	3.57
25	4.00	2.7	2.00	2.83	1.71
26	4.00	3.1	2.83	3.00	2.43
27	4.37	3.6	3.67	3.33	3.14
28	3.63	2.8	3.67	3.00	2.43
29	3.84	3	3.50	2.33	2.43
30	4.26	3.4	3.50	4.17	2.43
31	4.21	2.7	4.00	2.33	1.00
32	3.74	2.5	3.17	2.50	2.43
33	3.42	2.9	3.33	2.50	2.86
34	3.79	3.3	2.33	3.50	2.29
35	3.84	3.1	2.83	2.67	2.43
36	3.74	2.6	3.33	3.17	2.86
37	3.42	3.2	1.83	3.33	3.00
38	3.84	2.9	2.00	3.17	1.71
39	4.21	3.2	2.83	2.83	2.00
40	4.11	2.9	3.83	3.00	2.00
41	4.32	3.1	2.33	2.67	1.43
42	4.42	3.5	1.50	2.50	1.29
43	4.21	3.3	3.00	2.17	2.00
44	4.58	3.4	3.50	2.33	1.57
45	4.63	3.1	2.67	1.83	2.00
46	4.26	3.7	2.50	2.67	1.57
47	4.58	3.5	3.17	2.00	1.86
48	4.68	3.1	3.17	2.67	1.71
49	4.74	4.4	2.50	2.33	1.43
50	4.32	3.2	3.33	3.00	1.71
51	3.68	3.1	3.33	3.50	4.14
Org's Score	*3.94*	*3.13*	*2.92*	*2.87*	*2.35*
Standard Deviation	0.51	0.41	0.58	0.51	0.69

Table 10 - Scores Summary

Dimension	Dim Score	Q. No.	Score
Management Support	**3.94**	Q1	4.31
		Q2	4.25
		Q3	4.41
		Q4	4.39
		Q5	3.51
		Q6	4.22
		Q7	3.59
		Q8	3.84
		Q9	3.98
		Q10	3.35
		Q11	4.00
		Q12	3.18
		Q13	3.80
		Q14	3.82
		Q15	3.90
		Q16	3.69
		Q17	4.10
		Q18	4.10
		Q19	4.41
Work Discretion	**3.13**	Q20	3.27
		Q21	3.55
		Q22	3.04
		Q23	3.41
		Q24	2.88
		Q25	2.73
		Q26	3.29
		Q27	2.96
		Q28	3.06
		Q29	3.06
Rewards/ Reinforcements	**2.92**	Q30	2.75
		Q31	3.04
		Q32	2.84
		Q33	2.71
		Q34	3.49
		Q35	2.71
Time Availability	**2.87**	Q36	2.92
		Q37	3.14
		Q38	2.88
		Q39	2.84
		Q40	2.37
		Q41	3.04
Organizational Boundaries	**2.35**	Q42	2.04
		Q43	2.41
		Q44	1.96
		Q45	2.73
		Q46	3.22
		Q47	2.22
		Q48	1.90

Sustainable Initiative- Go Green

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Abstract

This paper presents a general overview of innovative testing method of optimization of SF6 gas handling in DEWA substation during high voltage testing of 132kilo volt cables between transformer and gas insulated switchgear. There are 300+ DEWA substations are in operation feeding electricity to the 844,216 consumer. DEWA substation is fully indoor substation and Gas insulated switchgear filled with SF6 gas are used in 400KV and 132KV substation. Using the old standard practice of High voltage testing method, there are possibilities of high possibilities of SF6 gas emission to ozone. We first study how to optimize the SF6 gas handling in DEWA substation predict these radiated fields and examined their compliance with international standards. An innovative model used the same technology with change in nature of work. An exposure assessment of a new innovative testing method conducted practically at DEWA substation with the one of make of gas insulated switchgear. In a second step, we studied the technical viability comparing with the international standard, taking into account the stakeholder confirmation, helped study exposure level of developed idea to deployment.

Keywords: Gas insulated switchgear, cables, High voltage testing method, test adaptor device.

Introduction

DEWA substation is a standard 132-kilo volt/ 11 kilo volt substation consists of 132KV Gas insulated switchgear of 8 number of feeder bays and 3 number of transformer. Gas insulated switchgear are filled with SF6 (Sulphur Hexa fluoride) gas. 132KV cables are connected to transfer power from Gas insulated switchgear (GIS) to transformer.

Scope of work

132KV cable connected between Gas insulated switchgear and transformer has to be tested after installation at site.

Gas-insulated high-voltage switchgear (GIS) is a compact metal encapsulated switchgear consisting of high-voltage components such as circuit-breakers and disconnectors, which can be safely operated in confined spaces. GIS is used where space is limited, for example, extensions, in city buildings, on roofs, on offshore platforms, industrial plants and hydro power plants. GIS offers outstanding reliability, operational safety and environmental compatibility.

It provides a complete range of products for all ratings and applications from 72.5 kV to 1200 kV matching current and future requirements for modern switchgears.

DEWA substation using the rated 145KV GIS and 420KV GIS for extra high voltage substation.

Figure 1: 132KV Gas insulated switchgear
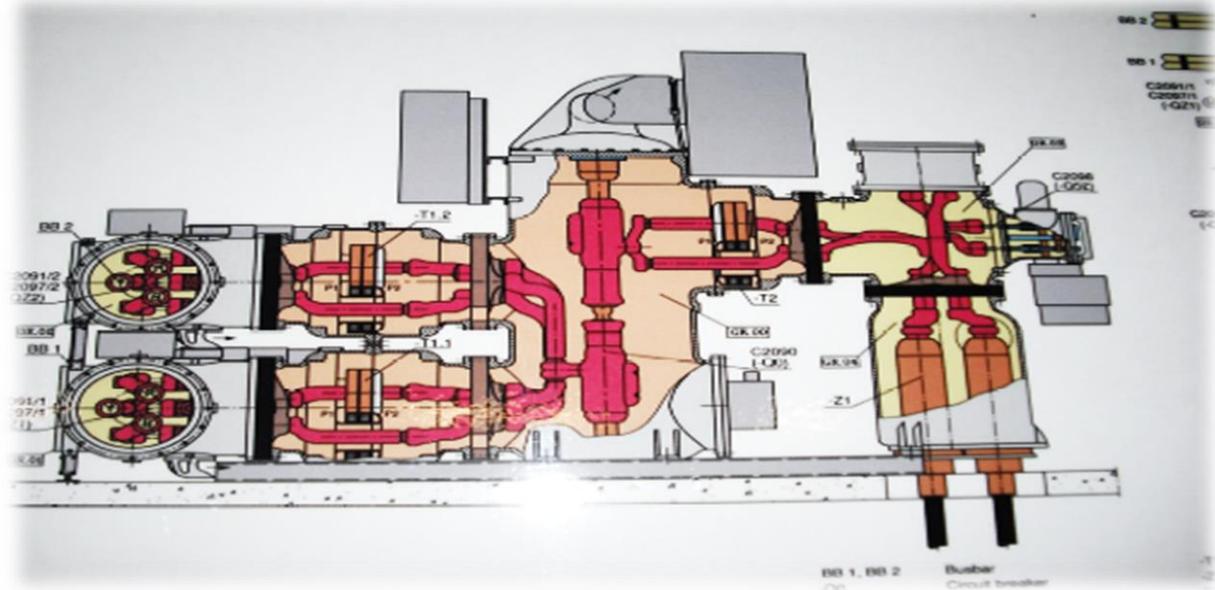
A high-voltage cable (HV cable) is a cable used for electric power transmission at high voltage. A cable includes a conductor and insulation, and is suitable for being run underground. This is in contrast to an overhead line, which does not have insulation. High-voltage cables of differing types have a variety of applications in instruments, ignition systems, and alternating current (AC) and direct current (DC) power transmission. In all applications, the insulation of the cable must not deteriorate due to the high-voltage stress, ozone produced by electric discharges in air, or tracking. The cable system must prevent contact of the high-voltage conductor with other objects or persons, and must contain and control leakage current. Cable joints and terminals must be designed to control the high-voltage stress to prevent breakdown of the insulation. Often a high-voltage cable will have a metallic shield layer over the insulation, connected to the ground and designed to equalize the dielectric stress on the insulation layer.

Any equipment's installed at site has to be tested to check the healthiness of equipment and to ensure free from defects due to transportation and installation.

SF6 gas: Sulphur hexafluoride (SF_6) is an excellent dielectric gas for high voltage applications. It is chemically inert, gaseous even at low temperature, non-flammable, non-toxic, non-corrosive. Its combined chemical, thermal and electrical properties allow many advantages to be achieved. However, SF6 gas its dangerous greenhouse gas impact to Global warming.

Test adaptor: The test adapter can permanently connect the tap on the bushing to measuring equipment, for monitoring of the bushing during service. All bushings are capacitance-graded bushings that are equipped with a voltage tap or test tap. The tap is connected to a conductive layer in the condenser core, this makes it possible to measure the capacitance and dissipation factor of an installed bushing. This can be done during service if the test adapter is installed on the tap. With the test adapter, the tap can also be used as a power source or for the measurement of voltage. The test adapter limits the amount of power that can be passed through the tap, despite a higher capacity of the tap, Test tap The test tap divides the total capacitance of the bushing in two sub-capacitances: C1 (central conductor – test-tap layer) and C2 (test-tap layer – grounded flange).

<u>Voltage tap:</u> The voltage tap divides the total capacitance of the bushing in two sub-capacitances: C1 (central conductor – voltage-tap layer) and C2 (voltage-tap layer – grounded layer).

Usage

The tap is not self-grounding, and must always be grounded or connected to an external impedance. Because C2 usually is relatively small, the test tap must never be open-circuited when the bushing is energized. If the tap is not grounded when the bushing is energized, failure of the bushing will occur.

Cable High voltage test

The purpose of the test is to ensure that the cable and its terminations are fit for service and safe to energize. The method used will be to apply a sinusoidal voltage between each cable conductor and insulation shield (ground) in turn for a period of time.

The voltage level and application duration shall be as specified by IEC-60840 (132kV for 1hour) or as agreed with client and will stress the cable and its accessories at the same levels encountered in normal service. The AC voltage will be generated by LC series resonance whereby the cable under test will be the capacitor and a high voltage reactor will be the inductor. An exciter transformer connected between the low voltage terminal of the reactor and ground will be used to energize the resonant LC pair. The exciter transformer is energized from a variable frequency inverter via a variable transformer. The inverter output frequency can be varied electronically between 20Hz and 300Hz.

By knowledge of the cable capacitance and the number of reactor inductance the resonant frequency of the test arrangement can be pre-calculated. For very short cables or apparatus having low capacitance, e.g. busbars, a high voltage capacitor (20,000pF) will be connected in parallel with the test object to enable resonance to be achieved at the lower end of the 20 – 300Hz frequency range.

A precision capacitive divider is used to measure the voltage being applied to the cable under test. Test voltage, frequency, inverter output voltage & current are displayed in the computer software.
The site will be surveyed to determine the most appropriate location to assemble the test equipment, reactor, & capacitor divider.

The terminations remote from the testing location will be barricaded and warning signs displayed to indicate that testing is liable to be in progress. During the application of test voltages to the cables a watchman will be stationed near the remote terminations as an additional safety precaution.

The free-air electrical clearance of all grounded materials from energized parts shall be a minimum of 1.5mtr of applied test voltage (i.e. 132kV) to avoid flashover. The AC resonant test set will be erected next to loading platform of substation and connection between the HV test set and the cable can be made by 25 mm²copper wires and at the far end the termination cable box end SF6 gas to be filled. The 25 mm² copper wire test lead will be contained within 100mm diameter aluminum foil ducting to reduce corona losses and minimize the generation of external partial discharges.

All test equipment grounds will be securely connected to the substation ground system. The diesel generators will be prepared nearby and connected to the test set input lead. Rigid safety barricades, warning signs and flashing warning lights will be erected around the test site. All cable shields and link-boxes at termination end and joints will be in their in-service configuration. Three phases of the same group will be tested together provided that the GIS Manufacturer can install three test bushing simultaneously.

High voltage testing will commence with the measurement of cable insulation resistance, between conductor and insulation shield, one phase at a time, by the use of a 5kV Insulation resistance tester (Megger). The measured value of insulation resistance will be recorded at the completion of one minute of measurement. Each conductor will be reconnected to ground upon the completion of the insulation resistance measurement for that phase

The ground will be disconnected from all the cable before starting the HVAC test. The cable terminals to be connected to HV terminal of the reactor via the low corona test lead.

Following a final check of safety precautions and that all equipment connections and grounds are present & adequate the generator can be started. With the exciter transformer voltage regulator at minimum setting the variable frequency inverter is energized and adjusted to the calculated resonant frequency.

The frequency is adjusted to give true resonance as indicated by maximizing the cable/reactor voltage. The voltage regulator will then be raised to increase the exciter transformer input voltage and consequently increase the applied test voltage. The voltage will be brought to 50kV and held for one minute, after completion of one-minute test voltage will be raised to 76kV and held for Partial Discharge measurement until the time the Partial Discharge (PD) operator gives clearance, after getting PD operator clearance test will be raised to 114kV for PD measurement, upon completion of PD measurement at 114kV, test voltage will be raised to 132kV for HV test.

The test period will commence when the specified test voltage has been achieved. In the event that a failure of the cable or accessories occurs during the AC high voltage test the effect will be that the Quality factor of the resonant circuit will be considerably degraded and consequently the test voltage will immediately fall to a much reduced value. Damage at the failure location would be minimal. The test set will be immediately shut down and the location and cause of the failure investigated. At the end of the specified test duration the voltage regulator output will be decreased to minimum and the inverter shut down. A ground lead shall be attached to the terminal of the cable that has just been tested.

After Completion of 132kV for one hour, test voltage will be reduced to 114kV and then again to 76kV for PD measurement after HV test.
After Completion of PD, Insulation resistance will be measured again at 5kV/1min and test will be completed.

When all phases have been AC High voltage tested the insulation resistance measurement procedure will be repeated. The tested cables will remain connected to ground until immediately prior to being put into service.

Previous method of testing of High voltage cables

In order to test 132KV cables, DEWA followed the standard recognized 25 years of practice of performing the cable High voltage test (To check the healthiness of cable) between Gas Insulated Switchgear and transformer by mounting test adaptor device on each bay independently (total 3 times since 3 number of bays) which involves 428 KG's of SF6 gas works per substation.
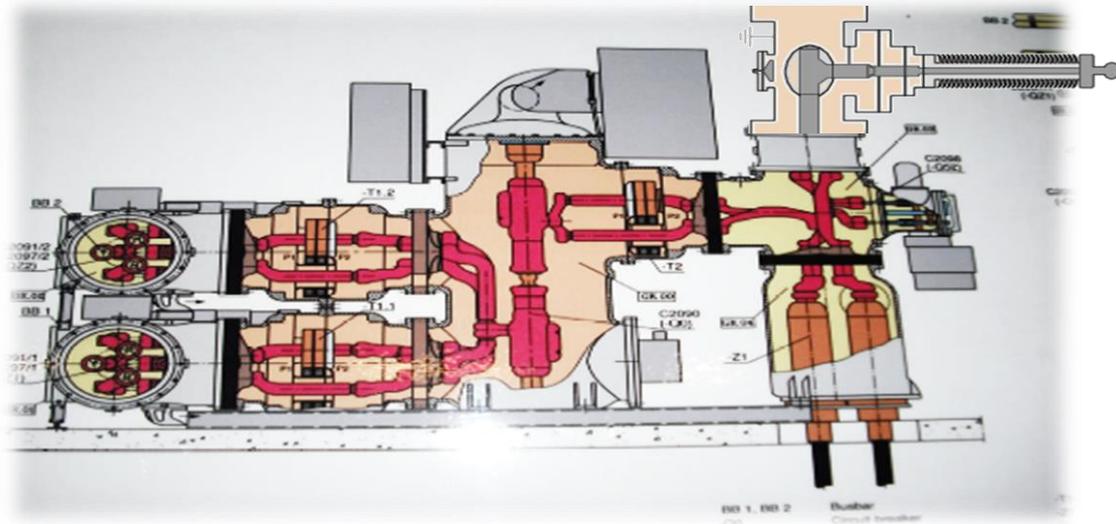
Figure 2- Gas insulated switchgear with test adaptor mounted

Fig- 3 Block diagram of old testing method process
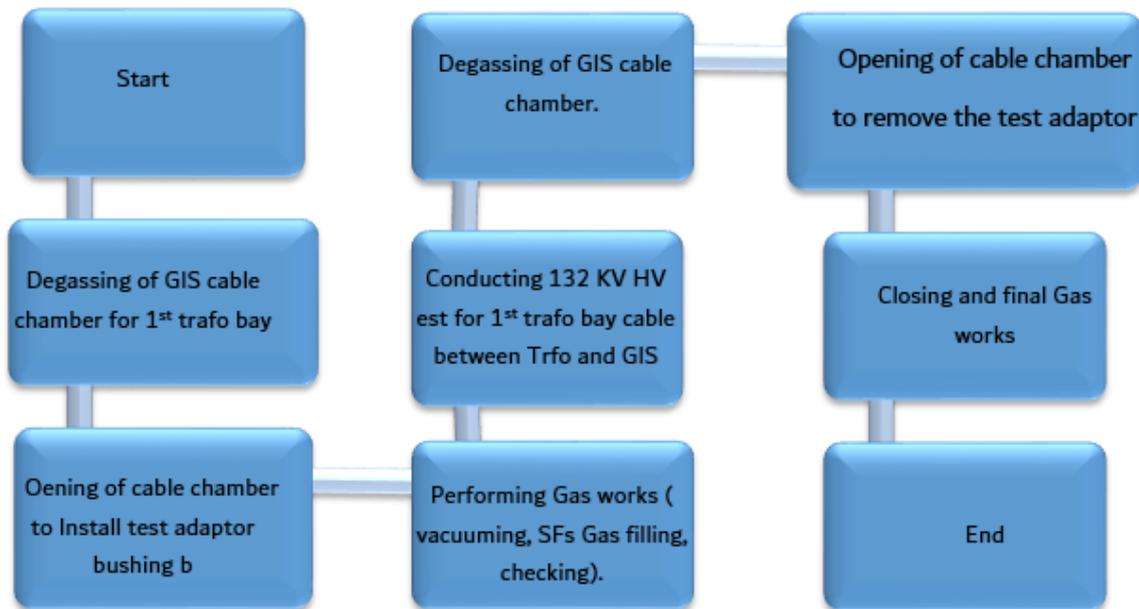
Challenges faced

Many challenges were faced in implementing the new innovative method. Since the old testing method are proven and standard worldwide practice of 25 years. On the other scenario, there were many disadvantage like usage of more Sf6 gas since repeating the works for similar bays, high risk like additional installation, more consumable, complicated process, non availability of resources and high cost issues were faced. Before conducting an experiment technical viability was confirmed and verified with international standards.

Root cause Analysis

Fig- 4 Fish bone diagram
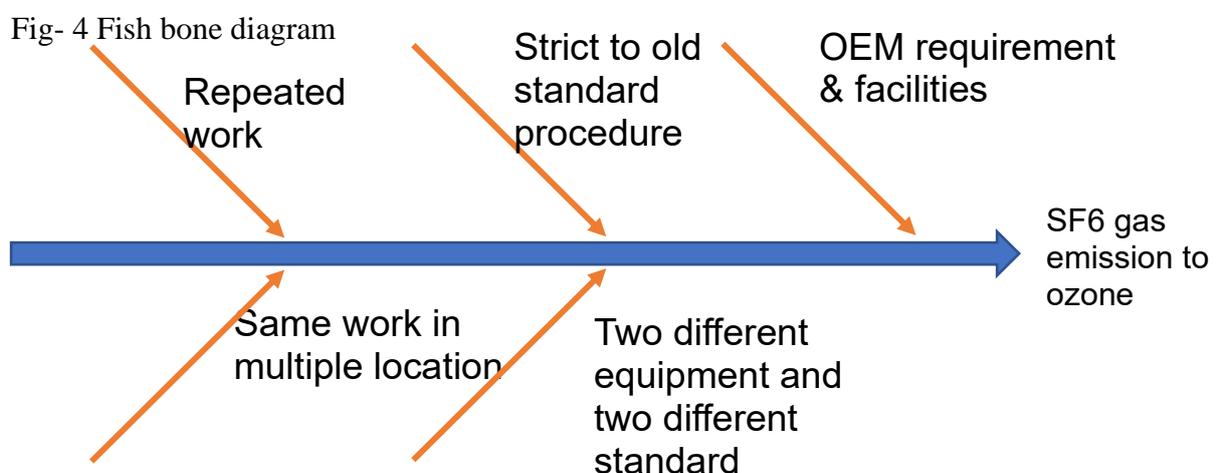
Solution

Did a case study on present practices and developed the innovative method on testing of High Voltage cables in 132-kilo volt DEWA substation. The main objective was to reduce the environmental impact on DEWA substation day to day business practice (to reduce the usage of SF6 gas with present practice). In addition to main objectives, we also focus in cost saving, optimize risk, happy stakeholder and happy society. Action for improvement were prepared for the pilot project. Studied in details of different option of pros and cons of new methods to reduce the usage of SF6 gas.

Experimental studies
New Innovative method of testing

Developed a new innovative method by combining all bays cable High Voltage test together by mounting test adaptor device on common place in switchgear instead of 3 times from each bay independently which simplify the process and reduced the usage of 85% SF6 gas works. Detailed study conducted on new testing method with each manufacturer. New innovation has streamlined the testing of high-voltage cable cables in the transmission stations between the transformer and the gas-insulated switches in addition to reducing the cost and limiting the work that includes the use of SF6 gas by 85% In the gas-insulated key room rather than installing multiple test adapters in multiple areas, thereby simplifying test operations.

In previous method, gassing works of 486 Kg's of SF6 gas handling works required, whereas the new innovative testing method required only 52 Kg's of SF6 gas works. Imagine if whatsoever reason if minor gas leakage happens, it will bring a major effect in environmental. For example, if 1 Kg of SF6 gas leaks that is equal to 22 tonnes of Carbon dioxide co2. In addition to optimization of Sf6 gas handling, Various other benefits like cost and resources saving saved.

The new innovative testing method, number of feeders bays can be selected by switching operation with the required bays. Experimentally done for each original equipment manufacturer and one of the test procedure shown below

Fig-5 New innovative testing method illustrative single line diagram
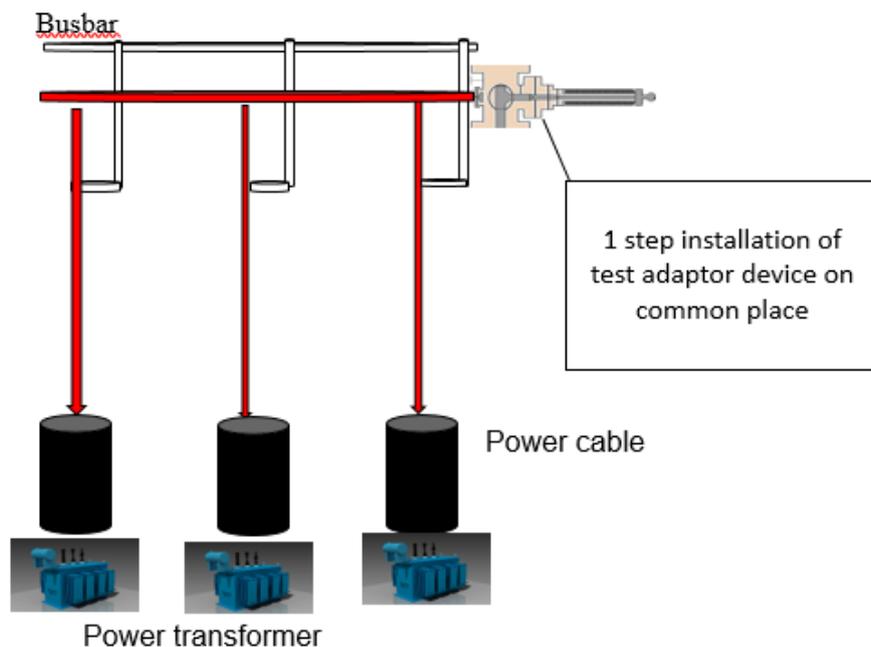
Installation of HV test adaptor on common location

Test adaptor device will be installed on common point of gas insulated switchgear. Three transformer cables between GIS and transformer will be tested together with the required switching in the gas insulated switchgear bays. In case of any abnormalities found, this can be separated and tested individually.
Test voltages will be applied to all the cables through gas insulated switchgear with respective switching operation. Gassing and degassing works limited since the complete cables i.e 3 numbers of transformer cable are testing in single application.

After completion of high voltage test of cables, will be normalized by degassing the chamber and then removing the test adaptor. If required by the user of the switchgear, the manufacturer shall make special provisions for the testing of the cable system, such as disconnecting facilities, earthing facilities and/or increasing gas pressure within the given design limits of the cable connection enclosure. This applies also if parts of the switchgear directly connected to the cable connection assembly cannot withstand the test voltage specified in IEC 60141 and IEC 60840 or IEC 62067 for the cable test at rated gas density. It also applies if in the judgment of the switchgear manufacturer, it is not acceptable to apply the test voltage to the affected switchgear components.

If required by the user, the switchgear manufacturer shall provide the location for a suitable test bushing and provide the user with all necessary information for mounting such a bushing to the cable connection enclosure. For cases where electrical clearances are inadequate, the term bushing shall include a suitable insulated connection and test terminal. The requirement for the test bushing shall be specified by the user in the enquiry.

NOTE It should be noted that increasing the gas pressure is not a reliable method of improving the electrical strength at the surface of an insulator when tested with DC voltage. The AC test voltages of extruded cables after installation according to IEC 60840 and IEC 62067 are

normally not critical for GIS insulators if the level is below the site test voltages of GIS according to IEC 62271-203 Subclause 10.2.101.1.4.

Outcome

Feedback and confirmation obtained from all stakeholders to implement the project (sustainable solution) for all ongoing and future DEWA substation. Challenges like technical vulnerability, original manufacturer confirmation on newly proposed method were overcome. Team initially plan to implement the project for 10 numbers of selected on-going substation, which was successfully tested and completed.

Accordingly, as per the project master plan, we implemented the new innovative method of testing in running projects after getting concurrence from concerned stakeholders.

Achievement

1. Usage of SF6 gas works reduced by 85% (4280 Kg's of SF6 gas works reduced per 10 Substation equals to 97,584 tonnes of CO_2 avoided).
2. Green Environment (21,400 cars emission avoided in Dubai city for a whole year)
3. Cost saving of USD 3.26 million per 10 numbers of Substation.

Cost saving calculation
Each item/scope of works (Degassing-test adaptor fixing-Re-gassing-specialist charges contains Bill of Quantity (BOQ) rate during tendering/ awarding of contract. BOQ rate is varying from AED 500,000 to AED 800,000 as per the signed contract. considered an average amount of AED 700,000 for one time per S/s .

Accordingly for 10 number of S/s- 10*700,000= AED 7 Million (3.26 million USD). This cost saving will be continued for running & future projects as well. Happy stakeholders (Resources, cost, time saved (328 man-days saved). Developer/customer- project work commissioned on time prior to ahead of schedule. Society- Green environment- Manufacturer/contractor – Work simplified, less consumables, man-days, cost and resource saving. Dewa- Increase productivity, cost saving, resource saving, Happy stakeholders5. Happy society (21,400 cars emission avoided in the Dubai city for a whole year).

Fig 6- comparison table

comparison on previous and new innovative sustainable method
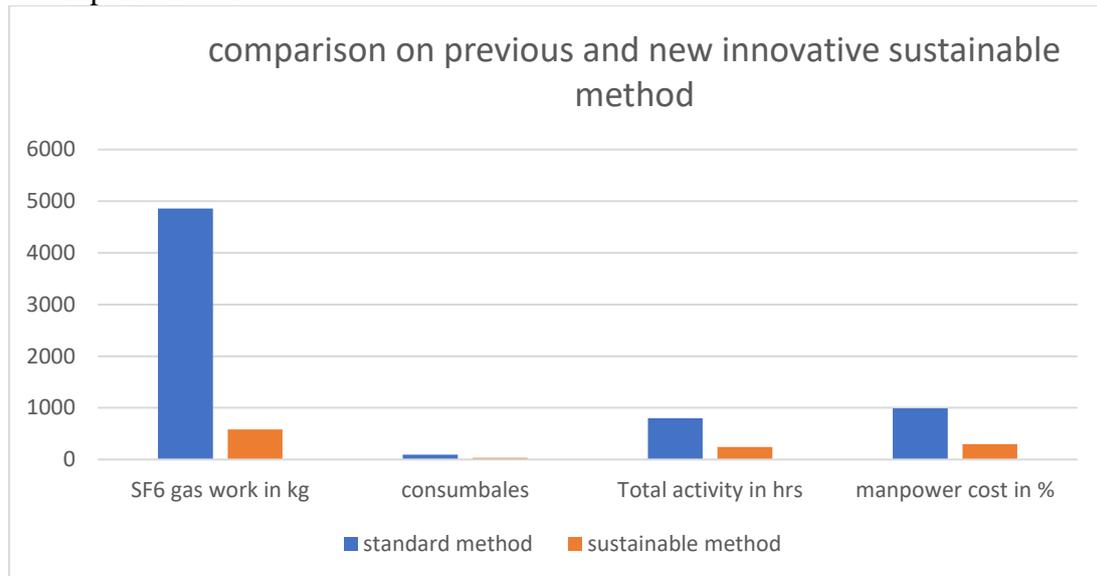
Conclusion

New innovation has streamlined the testing of high-voltage cable cables in the transmission stations between the transformer and the gas-insulated switches in addition to reducing the cost and limiting the work that includes the use of SF6 gas by 85% In the gas-insulated key room rather than installing multiple test adapters in multiple areas, thereby simplifying test operations.

This project is a breakthrough and globally it is first kind of new innovative testing methodology of high voltage cables which is contributing to environment. This project contributed to global sustainable development goals of responsible consumption and production, climate action.

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Establishment Smart Monitoring and Evaluation System in New Organizations (Case Study: Iran Ministry of Science, Research and Technology)

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Abstract

Nowadays, monitoring and evaluation is reliable toolkit to achieving qualitative and quantitative organization's goals. For success, modern organizations with Dynamics Structure, Strategy, System and Staff (4S) are required to have a multi dimension view to internal and external environment of organization. The aim of this study is identifying effective approaches in establishing a smart monitoring and evaluation system in modern organization with flat structure. Optimization in produce, development and maintains of Buildings of higher education system in Iran, was the most important reason that was followed by monitoring and evaluation system. The approach of research methodology is qualitative and case study is method which scholars used as a suitable methodology. Data collection was done by in- depth interview from 43 expert man who was expert in Information technology and civil engineering. The information was analyzed by some policy makers, experts in organizational behavior, and executive manager of Iran Ministry of Science, Research and Technology (MSRT) based on Delphi Method. The results indicate there are 2 approaches to install monitoring and evaluation system in modern organization. First, Technical approach which relates to level of technology and organizational readiness and second is about organizational behavior subjects through persons. All in all, for successful deployment of the system, both technical and human skills among leaders and managers are inevitable for establishment Smart Monitoring and Evaluation System in New Organizations.

Keywords: Monitoring and evaluation, Structure, Strategy, System, Staff, Technical Approach, Behavioral Approach

Problem Statement and Challenges

Monitoring and evaluation systems are considered one of the most important pillars of service and production organizations in achieving organizational goals. There is growing recognition of the critical role that National Monitoring and Evaluation Systems can play in achieving sustainable development through enhancing effectiveness, efficiency and sustainability of policies and programs(Tirivanhu & Jansen van Rensburg, 2018).

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The production, development and maintenance of buildings used in higher education systems within a dynamic and open system is a prelude to creating organizational values In this regard, the process of monitoring and evaluating performance on construction plans is axis to addressing the optimization process in the production, development, maintenance and repair of associated buildings, which can be a turning point in creating value in economic, cultural, technological, scientific and social in the higher education system. The Directorate of Monitoring and Evaluation is responsible for providing reliable data findings for decision-makers. They are in turn expected to access the data and information through the National Integrated Monitoring and Evaluation System (Warinda, 2019).

Deployment of monitoring and evaluation systems on the IT platform, in addition to creating intelligent organizational knowledge, can lead to information transparency for optimal allocation of construction budgets. Also, the use of monitoring and evaluation systems significantly contributes to the decision-building and decision-making of higher education managers and policymakers in achieving predetermined quantitative and qualitative goals. Because of the large scope of this program, a good monitoring and evaluation system is needed to ensure its effectiveness. A web-based application is proposed to complement the existing manual monitoring system(Budiarto et al., 2018).

Requirements to deploy these systems include receiving, processing and producing relevant, credible, and timely information from regulatory agencies. The need to ensure that construction project monitoring and evaluation systems generate the required project information for effective project delivery and decision-making is imperative for project success(Tengan, Aigbavboa, & Oke, 2018).

The advantages of using monitoring and evaluation systems in the construction sector of higher education include:

1- Integrating and Managing Physical Space Information in the status of a valid and reliable database
2- Cost-benefit analysis capability to develop educational, research, sport, entrepreneurship and welfare spaces in existing and future disciplines in universities.
3- Provide up-to-date reports on ongoing and planned construction projects that underpin mother development plans for universities.
4- Reduce human and process errors and mechanization of monitoring and evaluation process
5- Storing organizational knowledge and retaining knowledge with the retirement of expert human resource
6- Providing up-to-date reports for decision builder, policy makers and planners in higher education

Monitoring system definition

Monitoring is the permanent tracking and recognizing changes about a project, program and etc. It is based on management information system(MIS) with some components: Inputs, Storage, Control, Processing and out puts(Peersman, Rugg, & Carael, 2010). The ongoing process of collecting and using standardized information to assess progress towards objectives, resource usage and achievement of outcomes and impacts. It usually involves assessment against agreed performance indicators and targets. In conjunction with evaluation information, effective monitoring and reporting should provide decision-makers and stakeholders with the

knowledge they need to identify whether the implementation and outcomes of a project, programmer or policy initiative are unfolding as expected and to manage the initiative on an ongoing basis(Dal Poz, Gupta, Quain, Soucat, & Organization, 2009). Monitoring is the routine collection and analysis of information to track progress against set plans and check compliance to established standards. It helps identify trends and patterns, adapt strategies and inform decisions for project/program management(IFRC, 2011).

TABLE 1: Common types of monitoring system (IFRC, 2011)

| Common types of monitoring	Example
Results monitoring: tracks effects and impacts. This is where monitoring merges with evaluation to determine if the project/program is on target towards its intended results (outputs, outcomes, impact) and Whether there may be any unintended impact (positive or negative).	A psychosocial project may monitor that its community activities achieve the outputs that contribute to community resilience and ability to recover from a disaster.
Process (activity) monitoring tracks the use of inputs and resources, the progress of activities and the delivery of outputs	A water and sanitation project may monitor that targeted households receive septic systems according to schedule
Compliance monitoring ensures compliance with donor regulations and expected results, grant and contract requirements, local governmental regulations and laws, and ethical standards	A shelter project may monitor that shelters adhere to agreed national and international safety standards in construction.
Context (situation) monitoring tracks the setting in which the project/program operates, especially as it affects identified risks and assumptions, but also any unexpected considerations that may arise.	A project in a conflict-prone area may monitor potential fighting that could not only affect project success but endanger project staff and volunteers
Beneficiary monitoring tracks beneficiary perceptions of a project/program. It includes beneficiary satisfaction or complaints with the project/program, including their participation, treatment, access to resources and their overall experience of change.	A cash-for work program assisting community members after a natural disaster may monitor how they feel about the selection of program participants; the payment of participants and the contribution the program is making to the community (e.g. are these equitable?).
Financial monitoring accounts for costs by input and activity within predefined categories of expenditure. It is often conducted in conjunction with compliance and process monitoring	A livelihoods project implementing a series of micro-enterprises may monitor the money awarded and repaid, and ensure implementation is according to the budget and time frame.
Organizational monitoring tracks the sustainability, institutional development and capacity building in the project/ program and with its partners. It is often done in conjunction with the monitoring processes of the larger, implementing organization	A National Society's headquarters may use organizational monitoring to track communication and collaboration in project implementation among its branches and chapters.

Evaluation System Definitions

Evaluation is disciplined data collection about activities characteristics and outcomes of a project or program based on recognized indexes. Evaluation provides credible information for improving program, identifying lessons learned and informing decision about future resources(Peersman et al., 2010). Evaluation is Judging merit against some yardstick(Palfrey, 2005)" The systematic and objective assessment of an ongoing or completed initiative, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, efficiency, effectiveness, impact and sustainability. The development of an evaluation framework entails consideration of a range of matters, including identification of the types of data that could inform an evaluation(Dal Poz et al., 2009). The IFRC'6s secretariat

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[6] **International Federation of Red Cross and Red Crescent Societies**

adopts the OECD/DAC definition of evaluation as "an assessment, as systematic and objective as possible, of an ongoing or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors(IFRC, 2011).

Process of monitoring and evaluation

DIAGRAM 1: Results-Based Monitoring and Evaluation System(Zall Kusek & Rist, 2004)
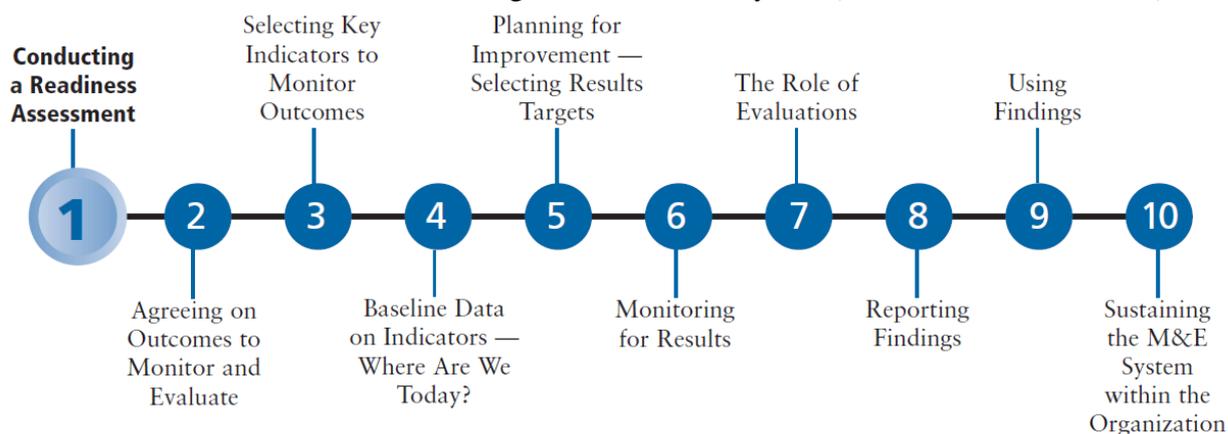
Research methodology

The approach of research methodology is qualitative and case study is method which scholars used as a appropriate methodology. Data collection was done by in- depth interview from 43 expert man who was expert in Information technology and civil engineering. The information was analyzed by some policy makers, experts in organizational behavior, and executive manager of Iran Ministry of Science, Research and Technology (MSRT) based on Delphi Method.

Key Concepts, Dimensions, and Active Elements

System introduction and subsystems: The monitoring and evaluation system consists of 6 subsystems
- Physical Space Subsystem
- Subsystem of Credits
- Project control Subsystem
- Reporting Subsystem
- Earthquake and disaster resilience subsystem
- Energy consumption optimization subsystem

DIAGRAM 2: Subsystems of monitoring and evaluation system of construction plans
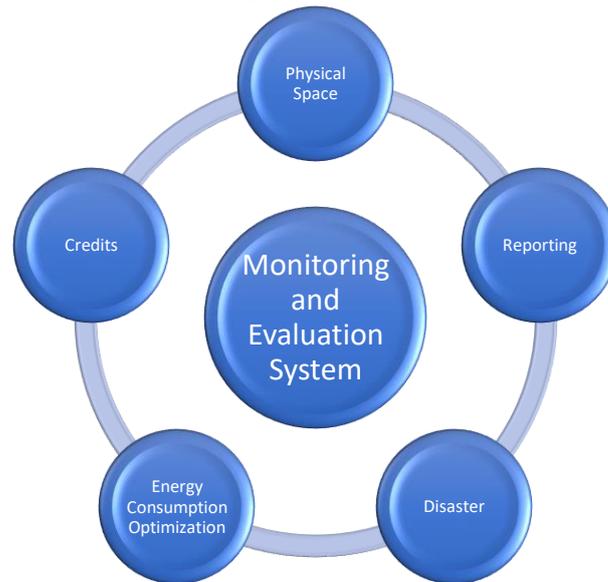
## Solutions and Executive measures
Technical Approach

DIAGRAM 3: Process of Implementation of Evaluation Monitoring System in the Ministryof Science, Research and Technology of Iran(Technical Approach)
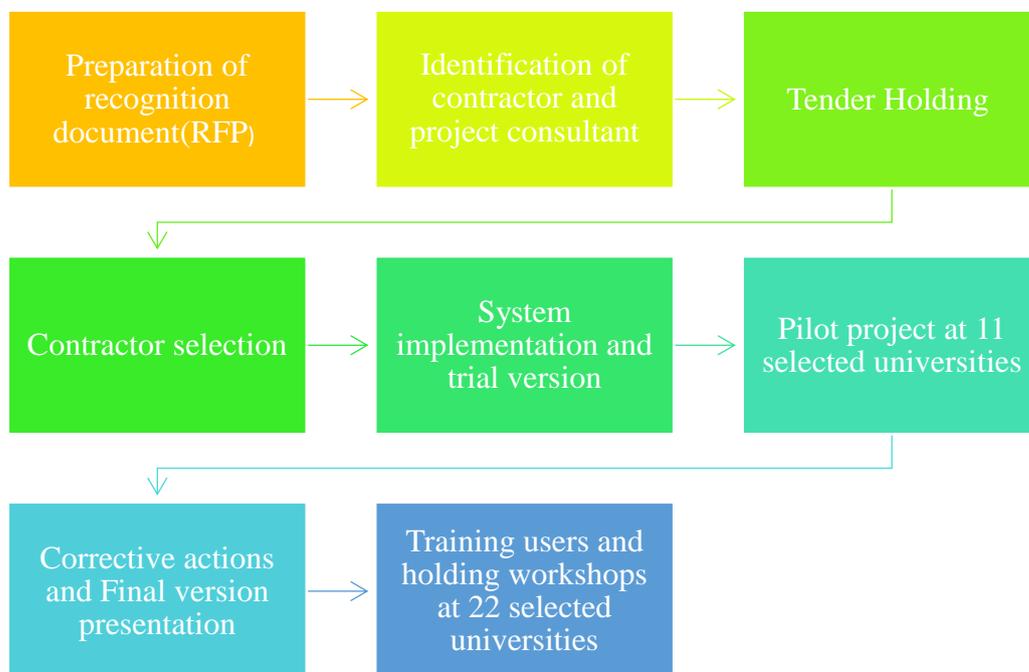
Behavior Approach

DIAGRAM 4: Process of Implementation of Evaluation Monitoring System in the Ministry of Science, Research and Technology of Iran (Behavioral Approach)

Pathology due to lack of system implementation in the organization

Identify the level of analysis of damage in the organization

Identify organizational negative conflicts

Provide solutions to resolve negative conflicts and reinforce positive organizational conflicts

Improving sense of belonging of experts man and professional staff	Promote authentic communication	Listen with understanding rather than evaluation	Help warning parties see that they are dependent on each other	Assist the parties to form their own views, rather than trying to sell them on your own

Results

TABLE 2: Results of Implementation of Information Management System in Construction Sector of Ministry of Science and Technology of Iran(Iran Ministry Of Science, 2018)

	Results	Related Indicators
Running plans	Organizing 422 universities and higher education centers	• University area • Type of ownership • Occupancy level of buildings • Data network • Gas supply • Power supply • Power grid capacity • Branch and water meter • Address
Plans under study	Identify 124 projects under study at 422 universities and higher education centers	• Project Specifications • Place of financing • Outsourcing implementation and consulting process • Runtime Forecast Management
Completed Plans	Identify, organize and register 1,363 completed projects among 422 universities and higher education centers	• Project Title • Type of Usage • Executed subtractions area

TABLE3: Results of Implementation of Monitoring and Evaluation System with Two Technical and Behavioral Approaches in the Construction of Higher Education System in Iran

	Indicators of readiness for deployment	Structure	Staff	strategy	System
Approach	*Technical*	Matrix	Training before, during and after deployment	Innovation in system design, deployment and development Synergy between subsystems and integration with other systems to achieve organizational goals	MANAGEMENT INFORMATION SYSTEM (MIS)
	Behavioral	Flat	• Improving sense of belonging of experts man and professional staff • Promote authentic communication • Listen with understanding rather than evaluation • Help warning parties see that they are dependent on each other • Assist the parties to form their own views, rather than trying to sell them on your own	Provide solutions to resolve negative conflicts and reinforce positive organizational conflicts	CUSTOMER KNOWLDEGE MANAGEMENT (CKM)
	MIS[7] => Technical Level ➔Efficiency in Organization				
	CM[8]=> Human Level ➔ Effectiveness in Organization				
	MIS + CM➔ Change ➔Efficiency+Effectivness = Productivity in Organization				

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[7] Management Information System

[8] Conflict Management

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AN INVESTIGATION INTO THE EFFECTS OF CORPORATE SOCIAL RESPONSIBILITY ON CUSTOMER SERVICE QUALITY IN THE UAE: THE MODERATING ROLE OF NATIONAL CULTURE

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Introduction

This study investigates the moderating role of national culture on the relationship between corporate social responsibility (CSR) and service quality. The focus on CSR lies in the mounting research evidence that CSR has strategic significance to competitive manufacturing and service market environments (Tilakasiri, 2012). A review of the extant literature indicates that most of CSR studies assume a linear relationship between CSR and service quality. As a result they are frequently devoid of critical analysis of the (in) direct effect of contextual forces that could moderate this relationship. While different internal and external factors are expected to play a part in the relationship between CSR and service quality and customer outcomes, more recent research seems to give more weight to cultural norms and values in this relationship.

Objectives

The aim of the current study is to investigate the impact of national culture as a moderator in the relationship between CSR and service quality in the United Arab Emirates (UAE). The specific objectives are to: (1) explore the relationship between CSR and service quality; and (2) examine the moderating effect of national culture on CSR impact on service quality.

Methods

In line with the aim of the study, a quantitative methodology with a cross-sectional time horizon was adopted. A questionnaire was developed and distributed among the customers of several UAE-based public and private service organizations.

Results & Conclusions

A total of 802 respondents completed the survey. Several statistical methods such as descriptive analysis, ANOVA and regression analysis were used. More precisely, correlation analysis, factor analysis, collinearity tests, and multiple regression analysis were used to test the hypotheses. The influence of CSR on service quality and the moderating role of natural culture were examined through several hypotheses outlining the relationship between the CSR dimensions of philanthropic, ethical, legal, economic, and environmental and service quality

along with the moderating role of cultural values of power distance, individualism, masculinity, and uncertainty avoidance. Overall, the results seem to be rather varied.

All CSR dimensions had positive effect on service quality. Power distance induced negative moderating role on the relationships between philanthropic, ethical and legal CSR dimensions and service quality. Individualism induced negative moderating role on the relationships between ethical and legal CSR dimensions and service quality. Masculinity induces negative moderating role on the relationship between legal CSR dimension and service quality. Uncertainty avoidance induced negative moderating role on the relationship between legal and environmental CSR dimensions and service quality.

Theoretical contribution

CSR has emerged as an unavoidable priority for companies worldwide (Korathotage, 2012). Visser (2008) has not only identified the importance of national context in CSR research, but also argues that the Western-driven CSR models do not fully fit into the framework of developing economies such as those of Middle East which have attracted the attention of many different international firms. Moreover, the moderating effect of national culture on relationship between CSR and service quality is limited. In this respect, the current study contributes insights into the CSR practices in social cultural contexts of developing nations.

Originality/value

The moderating role of national culture in the relationships between CSR and service quality has received less consideration in previous research.

Keywords*: Corporate social responsibility, national culture, service quality, UAE.*

1. CHAPTER 1: INTRODUCTION

1.1 Rationale and Background

Corporate social responsibility (CSR) is characterized as a high profile conception that has strategic significance for many firms in the current competitive service market environments (Kolodinsky et al., 2010). Corporate social responsibility philanthropic, ethical, legal, economic, and environmental. For CSR to turn out as a win-win case for both society and the firm, two important points have been ignored. The first point is the comprehensiveness of CSR (Moratis, 2016), and second that CSR has as an impact- management strategy at the central point of the corporate structure. Certainly, there are several noticeable parallels between the development of CSR and the development of quality management.

The limited empirical data of previous research on the impact of CSR on consumer attitudes and behaviors towards services are multidirectional (Sen & Bhattacharya, 2001). The data emphasized that CSR had no effect on consumer attitudes where other studies opposed this finding. This inconsistency in CSR impact critically indicates that the effect of CSR could be dependent on other factors (Sen & Bhattacharya, 2001).

The cultural disparity is one of the vital challenges for the possible success of CSR (Yaeger et al., 2006), and therefore the necessity for intercultural sensitivity and the awareness of diverse cultural values among significant proficiencies is essential for CSR practitioners. This research particularly focuses on the national culture that seems to have far less interest from CSR researchers (Chih et al., 2010; Moon, 2004) as the prominent aspect that verifies a firm's CSR practices.

Rettab et al. (2014) stated that more than two-thirds of companies based in Dubai – The United Arab Emirates (UAE) were engaged in some ways of environmental reporting, monitoring, and transparency. This is because the environmental impact has been given great attention in recent years because the UAE is an attractive tourism spot. This led to massive construction projects that induced environmental events and serious problems on the country level (Noeiaghaei, 2009). The UAE is encountering numerous dilemmas in its battle against environmental impact and CSR that has captured the attention of the UAE government recently. All Middle Eastern countries, including the UAE, have long roads ahead for CSR implementation. National culture variables are likely to have an impact on how customers evaluate and react to CSR initiatives. Previous studies identified cultural differences as a vital driver of how CSR was conceived and practiced (Huang et al., 2014; Nakata & Sivakumar, 2001).

National culture is known as the vital feature that shapes differences between individuals' and firms' values and principles, norms, and traditions within diverse cultural environments (Boonghee et al., 2011). National cultural frameworks, particularly Hofstede's framework, are the most cited cultural framework. He initiated four dimensions including power distance, collectivism versus individualism, femininity versus masculinity, and uncertainty avoidance presented in the 'Cultural Consequences' (1980) publication (Hofstede & Hofstede, 2005; Wiengarten et al., 2011).

This research investigated the cultural values with a particular focus on UAE. The UAE falls into the class of large power distance cultures - high score of 90 - meaning that people from these cultures regularly agree on the status variances and anticipate inequalities in opportunities and practices (O'Regan & Alturkman, 2010). The UAE, with a score of 25, is considered a collectivistic society. This manifests in a close long-term commitment to the member "group," be that a family, extended family, or extended relationships. In such society, primary focus is on the welfare of the group where an individualist (IDV) culture focuses on immediate families (Hofstede, 1980), and as a consequence and due to the fact that the CSR concept includes many volunteers practices for the communities, a negative relationship between IDV and CSR exists (Thanetsunthorn, 2014).

Another dimension of national culture is masculinity (MAS) that focuses more on power and material reward for success (Hofstede, 1980) where in such societies, individuals present less cooperative behaviors (Thanetsunthorn, 2014) and corporations present a high focus on certain customers and their needs. The UAE scores 50 in terms of masculinity, and can thus be considered neither masculine nor feminine. Uncertainty avoidance is another element of national culture where the UAE scores 80 on this dimension and, thus, has a high preference for avoiding uncertainty. Therefore, the focus of this research was to investigate the moderating effect of national culture on the relationship between CSR and service quality in UAE organizations.

1.2 Research Problem/ Gap

Kolodinsky et al. (2010) studied the customers' perceptions and behaviors towards firms' social practices and found positive attitudes in their findings. However, some research gaps are still recognized (Liu et al., 2014). For instance, each concept like service quality, customer satisfaction, customer loyalty, and national culture is still an extremely essential matter discussed by many papers in top-quality journals; however, studies of the relationships among CSR, service quality, and national culture are rare. Despite the bigger number of research articles on the range of impacts of CSR, the issue of whether CSR is meaningful for the service provider is yet to be tackled (Eisingerich et al., 2011).

Most of the current research studied CSR and customer perceptions of a company's motives and its impact on customer assessments of the product/company (Vlachos et al., 2009). Consequently, preceding researches generally investigated the impact of a company's involvement in CSR initiatives on customer attitudes and behavioral intentions, perceived quality of products/services, and the company's value and performance (Guchait et al., 2011).

As per my knowledge, none of the previous research investigated the consumers' perception of service quality and CSR that was one of the focuses of this study. Previous studies' results relating culture to service quality were often inconsistent and conflicting in the literature (Mok & Armstrong, 1998). For instance, Mok and Armstrong (1998) assessed hotel service quality prospects of global travelers where the phrasing of the scale was adapted for the hotel situation. Customers from five nations had distinctive outlooks in two of the five service quality measurements. Therefore, problems ensue because it is hard to contrast cultural results among diverse samples, environments, industries, or service encounters (Alshaibani & Bakir, 2017). Most cultural studies investigating cultural sensitivity nearly split customers into Asian and Western cultures. Consequently, to discover cultural sensitivity of customer behavior systematically, it is vital to link national culture models (such as Hofstede national culture) to service quality.

Though certain studies regarding CSR have been conducted in the UAE (Sajadifar, 2013), the findings determined that CSR was an increasing idea that was still limited to philanthropic practices only. None of the studies conducted in the UAE so far could answer the following issue that still needs a solution, "whether the relationship between CSR and service quality is affected by national culture dimensions," because the aim of the previous research was different. Because of the limited research, this research focused on answering this issue.

1.3 Research Questions

The following were the research questions for this research:

1. To what extent does CSR influence service quality in the public and private service sectors in the UAE?
2. Does national culture have a moderating effect on the relationship between CSR and service quality in the public and private service sectors in the UAE?

1.4 Primary Aim

This study sought to investigate the impact of national culture on the relationship between CSR and service quality in public and private service sectors in the UAE. The objectives were as follows:

- Identify whether CSR influences service quality in the public and private service sectors in the UAE.
- Examine the moderating role of the national culture on the relationship between CSR and service quality in the public and private service sectors in the UAE.

1.5 Conceptual Framework

Figure 1.1 depicts the conceptual framework of the study, which, as previously mentioned, built on the CSR literature. A central tenet of this model was that (1) CSR influences service quality and (2) national context, more specifically power distance, individualism, masculinity, and uncertainty avoidance, serve as moderators of the effects of this relationship. The following figure presents the research model incorporated with the directions of each hypotheses explained further in the following chapter.

Figure 1.1: Conceptual framework
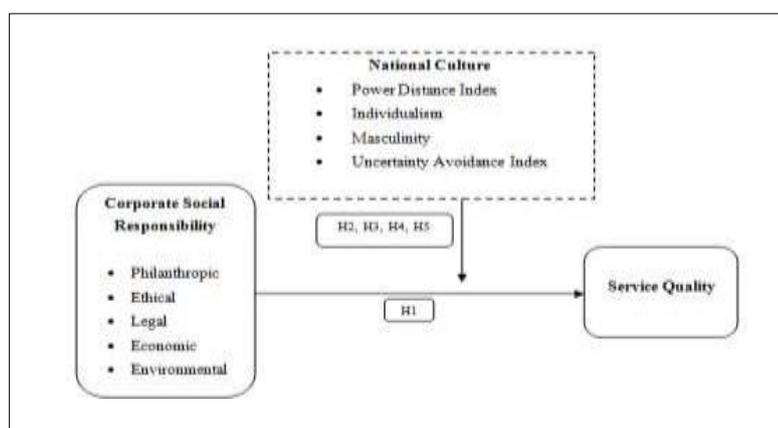
The conceptual framework for this research presents CSR as the main independent variable. Corporate social responsibility includes the following five dimensions: philanthropy, legal, ethical, economy, and environment. The national culture acts as a moderator of this relationship; four dimensions for measuring national culture, as introduced by the researchers, were added as independent variables of the study. Geert Hofstede (1980) identified the following dimensions of national culture: power distance, uncertainty avoidance, individualism, and masculinity. Service quality dimensions were the dependent variables and included empathy, assurance, responsiveness, reliability, and tangibility (Parasuraman, 1991).

2. CHAPTER 2: LITERATURE REVIEW

2.1 Corporate Social Responsibility

There is a lack of conceptual understanding of CSR due to many factors in which the complexity and dearth of consensual descriptions of the conception are considered critical (Gulyas, 2009). Griffin (2000) stated that CSR could be conceptualized in a different way by different individuals and various definitions of CSR have been argued. Indeed, a generally accepted definition of CSR is yet to emerge despite it being widely used and discussed in theory and practice (Weber, 2008). The academics and practitioners have failed to reach a consensus description of CSR. In

accordance with Marrewijk and Werre's (2003, 95) statement, the *"one solution fits all"* definition of CSR is unfeasible because CSR has different meanings for every entity based on the progress, consciousness, and desire levels of the firm.

Howard Bowen defined CSR as:

> *"Corporate social responsibility refers to the obligations of businessmen to pursue those policies, to make decisions, or to follow those lines of action which are desirable in term of the objectives and values of our society". (Bowen, 1953, 6)*

Different definitions of CSR have emerged since the twentieth century, in which the concept of CSR has noticeably improved through the decades. Even though scholars and managers have constantly used the terminology of CSR, its dimensions and contents have taken various forms over time. Its conceptual margins have been demonstrated as a porous, emerging kind of epistemological flexibility and the deliberations on the theoretical concept have a certain level of "analytical looseness and lack of rigor" (Friedman, 1970).

Carroll (1979) defined CSR as:

> *"the social responsibility of business encompasses the economic, legal, ethical, and discretionary (or philanthropic) expectations that society has of organizations at a given point in time". (Carroll, 1979, 4)*

The European Commission (2002) defined CSR as:

> *"a concept whereby companies integrate social and environmental concerns in their business operations and in their interactions with their stakeholders on a voluntary basis". (European Commission, 2002, 92)*

ISO 26000 defines CSR by limiting its understanding with four specifications concerning the business–society relationship as the:

[…] responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, including health and the welfare of society; takes into account the expectations of stakeholders; is in compliance with applicable law and consistent with international norms of behavior; and is integrated throughout the organization and practiced in its relationships. (ISO, 2010, 3-4).

This researcher adopted Carroll's (1991) definition of CSR, because it is important for an organization to be concerned with profit maximization and about its CSR, corporate citizenship, and sustainability, to which the fifth dimension of an environmental aspect is added. Therefore, to answer the current research questions on the CSR impact on service quality within service organizations and the moderating role of national culture on such relationship, the researcher used the four dimensions of CSR (namely philanthropic, legal, economic, ethical; Carroll, 1991) and added the environmental dimension (Elkington, 2012).

2.1.1. CSR Dimensions

Corporate social responsibility is a perception that supports voluntary actions and/or social responsibilities. Even though these actions may not be underlined with the direct firm's business, there is always an indirect positive impact for those firms (Hopkins, 2005). Corporate social responsibility concept can be defined and understood in different ways by different people (Griffin, 2000). Currently, CSR is known for what previously was used as a combination of diverse terminologies including corporate philanthropy, business ethics, triple bottom line, corporate accountability, corporate citizenship, stakeholding, corporate responsibility, community involvement, socially responsible investment, and sustainability (Silberhorn & Warren, 2007). In line with Griffin's concept, the understanding of the above terminologies fluctuates from one country to another (Hopkins, 2005). In general, economic, legal, ethical, and discretionary aspects of CSR are identified.

Therefore, a socially responsible firm should adhere to the above components (Carroll, 1979). Later, the definition of CSR has been based on multiple corporate social responsibilities in a pyramid model, by Carroll (1991) named 'Pyramid of Corporate Social Responsibility' model that the most well-known contributions in the field, in which economic responsibility forms the base.

Economic CSR: The type of CSR is measured in terms of shareholders' wealth maximization; generate profit, being competitive (high quality and low cost), operational efficiency, and continuous profitability (Carroll, 1991).

Legal CSR: This type of CSR is measured in terms of the extent that organizational activities are consistent with laws and regulations, law-abiding corporate citizen, fulfilling a legal obligation, and goods and services (Carroll, 1991).

Ethical CSR: Carroll defined Ethical responsibility of CSR in terms of societal mores and ethical norms, extent that organization adjusted themselves to emerging moral norms, degree of compromising ethical standards or norms, corporate citizenship behavior accepted by society and the extent that the organization went beyond the legal and regulatory requirements to maintain the integrity of the organization (Carroll, 1991).

Philanthropic CSR: Carroll defined Philanthropic as the highest level of CSR, where it was measured in terms of philanthropic and charitable expectation of society, assistance provided to fine and performing arts, extent that managers and employees of the organization had involvement in voluntary charitable activities organized by the community, and assistance provided by organization to the projects that enhances "quality life" (Carroll, 1991).

2.1.2. CSR in the UAE

In the present position of global trends in corporate responsibility, the understanding of the CSR concept in the UAE is ever more significant specifically in terms of its application and impact for the country's commercial sector. Global Education Research Network (Visser et al., 2010) within a thorough study regarding the CSR practices worldwide chose UAE as the representative country in the Middle East.

The UAE companies' analysis of corporate citizenship is narrowed down to legal compliance, business growth, and occupational health and safety. In 2002, for instance, none of the countries was considered to have political solidity by the World Bank except for UAE, which was at the

borderline (Kaufmann et al., 2003), as several Arab nations were going through a course of change and redistribution in a very multifaceted and conflict-reach setting. Hamad Buamim, the president and CEO of the Dubai Chamber of Commerce and Industry stated that CSR was the language of business in society. He identified ways for UAE businesses to implement CSR before it became an efficient driver for the long-term sustainable development of the country (Azzam & Rettab, 2015).

Rettab et al. (2014) performed a study involving companies from five different economic sectors and various employment sizes. The rise in CSR practices and the drivers for adopting it are discussed in Rettab et al. studies that concluded the reasons to focus on CSR in the UAE:

- o An increase from 13% to 23% in 2012 as the importance of CSR to a company's strategy (Rettab et al., 2014).
- o Legal compliance as the most common CSR practice (i.e. implementation of policies for health and safety - 82%) (Rettab et al., 2009).
- o Environmental impacts reported by 55% for material usage, 54% for water usage; 52% for both energy usage and transport (Rettab et al., 2014).

- o Demonstration of a strong commitment to customers, reported by 96% for protection of customers' privacy, 90% for customer satisfaction (Rettab et al., 2009).
- o Missing on the opportunity to involve suppliers and increasing the engagement in the supply chain (Rettab et al., 2009).

Company reputation considered as the most common driver for CSR performance, reported by 66%; and legal compliance by 64% (Rettab et al., 2014).

2.2 Service Quality

Service quality has been defined in various ways by diverse inhabitants and there is no harmony as to a concrete definition. The operational definition of the service quality for the purpose of this research paper is the one used by Parasuraman et al. (1988, 5), which defines:

> *"service quality as the discrepancy between a customers' expectation of a service and the customers' perception of the service offering."*

Parasuraman et al. (1985) described service quality as the following:

> *"Service quality is more difficult for the customer to evaluate than goods quality. Service quality perceptions result from a comparison of consumer expectation with actual service performance. Quality evaluations are not made solely on the outcome of a service; they also involve evaluations of the process of service delivery" (42)*

It is legitimate and even necessary for a company to know the opinion of its customers on its services. But on what criteria does such an assessment rest? We must first identify what needs to be measured. This step leads to the identification of what specialists usually call the elements of the service. These elements are grouped under more general themes called dimensions. It is widely recognized that the relative importance of the service dimensions is influenced by the nature of the service and the characteristics of the clients; hence, the relevance of the following question: What dimensions can satisfy the expectations of the customers and which allow them to be satisfied? exceed?

2.2.1. SERVQUAL

Parasuraman et al. (1991) introduced a concise multi-item scale called SERVQUAL in which many valid inferences as representing scores were made about service quality that could be utilized in different contexts. This tool was constructed by Parasuraman, Berry, and Zeithaml in 1985. Later, the same scholars improved the tool successively in 1988, 1991, and 1994. SERVQUAL primarily was constructed of a hundred items condensed in ten dimensions titled as: tangibles, reliability, responsiveness, competence, courtesy, credibility, security, access, communication, and understanding. A concise 22-item tool with five dimensions has been refined latterly.

The SERVQUAL tool includes 22 questions in each of the expectation and perception sections with an extra section to ascertain customers' assessment of the relative significance of the five dimensions. Each statement is measured with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). More sections on customers' experiences about the service and demographic information are included.

2.3 National Culture

Given the importance of globalization to both practicing managers and academics, a supplementary area of research comes into view in the form of the study of analyzing the impact of culture on business and services. The aim of section one is to present a background on national culture in order to contextualize this research. This section includes various definitions of culture. It then presents a range of national cultural frameworks, particularly, Hofstede's (2005) framework as the most cited cultural framework. It has been simulated, at least on several dimensions, into many cross-cultural studies, until the GLOBE became the most comprehensive cross-cultural study in terms of a range of countries and number of responses.

Hofstede and Hofstede (2005, 4) define culture as:

"the collective programming of the mind that distinguishes the members of one group or category of people from others".

Hofstede's model:
Among many of the developed cultural frameworks, 'Hofstede Five National Cultural Dimensions' is the most well-known. This model received its international recognition due to its ability to measure national culture numerically. This is because scholars can use such a calculation model to illustrate the national culture of countries and contrast diverse nations in a practical way.

Hofstede is a Dutch anthropologist who initiated his work studying the cultural dimensions in the 1970s by investigating and gathering data on the values of IBM staff from 50 different countries working at local subsidiaries of the multinational through an empirical study using responses from 116,000 questionnaires to assess differences of personal perceptions across countries (Hofstede, 1980). In his post data analysis, Hofstede found that the four vital dilemma fields of social inequality and the relationship with authority, the relationship between the individual and the group, concepts of masculinity and femininity as well as ways of dealing with uncertainty and ambiguity had country-specific solutions.

Power distance:

> *"the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede & Hofstede 2005, 46).*

Uncertainty avoidance:

> *"the extent to which the members of a culture feel threatened by ambiguous or unknown situations" (Hofstede & Hofstede 2005, 167).*

Individualism versus collectivism:

> *"is the degree to which individuals are supposed to look after themselves or remain integrated into groups, usually around family" (Hofstede & Hofstede 2005, 167).*

Masculinity versus femininity:

"when the emotional roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life" (Hofstede & Hofstede 2005, 120).

2.3.1. National Culture Model Used in Current Research

Hofstede's (1980) research remains the major reference in this field and his way of conceptualizing cultures continues to be adopted in many works. Moreover, it must be recognized that Hofstede was one of the first, in the field of management or more precisely management control in the broad sense, to use not only technical dimensions or formal organizational characteristics, but to propose less formalized and more psychosociological dimensions, on which the geo-societal culture undoubtedly had more influence.

2.3.2. National Culture and CSR

Corporate Social Responsibility gained increasingly high attention in recent years but only in the West. However, it is still emerging in other countries outside the West.

> *Two-thirds of U.S. companies that consider CSR an important objective list "it's the right thing to do" as one of their top three reasons for engaging in CSR, followed by improving external image and brand (61%), improving employee morale and hiring (49%), and in response to legal or regulatory requirements (28%).* (source: CFO Survey, 2013).

Similarly, in Europe, studies like Capron and Lanoizelée (2010) and Matten and Moon (2004), showed that the companies applied CSR more than half way beyond the minimum regulatory requirement. Capron and Lanoizelée (2010) noted that despite its universality, CSR varied conceptually and operationally from one region to another. Considering the cultural specificities of the countries only emerged very recently. Bowen (1953) specified that his analysis of economic systems was limited to the capitalist system of the United States and did not suggest a relevance of the concept of CSR. The spread of the concept around the world and the development of research in the 1970s in other countries proved Bowen's position.

2.4 Hypotheses Development

National culture is a precursor of organizational culture, which sequentially acts as a determinant of Service Quality and CSR approach. Many scholars claim that CSR operations on the firm level may distract the firm business (KPMG, 2011). However, the point that both opponents and proponents agree upon is the financial benefits any firm can get by operating CSR, especially with any transactions with its customers. Figure 1.1 depicts the conceptual framework of the study, which, as previously mentioned, this model indicates a relationship between CSR and service quality and national context, more specifically power distance, individualism, masculinity, and uncertainty avoidance, serve as moderators of the effects of this relationship.

The conceptual framework for this research presents CSR as a variable with five dimensions: philanthropy, legal, ethical, economy, and environment. Service quality is the outcome variable. The national culture acts as a moderator of this relationship and four dimensions for measuring national culture, are added as variables of the study: power distance, uncertainty avoidance, individualism, and masculinity.

2.4.1. CSR and Service Quality Hypotheses

Some scholars present negative effects and sometimes no effect of CSR upon the new product assessment. Sen and Bhattacharya (2001) justified the negative effect of CSR based on corporate ability-CSR trade-off in which it introduced the feelings of the customers that any firm has a high level of investment in CSR may not show the same level in its quality development (He & Li, 2011). Some other scholars justified the weak effect due to CSR information being less pertinent or indicative of the product evaluation (Brown and Dacin, 1997). Managers can leverage CSR to increase performance by aligning the company's strategy with its CSR initiatives and maintaining the quality and innovation of its services (Tingchi et al., 2014).

o   H1: Customer's perception of CSR positively influences service quality in the UAE.

2.4.2. Power Distance Index (PDI) and CSR

The UAE scores highly on the PDI dimension (a score of 90), which means that people accept a hierarchical order in which everybody has a place and that needs no further justification.

 Therefore, we expected that firms in the UAE with a high PDI culture to have a lower degree of CSR, which in turn would decrease service quality (Hofstede, 2016). Based on the analysis above we hypothesized that PDI moderated the relationship between CSR and service quality in the UAE. The role of this study was to reveal whether this moderation negative or positive for each CSR dimension.

o   H2: PDI moderates the relationship between CSR and service quality in the UAE.

2.4.3. Individualism (IDV) and CSR

An individualist (IDV) culture is one in which members focus on their own interests rather than the group interest, such that individuals primarily focus on their immediate families (Hofstede, 1980), and relationships between individuals are loose. Scholars such as Ringov and Zollo (2007), and Ho et al. (2012) found a negative relationship between IDV and CSR (Nakata & Sivakumar, 2001; Thanetsunthorn, 2014). The UAE, with a score of 25, is considered a collectivistic society, and in collectivist cultures, as being group dominant formation, harmonization of efforts to diminish confusion and competition, and subordination of personal inclination are encouraged (Diener & Diener, 1995).

- H3: IDV moderates negatively the relationship between CSR and service quality in the UAE.

2.4.4. Masculinity (MAS) and CSR

The hypothesis of a negative link between masculinity and company CSR level was validated by Ringov and Zollo (2007) and Peng et al., (2012). Only the study by Ho et al. (2012) concluded that the CSR score increased with the male orientation of society. However, on the sub-scores, if the environmental performance was increasing with masculinity, the opposite phenomenon was observed in the human capital. The UAE scored 50 in terms of MAS, and can thus be considered neither masculine nor feminine (Hofstede, 2016). The following hypotheses were formulated.

- H4: MAS moderates negatively the relationship between CSR and service quality in the UAE.

2.4.5. Uncertainty Avoidance Index (UAI) and CSR

Uncertainty avoidance index is defined as the level of individuals' acceptance of uncertainty and ambiguity within society. Individuals with a high UAI score are uncomfortable with uncertainty, and seek inflexible codes of conduct, and harsh laws and policies to lessen the uncertainty (Hofstede, 1980). However, individuals with a low score exhibit riskier behaviors, which is correlated with unethical practices (Thanetsunthorn, 2014). The UAE scores 80 on this dimension and, thus, has a high preference for avoiding uncertainty. Therefore, we predict that firms in the UAE, with high UAI and in which strict rules enacted, place more emphasis on CSR and, in turn, have a high degree of service quality outcomes (Hofstede, 2016). We hypothesized that the UAI moderates positively the relationship between CSR dimensions and service quality. In summary, we formulated the following hypothesis:

- H5: UAI moderates positively the relationship between CSR and service quality in the UAE.

3. CHAPTER 3: RESEARCH METHODOLOGY

This section illustrates the methodology of the current study and conceptual framework discussed in the previous chapters.

3.1 Research Objectives

This study sought to investigate the impact of national culture on the relationship between CSR and service quality in service sectors in the UAE. The objectives were as follows:

- Identify whether CSR influences customer perceptions of service quality in the public and private service sectors in the UAE.

Examine the moderating role of the national culture on the CSR relationship with service quality, in public and private service sectors in the UAE.

3.2 Study Setting

The aim of this research was to explore the moderating role of national culture on the relationship between CSR and service quality in the service sector in the UAE. The service sector in UAE has been chosen as the setting against which to investigate the study phenomena as service sector in the UAE encompasses 75% of the country's GDP.

Further, the UAE is engaged in international and regional projects such as Expo 2020 and Abu Dhabi's Surface Transport Master Plan that will lead the growth in services. The UAE Ministry of the Economy anticipates the growth in tourism and travel service sector will expand 5.4% on an annual basis over the next decade worth (Dhs 236.8 billion by 2026; https://gulfnews.com/business/).

Minister of Economy Sultan Bin Saeed Al Mansouri said that *"the services sector in the UAE played an important role in the economic growth of the country through its contribution to achieving a set of basic requirements for the process of economic development as well as its share in the formation of the GDP and creation of jobs"* (www.uaeinteract.com). The minister added that *"in recent years, this sector achieved an effective contribution to the country's GDP, and with an annual cumulative total of about 2 percent it also enhanced the position of the UAE as a link between the world continents"* (www.uaeinteract.com). The researcher utilized the UAE service sector list from 2017, published in the Ministry of Economy official website.

3.3 Time Horizon: Cross-Sectional

The cross-sectional study design is an observational study that help researchers compare multiple variables at a time. The cross-sectional design takes forms of descriptive or exploratory information in which it basically indicates a description of behavior or attitudes. Given the objectives of this research and the accessibility of the data for the current study, a cross-sectional time horizon was implemented as it made it possible to assemble data on the researched phenomenon at a single point in time from more than a single source (Neuman, 2011).

3.4 Sampling: Description and Size

In respect to the sample frame, a database from the UAE service sector was used from the Dubai Government customer profile that included around three million email addresses of the customers for the government sector (Dubai Executive Council, 2016). For sample size calculation, Item-Response Theory with the rule of thumb suggested by Foxcroft and Roodt (2010) was used. Around 810 expected respondents for this research was calculated. Data were collected during the period 14 December 2017 to 8 July 2018.

3.5 Survey Tool

Following steps were used for questionnaire development:

Review of the literature:

A total of 15 items were recorded for the philanthropic responsibility construct from a minimum of five sources. A total of 17 items been recorded for the ethical responsibility construct from a minimum of six sources. A total of 12 items were recorded for the legal responsibility construct from a minimum of six sources. A total of 14 items were recorded for the economic responsibility construct from a minimum of five sources. A total of 12 items were recorded for the environmental responsibility construct from a minimum of six sources.

The current research questionnaire is composed of six sections used to measure the moderating role of national culture in the relationship between CSR and service quality. The introductory part of the questionnaire included a question on whether the respondent had ever used any service (partially or fully) at any service organizations in the UAE. The first section asked about demographic information. Section two discusses the service profile. Section three asked about CSR dimensions. Section four asked about service quality dimensions. Section five asks about national culture dimensions with 16 statements adapted from Hofstede (1991). A five-point Likert scale (strongly disagree=1, disagree=2, neither agree nor disagree=3, agree=4, strongly agree=5) was used to answer each statement. This survey was designed to be self-completed by the respondents through a web-based electronic link sent to the respondents' emails.

3.5.1. Statistical Analysis

Data was exported from the computer application as a Microsoft Excel 2010© spreadsheet and analyses were conducted using SPSS version 20. Data were cleaned prior to analysis. Two researchers helped in the data cleansing process to ensure there was no missing data detected. Descriptive statistics were used to describe the demographic characteristics of the sample using frequencies (percentages) or means (standard deviation) as appropriate.

If differences were found between subgroups of the sample (age, gender, educational status, nationality of the respondents, etc.), these differences were tested for statistical significance using a chi-square test for categorical variables and ANOVA for continuous variables. The distribution of the characteristics of the study population for each of the outcome variables was tabulated. For characteristics that are categorical variables, frequencies and percentages are shown and for characteristics that are continuous variables, means are shown. A chi- square test or ANOVA was used as appropriate to test for statistical differences.

4. CHAPTER 4: DATA ANALYSIS AND RESULTS

4.1 Demographic Characteristics of the Study Participants

The demographic characters of the participants are described in table 4.1. It gives an overview of the participant's gender, age (in years), nationality of the respondents, work experience, occupation, education level, and income.

Table 4.1: Frequency table for demographic characteristics

Demographic	Group	Frequency (%)
Gender	Male	158 (19.7%)
	Female	644 (80.2%)
Age	Up to 18	10 (1.2%)
	19-25	82 (10.2%)
	26-35	388 (48.4%)
	36-45	231 (28.8%)
	46 or Above	91 (11.3%)
Nationality	Emirati	35 (4.36%)
	Middle East/North Africa	108 (13.47%)
	South Asia	517 (64.46%)
	East Asia/Pacific	74 (9.23%)
	Central Asia/Europe	32 (3.99%)
	Africa	6 (0.75%)
	Latin America/Caribbean	20 (2.5%)
	Western Europe /North America/ Australia	10 (1.25%)
Work Experience	No work experience	21 (2.6%)
	Up to 1 year	57 (7.1%)
	1 - up to 2 years	84 (10.5%)
	2 - up to 5 years	128 (16%)
	5 - up to 10 years	216 (26.9%)
	10 - up to 15 years	147 (18.3%)
	15 years and above	149 (18.6%)
Occupation	Owner	47 (5.9%)
	Private	14 (1.7%)
	Employed	712 (88.8%)
	Unemployed	4 (0.5)
	Student	25 (3.1%)
Current education degree	PhD	8 (1%)
	Master or equivalent	146 (18.2%)
	Bachelor or equivalent	343 (42.8%)
	Diploma	7 (0.9%)
	High school	298 (37.2%)
Income (monthly)	Up to 5000 AED	346 (43.1%)
	5000 - 10000 AED	230 (28.7%)
	10000 - 20000 AED	141 (17.6%)
	20000 – up to 30000 AED	31 (3.9%)
	30000 – up to 40000 AED	18 (2.2%)
	40000 AED and above	36 4.5%)

4.2 Correlation between CSR and Service Quality

Table 4.2 presents the correlation coefficients between CSR and service quality dimensions along with p-values. These p-values were provided from the results of the Pearson correlation for testing the assumption that no correlation was present between CSR and service quality

dimensions. The results brief that all CSR dimensions had a significant positive correlation with all service quality dimensions.

Table 4.2: Correlation between CSR and service quality

CSR Dimensions	Service Quality Dimensions					
	RL	TG	RES	ASS	EMP	Overall
Philanthropic Responsibility	0.581 ***	0.626 ***	0.579 ***	0.617 ***	0.562 ***	0.664 ***
Ethical Responsibility	0.638 ***	0.634 ***	0.586 ***	0.635 ***	0.602 ***	0.695 ***
Legal Responsibility	0.627 ***	0.673 ***	0.608 ***	0.670 ***	0.598 **	0.711 ***
Economic Responsibility	0.555 ***	0.512 ***	0.481 ***	0.515 ***	0.519 ***	0.582 ***
Environmental Responsibility	0.581 ***	0.636 ***	0.565 ***	0.561 ***	0.539 ***	0.647 ***
Overall	0.700 ***	0.728 ***	0.666 ***	0.708 ***	0.663 ***	0.777 **
***. Correlation is significant at the 0.001 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						
RL= Reliability, TG= Tangibility, RES= Responsiveness, ASS= Assurance, EMP= Empathy						

4.2.1 Correlation of National Culture and Service Quality

The correlation coefficients between national culture and service quality dimensions were calculated . These p-values were provided from the results of the Pearson correlation for testing the assumption that no correlation was present between national culture and service quality dimensions. National culture dimensions (power distance, individualism, masculinity, uncertainty avoidance) individually and overall showed a significant positive association with service quality dimensions (reliability, tangibility, responsiveness, assurance, empathy). National culture dimensions had a significant positive relationship with service quality dimensions.

4.2.2. Correlation of CSR, Service Quality and National Culture

Five regression models are presented and each model analyzes service quality as a dependent variable with CSR dimensions (philanthropic responsibility, ethical responsibility, legal responsibility, economic responsibility, and environmental responsibility) as an independent variables, in addition to the moderators (power distance, individualism, masculinity, and uncertainty avoidance) to test effects on service quality. Table 4.3 recaps the results.

Table 4.3: Summary of the results of hypotheses tests

Hypothesized relationship		Status
H1: CSR → Service Quality	H1a: Philanthropic CSR → Service Quality	Accepted
	H1b: Ethical CSR → Service Quality	Accepted
	H1c: Legal CSR → Service Quality	Accepted
	H1d: Economic CSR → Service Quality	Accepted
	H1e: Environmental CSR → Service Quality	Accepted
National Culture Dimension as a Moderator: Power Distance		
H2: CSR → Service Quality	H2a: Philanthropic CSR → Service Quality	Accepted
	H2b: Ethical CSR → Service Quality	Accepted
	H2c: Legal CSR → Service Quality	Accepted
	H2d: Economic CSR → Service Quality	Rejected
	H2e: Environmental CSR → Service Quality	Rejected
National Culture Dimension as a Moderator: Individualism		
H3: CSR → Service Quality	H3a: Philanthropic CSR → Service Quality	Rejected
	H3b: Ethical CSR → Service Quality	Accepted
	H3c: Legal CSR → Service Quality	Accepted
	H3d: Economic CSR → Service Quality	Rejected
	H3e: Environmental CSR → Service Quality	Rejected
National Culture Dimension as a Moderator: Masculinity		
H4: CSR → Service Quality	H4a: Philanthropic CSR → Service Quality	Rejected
	H4b: Ethical CSR → Service Quality	Rejected
	H4c: Legal CSR → Service Quality	Accepted
	H4d: Economic CSR → Service Quality	Rejected
	H4e: Environmental CSR → Service Quality	Rejected
National Culture Dimension as a Moderator: Uncertainty Avoidance		
H5: CSR → Service Quality	H5a: Philanthropic CSR → Service Quality	Rejected
	H5b: Ethical CSR → Service Quality	Rejected
	H5c: Legal CSR → Service Quality	Partial accepted
	H5d: Economic CSR → Service Quality	Rejected
	H5e: Environmental CSR → Service Quality	Partial accepted

5. CHAPTER 5: DISCUSSION & CONCLUSION

5.1 Impact of CSR on Service Quality

In this research, the researcher hypothesized that firms' socially responsible practices had a direct and positive effect on service quality (measured by means of reliability, responsiveness, assurance, empathy, and tangibility). Results confirmed that firms' socially responsible practices had a direct and positive effect on service quality (measured by means of reliability, responsiveness, assurance, empathy, and tangibility).

5.2 Impact of National Culture on Service Quality

The findings from the present study indicated that customers or service users more likely to expect and accept that power within a society that is distributed unequally. Their average power distance score was 76.5% (95% CI: [75.5– 77.5]). Our findings identified a positive relationship between power distance and tangibility ($r=0.263$, $p=0.000$) and between power distance and assurance ($r=0.321$, $p=0.000$). These results were consistent with the findings of Furrer et al. (2000). This is because tangibles are similarly essential for powerful and influential customers as they understand this element as an icon of respect.

5.3 Research Implications

The current research brings about several contributions to knowledge, practiced policy on the moderating role of Hofstede's cultural values on the impact of CSR dimensions on service quality in the UAE. The results enhance the emergent knowledge of how different cultural values might affect the relationships between CSR and service quality. Different studies discussed in the previous chapters present variation of this relationship, our results are aligned with some scholars and do not go along with others. Our discussion and comparison between the results of these studies and our results can be considered as an important contribution to knowledge. Noticeably, the research outcomes and the above-mentioned managerial implications position a critical challenge for the policy-makers in the UAE, in that the executive councils of the UAE government need to work on the linking role among the concerned parties involved in the service sector.

5.4 Limitations of the Study and Future Research

Research focus: the research data were collected from one country, namely the UAE while for cross-cultural studies the claimed data collection is from different countries to guarantee the generalization of the research findings. Given that the data were drawn from the UAE service sector, it is vital to endorse the findings further by investigating the other sectors too (i.e. the manufacturing sector). In addition, the current research collected the data from a single customer from each service organization; further research is essential to collect the data from different hierarchical levels in the firm (i.e., top-level managers, middle-level managers).

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Business Innovation Strategies – Thinkinova

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Introduction

New technology and digital transformation will bring in a new era of innovation; where many corporations and startups will create new innovative ideas to penetrate the market and deliver new value to their customer. However, the real innovation disruption and value-creation are not any more dependent on High-Tech innovation since the new strategies in "business innovation" are highly-effective in creating a competitive edge in the market.

Recent practices and studies have proven that new strategies in business innovation are helping to add values to corporations and startups, which will allow them to serve their customers better and deliver the desired values. Creating new business models to manage value-creation and value-delivering is considered as a new disruptive revolution, alongside developing co-creation and empathy with customers to understand the real needs to create new solutions for them is the new approach for business innovation.

Nevertheless, rethinking the way we innovate is the new approach of the business innovation revolution. Applying new methodologies and approaches in business is crucial for innovation.

- **Design Thinking for Innovation** (apply in Business and Product) – A solution-based method following a systematic approach to solve problems in a creative and customer-oriented way, which will be desirable for the market, feasible for the company capability and viable for the profitability of the business

- **Business Model Innovation** (deliver new value to the market) – Approach to organize the business based on business patterns and concepts, including the basic building blocks and transformation of your business framework. The model is all about creating and working on conditions that allow ideas and different business model approaches to flourish and surface, in order to optimize and re-engineer the business models to ensure true growth and add values in your business.

- **Open Innovation** – Approach to allow companies to inflows and outflows of knowledge to accelerate internal innovation, and expands the market for external use of innovation (Henry Chesbrough 2003).

- **Agile Development** – To give your business an entrepreneurial outlook, apply lean startup methodologies with the aim to re-engineer your product development and business growth techniques. Employing the lean startup approach, will enable your businesses to steer the business development with optimal acceleration.

Effects of Digital Screens Exposure on Children: Research Proposal

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Abstract

The number of children, aged 0-5 years, exposed to digital screens over the past decade have increased exponentially. Unfortunately, little information is available regarding the positive and negative effects of digital screens on children's cognition, social behavior, and physical well-being. The reviewed literature reveals varied opinions from experts and caregivers that digital screens may or may not be healthy for children in terms of cognitive development, including those who are under the age of 2 years. However, most literature agree that the type of media viewed define the social habits and responsiveness in children. Further agreement across the literature was found regarding the negative effect of digital screens exposure on the sleeping habits and diet of children in addition to introducing other issues such as cardiovascular risks. With this being said, the objective of this research proposal is to investigate the effect of digital screens exposure on children's cognitive development, social behavior, and physical and psychological well-being. Another objective is to establish a set of guidelines for parents and caregivers that will ensure healthy digital screens exposure for their children. These objectives may be achieved through conducting a quantitative survey research method with Quota sampling of 50 boys and girls from three nurseries following different curriculum located in the same area. The time scale proposed is longitudinal, where monthly data will be collected from samples 4-5 times, based on the requirement. The research hypotheses suggest that digital screens exposure has a positive correlation with cognitive development, and a negative correlation with social behavior, physical and psychological well-being.

Introduction

The past 10-15 years have had a great impact in changing the core methods on how to get things done. Traditionally, play would mean to go outside in the garden, shopping would mean to go to the shopping mall, studying would mean to read books, family time would usually include board games. However, nowadays, all these definitions have changed. To play, socialize, shop, learn, etc. all would require an individual to use digital screens regardless of the physical model, may it be a smart phone, TV, tablet, notepad or a computer. Studies have shown that most 4-year old children own personal mobile phones mainly used for internet surfing and gaming and are usually used on an average of more than 3 hours on a daily basis (Kabali et al., 2015). Furthermore, Kebali et al. (2015) also state that many parents are relying on these devices to keep their children, aged 6 to 18-months old, quiet while completing their house chores. However, the effects of such exposure are yet to be known.

As concerned parents, it is vital to aim at investigating the effects of digital screens on children's cognitive development, social behavior, and physical and psychological well-being. In addition, to establish a set of guidelines that would assist in maintaining healthy exposure of children to digital screens. In this regard, this research proposal first introduces a literature review on the topic from the view-point of field experts and caregivers who are witnessing first-hand the impact of digital screens on their children. Next, it suggests a research methodology to gather the necessary data to address the mentioned concerns, followed by the expected findings and hypotheses of the research.

Literature review

The recent emergence of the touchscreen devices, in 2010, and the fact that the topic in question mainly focuses on very young children in particular areas, conclusive studies are yet to be published on the level of impact of digital screens on children. Therefore, most of the literature reviewed is merely based on expert opinion and researcher's diligence, not on concrete evidence that are impossible to be proven wrong. The reason being that most of the literature reviewed are responses to parents, teachers and caregivers concerns on whether or not it is healthy for their children to be exposed to digital screens. Nevertheless, based on the data collected, this section will discuss the benefits and risks according to the literature reviewed about the impact of digital screens on young children, aged 0-5 years, in terms of cognitive development, social behavior, physical and psychological well-being, as well as the recommendations on parental guidelines for healthy screen-time.

Cognitive Development and Learning

An important fact about digital screens, specifically in touch screen devices, is that they can react to what a child does, allow joint play between adults and children and can be used anywhere at any time, which is similar to traditional toys (Christakis, 2014). Christakis (2014) adds that touchscreen devices differ from traditional toys in which they can stimulate certain reactions from a child based on actions taken, can be tailored as per the child's preferences, may be continued later and enable a child to build on his/her understanding according to the available stages. However, other digital screens, such as television, do not offer any of the above-mentioned features (Christakis, 2014). With this being said, viewing educational media using touchscreen devices may be considered healthy for children above 2 years old as it may improve their literacy (Chassiakos, Radesky, Christakis, Moreno, & Cross, 2016; Sharkins, Newton, Albaiz, & Ernest, 2015; Canadian Pediatric Society [CPS], 2017), cognition and learning (Chassiakos et al., 2016; Przybylski & Weinstein, 2019; Sharkins et al., 2015; CPS, 2017) with moderate use only, around 1-2 hours/day (Kardefelt-Winther, 2017). Nevertheless, according to CPS (2017) and Chassiakos et al. (2016), parental and caregivers' interaction is still favored above all due to the difficulty that infants and toddlers go through when transferring 2-dimensional learning to the 3-dimensional reality.

Furthermore, Christakis (2014) expresses his opinion that children aged less than 2 years should also be exposed to these educational programs for the same reasons. However, the researcher disagrees with Christakis (2014) on that notion and side with CPS (2017), Anderson & Subrahmanyam (2017) and Chassiakos et al. (2016) because most educational programs target children above 2 years old, and having infants who are younger than that age be exposed to such programming would only distort their cognition and would actually cause more harm than good.

Social Interaction and Behavior

Another dimension that is expected to be affected by the exposure to digital screens is children's social interaction and behavior. Based on the literature reviewed, it is a unanimous agreement that the content of the media being viewed is what affects the social behavior of children, where being exposed to media that draws empathy and tackles racial equality causes children to be more empathetic and caring towards others (CPS, 2017). However, violent media results in aggressive behavior of children and makes them less empathetic towards injustice and brutality (Sharkins et al., 2015; Chassiakos et al., 2016; CPS, 2017). Furthermore, in case of prolonged exposure to digital screens, children may go through tantrums if they were suddenly

disconnected from the media source (Chassiakos et al., 2016). Studies discussed by Christakis, Zimmerman, DiGiuseppe, & McCarty (as cited in Christakis, 2014) and Neumann (2015) have shown that high exposure to digital screens may even cause attention span disorders in children.

Moreover, Dunckley (2015) takes a stronger stand in which she claims that the exposure of children to digital screens is the reason behind their poor focus, rages, aggressive and vindictive behavior, agreed by CPS (2017) and Neumann (2015), and is usually misdiagnosed as bipolar disorder instead of Disruptive Mood Dysregulation Disorder (DMDD). In my view, Dunckley (2015) seems to have an extreme point-of-view resulting from children that may have been left in front of the digital screens without adult supervision or interaction for several hours, and this scenario may not be applicable to many children. However, the researcher stands firmly with the earlier statement that the content being viewed on the media is what shapes the children's behavior both interactive and social.

Physical and Psychological Well-being

The third aspect under investigation is the physical health and psychological well-being of children exposed to digital screens. For the physical health, the literature reviewed appears to agree that there is a positive correlation between time spent on digital screens and childhood obesity (Neumann, 2015; CPS, 2017; Sharkins et al., 2015; Przybylski & Weinstein, 2019; Kardefelt-Winther, 2017; Chassiakos et al., 2016) as well as increased cardiovascular risk throughout the child's life (Chassiakos et al., 2016).

The reason being, as Kardefelt-Winther (2017) explains, is that as the time spent on digital screens replaces the time that may be allocated for physical activities, hence, leading to a slight increase in both the BMI ratio and risk of having adopting an unhealthy diet. In addition, Rosenfield (2011) discusses the computer vision syndrome (CVS) and the impacts that follow, such as headaches, visual discomfort, eyestrain, and blurred vision when looking at a distance after gazing at a digital screen for too long. Rosenfield (2011) explains that the reason behind the mentioned symptoms is the decrease in blink rate and increase in corneal exposure after spending hours focusing on a digital screen.

Similarly, for the psychological well-being, a positive correlation is argued between the time spent on digital screens and depression as well as sleep deprivation (Sharkins et al., 2015, Przybylski & Weinstein, 2019; Chassiakos et al., 2016). In fact, CPS (2017) suggests that the presence of any electronic device in the bedroom would cause fewer minutes of sleep, partly due to the suppression of Melatonin – a natural sleep hormone released by the body in a dark environment.

Another study by LeBourgeois et al. (2017) suggests that the light emitted from digital screens may have adverse effects on the circadian rhythm, sleep physiology, and alertness. The researcher strongly agrees with the literature regarding the physical and psychological well-being of children as obesity has been witnessed in children who spend a lot of time on digital screens as well as sleep deprivation when the digital devices are being utilized in a dimmed environment.

Parental Guidelines Recommendations

As mentioned earlier, most of the literature reviewed aims to answer questions from parents and caregivers on their concerns on whether or not it is safe for their children to use digital devices at an age as young as 2 years. It is recommended that children experience educational

programs or applications that would have a positive influence on their learning and interaction with the device (Sharkins et al., 2015), that is under the supervision of a parent or caregiver (Chassiakos et al., 2016; CPS, 2017; Kardefelt-Winther, 2017).

In addition, children should be encouraged to ask questions while viewing any program in order to increase their learning through thorough comprehension of the media being viewed based on the answers received, where in that case, the digital screen will have a less negative effect because most of the child's attention will be focused on the responder rather than the digital screen (CPS, 2017; Sharkins et al., 2015). In other words, the presence of the caregiver around the child during their exposure to digital screens is highly recommended.

Further recommendations include the viewing time to be limited to 1-2 hours (Przybylski & Weinstein, 2019; Kardefelt-Winther, 2017) in order to save time for physical activities for at least 3 hours per day (Neumann, 2015), however, programs that provoke group physical movement (Chassiakos et al., 2016), e.g. Wii or dance programs, may suffice (Neumann, 2015). Other literature suggests that the digital screen last viewing time be at least one hour apart from bedtime (CPS, 2017).

Nevertheless, researchers encourage parents and caregivers to ask "what would my child be doing if digital screens did not exist?" and act upon the answer to that question. The most favored answer, however, is "reading a book" alongside with a parent or caregiver (Chassiakos et al., 2016). Furthermore, Chassiakos et al. (2016) and Lauricella, Wartella and Rideout (2015) studies provide evidence that the time spent by parents on digital screens influences the time spent by children on digital screens. With this being said, parents must first control their own screen time in order to act as role-models for their children.

Methodology

The study proposed is an exploratory study to understand and explore the effects of digital screens exposure on children's cognitive development, social behavior, and physical and psychological well-being through Quantitative Survey Research method. In order to determine the effect of the digital screen exposure duration, the independent variable, on the children's cognition, social behavior, and physical and psychological well-being – the dependent variables, the researcher must have minimal interference with the subject and allow them to be in a non-contrived setting.

As for the time-scale, a longitudinal study is proposed in order to collect data from the parent or caregiver without any exposure of the children to digital screens for at least one month, collect data again after one month of exposure for 1 hour daily. The data collection process will be repeated monthly with 1 hour increment every month until the exposure duration reaches 4 hours daily. The correlation between the dependent and independent variables are expected to be revealed after the third or fourth time the data has been collected.

The sampling process for the research will be as follows: the population for the sample is defined as Bur Dubai area, divided into clusters of nurseries based on the curriculum followed – American, British, and IB. The sample would be selected from the nursery clusters based on Quota sampling strategy where 10 subjects will be selected from each age (1-5 years), and equally divided between boys and girls. Nurseries are proposed to be selected as clusters, rather than households because it will be easier to obtain information related to a child's cognition and social interaction with other children as well as their physical and psychological well-being

because, in that setting, the child is expected to have a certain level of knowledge, and it is detectable whether or not the child possesses additional or less knowledge and skills.

However, limitations in this sampling method will include the absence of varied financial status and ethnic background, hence, the data collected may not be generalized on a larger population. Another methodology limitation is identified where it is expected to be difficult to obtain parents' approval to expose their children to digital screens for up to 3 or 4 hours daily for the sake of conducting research.

The survey will show the relationship between digital screens exposure and the three dimensions under evaluation after the completion of the research duration. However, on a monthly basis, the same questions must be answered regarding screen-time observation, cognitive development assessment, social behavior observation, physical and psychological assessment, as well as general information about the sample for categorizing purposes. The sections related to observation will be answered using ordinal scales because they are merely based on opinion, however, for the assessment sections, they may be answered using ratio scale because the answers will be based on actual quantifiable data such as the number of hours of sleep or BMI ratio. Finally, the data for all samples may be combined for each month separately in order to reveal the overall relation.

Expected Findings

Based on the literature review and the researcher's personal experience, it is predicted that the exposure of digital screens on children has positive and negative effects on different aspects. Firstly, regarding the effect of digital screens on children's cognitive development and learning, a positive relation is expected to be revealed from the research where continuous repetition of certain information daily would most likely be remembered or learned than if it was informed only once a day.

Secondly, a negative correlation is predicted between time spent on digital screens and children's social interaction and behavior due to the fact that when a child is exposed to digital screens for longer periods of time, without disturbance, they would cause them to be detached from their surroundings. This would usually result in lack of verbal communication and dealing with others people personally, hence, the child would not be able to respond properly or feel comfortable around others, resulting an increase in the child's rage and annoyance levels.

The third aspect pertaining to the child's physical and psychological well-being, it is most likely to observe a negative relation in that aspect as well where increase in digital screens exposure would make the child lose track of time and probably skip meals or pass the specified bedtime, especially if the caregiver was not paying close attention. With this being said, the parents' or caregivers' role is vital for a healthy exposure to digital screens. Parental guidelines would include the continuous involvement of the parent or caregiver in the type of media being viewed, as well as when and for how long. Specific timings must be set in order to ensure that the child will have enough time to spend on social interaction in the real world with other children, or people for that matter, as well as meals, physical exercises and required sleeping hours recommended based on the child's age.

This research proposal is expected to help raise future generations that combine knowledge, interpersonal skills, and good health; a generation that will be powerful enough to control themselves against the temptations of the digital world. The available literature is merely based on expert opinion and caregiver observation through cross-sectional studies. However, in order

to ensure that the observed behavior or sleep pattern is not being affected by other variables, a longitudinal study would serve the purpose to collect the data multiple times with slight manipulation of the independent variable, which is the exposure duration to digital screens. Through that study, it may be possible to answer the major questions: What is the effect of digital screens exposure on children's cognition, behavior, and physical and psychological well-being? And what should the parents do from their end to optimize the benefits and minimize the risks of digital screens exposure on their children?

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Internal vs. External Auditing; A Comparison between the Rules and Regulations in the UAE.

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Introduction

In today's dynamic business world where risks arise, new opportunities are emerging when it comes to auditing. Auditing had become a very important aspect to provide assurance to the different stakeholders and to the management. Auditing can be defined as the process of examining financial statements and records by an independent party where audit standards are followed. Auditing can be divided into two main functions which are an internal and external audit. The aim of this study is to analyze the differences between the rules, regulations, procedures, planning, and reporting of internal and external auditing. Furthermore, to present a real-life example of entities and how they implement the audit.

Methodology

A research methodology presents the procedure of conducting the research. This current study is a qualitative one. Data were collected from both primary and secondary sources to ensure the accuracy of data. The primary sources are the interviews that were conducted to collect the needed data *as per the appendix*. The interviewees were an audit professional and a financial manager from two different organizations. Open-ended questions were asked in the interviews and the responses were recorded in a written form to generate findings accordingly. Furthermore, the secondary sources depended on reviewing literature which are the previously published reports and articles that are useful for the purpose of this study. The study will start by presenting the differences between the internal and external auditing in many aspects. Then, it will provide an example of the audit procedures in a private and a public entity.

Literature Review

Internal auditing is a "structured, controlled approach and objective appraisal by internal auditors of various functions within the organization to assess and enhance the risk management, internal control and corporate governance" (Sawyer, 2003). External auditing is to report the condition of the organization's financial position and verify the reasonableness of the financial reports to protect the shareholders' interests (Ferreira, 2018).

As stated by Hay & Cordery (2018), audit in accounting of a public sector entity is not generally intended to provide top management with information; nevertheless, audit provides them with the assurance about what is going on within remote corners of entity. Financial audit in public sector is intended for verifying the financial declarations, balances and accounts. The main aim of performing audit is to ensure financial statements published by the organizations are free from errors and mistakes.

As per the opinion of Madawaki, Ahmi & Ahmad (2017), in the private sector, members of audit committee are involved in appointment, evaluation as well as dismissal of head of internal audit function. Private company can be subject to GAAP for satisfying the lenders and insurance companies. Most of the private companies do not publish audited financial reports as their main concern is decreasing taxes.

The Overall Audit Process

To start with, there are many key characteristics that both internal and external audit professionals must have. First, **Competence,** which indicates that auditors must meet their expert duties with competence, unprejudiced and in conformance with the assigned international standards for this profession and implement the obtained skills. Second, **Independence,** where the auditor should be independent from other parties that may have a financial appeal in the business being audited. Thirds, **Due professional care,** to sustain competent knowledge throughout the auditing activity. Fourth, **Objective,** which is revealed by auditors in constructing reports and drawing opinions and conclusions derived from the acquired documents and examined in conformance with the standards of auditing.

Internal Audit

The internal auditing activity requires an evaluation of three primary aspects. Firstly, **Corporate governance,** where the internal audit activity should evaluate and proved relevant suggestions to enhance the processes of corporate governance. Secondly, **Risk management,** where the internal audit activity must present developments of the process of risk management and should assess the effectiveness. Thirdly, **Internal control,** where the undertaking of the internal audit should assess the vulnerability of risk concerned with the corporate's information systems and governance.

Internal audit planning:

The internal audit planning is essential to make sure that all the procedures are following the rules and regulations, and to eliminate the risks. The annual internal auditing plan is based on the following steps:
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1. Preparing the audit universe – auditable units such as a department,
   section, project, process, function or committee.
2. Risk assessment for each auditable unit.
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Rate the risk - by giving a score of risk or ranking by identifying the highest to the lowest risk based on the available resources.

The steps of internal audit:

The first step of the internal auditing is planning, where the chief audit executive initiates a plan of risk assessment to prioritize the activity of the internal audit, which is constant with the organization's objectives. Then the plan of engagement is reviewed and adjusted by the chief audit executive. The next step that should be done by the chief audit executive is to manage the activity of internal auditing to assure that it adds value to the institution.

The third step by the chief audit executive is to execute the plan, the requirements of resources, and the effect of the limitations of the resources of the internal audit activity to the board of

directors and the senior management. After that, comes the reporting of the internal audit activity, where the chief audit executive should report regularly to the board of directors and the senior management on the purpose and responsibility of the internal audit respective to the plan and the compliance of the IIE's standards.

The report includes recommendations that must be executed and implemented within the time frame provided. Then, a follow up with the concerned department should be done to ensure the execution of the recommendations. In case of a lack of execution, this should be reported to the board of directors. The audit report has an executive summary that includes specific issues and related recommendation or action plans and appendix information such as detailed graphs and charts or process information.

The steps of internal auditing can be summarized as the following:
1. Setting and identifying the objectives.
2. Assessing the internal control system over departments.
3. Preparing an internal audit plan.
4. Preparing an audit program.
5. Preparing the audit reports after testing the weaknesses and deficiencies in three elements of internal control which are corporate governance, risk assessment, and internal control.
6. Sets recommendations and observations in the report.
7. Submit the report to the board of directors.
8. If the concerned department disagreed with the report, then the department should prove that the evidence is not sufficient.

External Auditing

When it comes to the external auditing, an examination of the accounting records and financial statements take place. The external audit is commonly conducted once a year to provide assurance for investors, third parties, and different stakeholders. External auditors must not be affiliated with the audited company to ensure accurate and unbiased audit report and opinion. Finally, the cost of an external audit for a company with a high internal control tends to be lower than the cost of auditing a company with a weak internal control.

External audit planning:

Before performing an external audit, the auditor must conduct a meeting with the audited company's management and do the following:
1. Asses the internal control of the company that is being audited.
2. Assess the risk.
3. Design the audit procedure.

The steps of external audit:

The overall steps of preparing the external audit can be summarized as the following:
1. To have a business understanding about the firm that will be audited, since having a general understanding can help the auditing process to be more efficient.
2. Risk assessment which means to evaluate and identify the potential risks of audit where it helps to assess the control risk and make it lower by high tests of control.
3. Based on the previous step, the detection risk is determined.
4. Planning and distribution of the assignment (allocation of tasks).

5. Prepare the audit program (do what and when).
6. Execution of the audit program with assurance (fieldwork).
7. Prepare the audit report, which can come in four types: Unqualified opinion, Qualified opinion, Disclaimer of opinion and Adverse opinion.
8. Submit the report to the shareholders.

After completing the audit fieldwork, a management letter which includes notes and recommendations should be written by the external auditor. The management letter can include and states immaterial errors and mistakes. External auditors perform an audit in accordance with specific laws and rules of the financial statement of the company and it is independent of the entity that is being audited.

The Sources of Rules and Regulations Used During the Audit Process

Internal Auditing

Internal auditing is performed in various legal environments for organizations ranging in structure and size, and by individuals within an organization or outside an organization. It is necessary to comply with the "Institute of Internal Auditors (IIE)" standards for the competent practice of the internal audit process and fulfilling the internal auditors' responsibilities (IIE, 2016). The IIE standards are used for both sectors: private and public.

The IIE standards consist of two primary classifications: Attribute standards and performance standards. The attribute standards embark on the organizations characteristics and individuals executing the internal auditing. Whereas, the performance standards present quality basis contra to the measurement of these services' performance and outlines the internal auditing's nature. Both classifications apply to the process of internal auditing.

External Auditing

When it comes to external auditing, it is conducted based on the international rules and regulations of the concerned country. In the UAE, the external audit requires to be performed by the "Financial Audit Authority" (FAA) as per Law No. 4 of 2018. The external auditor reviews the accounts of the organization and prepares the audit report by forming an audit opinion. The role of the external auditor is to assure that the organization's financial reports are error-free and accurate. They also assure that the accounts were developed in conformance with IFRS.

Auditing in the Private Sector

Al Arif Contracting Co LLC

The auditor will follow the International Standards Auditing (ISA) in order to assure compliance with the International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS) which are issued by the International Accounting Standards Board (IASB).
The auditing process will be planned through the following steps:
1. Engagement of the audit
2. Plan for the audit
3. Provide trial balance and the sub-ledger reports
4. Start the fieldwork, confirmation of final financial statements' reports and closing entries

Before performing the audit process, the following steps are usually undertaken:
1. The first step is to ensure all accounting entries have been passed during the year such as expenses and revenues.
2. Trial balance closing must match with the sub-ledger reports.

Performing the internal audit:

Firstly, is to identify the area which requires the internal audit within the organization. Secondly, to prepare the audit schedule and notify the concerned department about the internal audit. Finally, to start the audit process by providing reports and supporting documents as an evidence in order to finalize the final audit report.

After the auditing takes place, we must verify the audit report to ensure the final audit draft matches the provided data and the final trial balance. Once the verification is over, the final consolidated financial report will be signed by the chairman of the board member as a final step. Finally, the audit reports are being prepared as the following:
1. Prepare the general ledger and the trial balance.
2. Reconcile all the accounts specially the vendor accounts, the banks yearend balance confirmation, and all the loans and bank overdrafts.
3. Pass all the provisions entries such as provision for leave salary, air tickets, and gratuity and payroll reports.
4. Fix assets schedule showing the assets purchased and sold during the year.
5. Provide the general ledger dump.
6. Stocks and inventories report and stock taking at the year-end.
7. All accruals and prepaid expenses preparation.

Auditing in the Public Sector

The Financial Audit Authority

Internal audit in Dubai government entities is required by law issued by H.H Sheikh Mohammed bin Rashid that encourages the principles of integrity and transparency. The internal auditing implemented in government entities of Dubai is used to audit transactions and financial statements, as well as, for annual budget assurance. All departments in government of Dubai are required to use smart accounting and financial systems. The auditor in the public sector in the UAE is required to comply with IFRS standards if the public company was listed on Dubai Financial Service Authority (DFSA), NASDAQ Dubai, and Abu Dhabi Securities Exchange.

When it comes to external auditing, the Financial Audit Authority (FAA) is the public authority that is responsible for auditing all government entities in Dubai, ensure their compliance with the policies and regulations, provide expert auditors, verify the accuracy of data, provide recommendations and advice, follow up and review, etc.

The responsibilities of the Financial Audit Authority (FAA) are the following:
1. Financial and compliance audit
2. Performance audit
3. Audit the audit systems
4. Audit the effectiveness and efficiency of the audit Systems

Auditing procedures of the Financial Audit Authority:

The authority can audit records, documents, accounts, etc. that is important to complete the audit successfully. The audit process can be conducted either at the authority's headquarter, the auditees' headquarter, or at the entity where the required documents are kept. Furthermore, it can be required from the auditee to link the authority's system with their audit systems to ease the process of audit. All audit data and information are kept confidential.

Audit of records and documents:

The employees assigned to perform the audit can have access to the documents and records needed to conduct the audit. They can also have direct contact with the employees of the audited entity to inquire and investigate. Where they can also interview the employees who are involved in violations in the audited entity. The auditee is required to help and collaborate with the Authority's employees 'the auditors' by offering them the necessary records and documents that will help them perform the audit. As well as, to offer them a proper place to work in.

Internal audit units:

The authority has the power to check and assess the work and the plans of the internal auditors as well as the external auditors of the audited entity, to confirm that they have implemented the recommendations stated in the reports, and to state an opinion about these reports.

Audit reports and findings:

After performing the audit, the authority will collect the findings and prepare the reports which contain recommendations and observations. The audited entity is required to implement these recommendations and to submit a response or feedback in 30 days after notifying. The deadline can be extended in some cases. If no response was made by the audited company during the specified period, then the audit report prepared by the authority is considered final and correct.

Findings

Both the private and the public sectors have internal and external auditing to assure the fulfilment of standards compliance. The process of auditing is somehow similar in both sectors. However, when it comes to internal and external audit, the difference is that the internal auditing is concerned with the organization's corporate governance, risk management, and internal control and usually reports to the board of directors and the management. Whereas, the external auditor is concerned with expressing an opinion on the fairness of the financial statements and only reports to the shareholders.

Conclusion

To conclude, auditing is a very crucial process in today's world since it provides assessment and assurance related to financial, operational, as well as strategic goals and procedures in a business. Both internal and external audit are essential to be implemented in almost every organization. As per this study, it was found that the audit procedures are somehow similar in both the private and the public sector. This was determined through the analysis and comparison of the auditing processes and practices in both sectors. Finally, when it comes to internal and external audit, the two types do differ as presented previously.

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Appendix

Interview (1)

Interviewers Name: Fatima Al Saidi – Farida Khorrami – Hind Al Ali
Interviewee Name: Dr. Ehab Elbahar – Assistant Professor at the American University in the Emirates – External & Internal auditing, corporate governance and risk management professional
Date and Time: Monday, 25th November 2019 at 12:00 PM

Interview Questions

1. What are the sources of rules and regulations that are used during the audit process?
2. How do you plan the auditing process?
3. Explain the steps that you take before an audit process?
4. Explain what you should do after the audit?
5. How do you prepare the audit reports?

Interview (2)

Interviewers Name: Fatima Al Saidi – Farida Khorrami – Hind Al Ali
Interviewee Name: Arif Abdulla – Financial Manager at Al Arif Contracting Co LLC
Date and Time: Wednesday, 4th December 2019 at 11:00 AM

Interview Questions

1. What are the sources of rules and regulations that are used during the audit process?
2. How do you plan the auditing process?
3. Explain the steps that you take before an audit process?
4. Explain what you should do after the audit?
5. How do you prepare the audit reports?

Change management: Merger of X and Y companies

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Introduction

Nowadays, many companies change in different ways not because it's their goal to change but it's a way to ensure their company sustainability that's why change management became an important tool to ensure their adaptation with the rapidly changing work environment. One of the changes type is merger and it's combining two companies and more for different reasons such as financial growth, gaining competitive advantage and surviving.

The aim of this report is to give a consultancy advice to X company and Y company on how to deal with the change that they want to implement which is merging both companies. The report will include different issues of the change that might face the companies and how to deal with it.

Possible impacts of the change

Many companies decide to merge because of its benefits although merger has positive impact it has negative impacts also, which the companies must put it in their consideration before starting the change, the following are the possible impacts that might face the companies while merging.

1. *Impact on employees*

Merger may have a major impact on employees, one of the impacts is that it might be difficult for them to adapt with the new situation since the work environment will change, also there will be a new system and new work processes and procedures that means the current routine will change and all these new changes needs new skills or improve the old skills to fit with the new work requirements this lead the employees to feel fear of failure of adaption (Long hall consulting, n.d.). Another impact due to merger is the employees may suffer from workload because of merging the projects of both companies which leads to increasing the work (Richards, n.d.). Moreover, merger might change the organizational structure and cancel some jobs or it will be sufficient with the amount of employees, they need less amount of employees therefore some employees will lose their jobs (Jeyanthi, et al., 2016).

2. *Impact on management*

The chance of losing jobs might be higher in the management level than the lower level employees due to corporate culture conflict, the new corporate culture will effect on the management behavior because they might do things they don't agree with this will cause stress to them (Jeyanthi, et al., 2016). Merger might be difficult for the managers to manage and deliver the change for their employees and some managers have lack of confidence that they can do it, this might cause a resistance to change from the management side (Stark, 2015).

3. *Impact on shareholders*

Merger has some economic impact on shareholders of both companies in different way. The impact depends on many factors such as company size, economic environment and the merger management (Jeyanthi, et al., 2016). One of the merged company will benefit from the merger because the share value will rise while small size company may suffer because the share value could drop (Beers, 2019).

Ways to deal with these impacts

1. *Communication*

Communication is the most important tool in change management which relieves the impact of the change. Communication will be by providing timely, clear, consistent and correct information to the stakeholders about the change, discuss with them about the change to start on the change project and also by listening to their problems.
Communication with stakeholders enhance and increase their understanding, motivation and commitment to the project (Hao & Yazdanifard, 2015). Ineffective communication will increase stakeholders' resistance to change. Therefore, communication must start before implementing the change, beginning of the change, during the change and should continue after the change (Rosin, 2018).

2. *Stakeholders' involvement*

Involve the stakeholders from both companies in the planning and preparing stage of the change, and involve them in taking decisions this will increase their satisfaction with the new changes and make the image clear to them (Contributor, 2017). Involving the stakeholders on the change project will build commitment toward the success of the new change. Building the commitment will be when they help in developing the change and they become part of the change success (Cordas & Cicos, 2017).

3. *Training*

Training is another way to deal with merger impact. Training on the new system, processes, procedure not only technical training but also providing suitable training programs for employees to develop their skills and gain new skills, and provide programs for managers on how to deal with employees during the change, this will decrease the fear of failure and will make the adaptation to change easier (Go fluent, 2017). Without effective training it would be difficult for stakeholders to accept the change and they might leave the organization, training will increase their confidence and they will let them stay and will increase the change success (Courtney, 2016).

4. *Change step by step*

The implementing of change step by step and on stages increase the stakeholders' acceptance and response to change. Also choose the suitable time to start the implementation and the best time is when the required resources are available (Insights, n.d.).

Change leader

Leadership is important in change management since it makes a great difference and helps in increasing the success of the project (Thomas, 2014). The change leader can be from the company or from outside the company. In merging X company and Y company it's preferable that the leader is from one of the merging companies but he must be selected based on some characteristics.

Change leader must have in-depth understanding of the change, the reasons of the change, the problems and barriers that affect the change implementation and the requirement of the change, this understanding will help him to set a clear direction of the change for the team to follow (Anderson, 2016). Furthermore, the leader must have the ability to communicate always with employees and understand their problems, suggestions, ideas and their needs with providing them an effective feedback which improves the relationship between the leader and employees (Hao & Yazdanifard, 2015). The leader must motivate himself and his team and empower them which encourage them to innovate in the period of change which makes them find solution for any problem they might face during the change. Aligning employees' work with the company's strategy is one of the change leader roles, this could happen by understanding and defining the vision, mission and culture of the company. Moreover, it's important that the change leader can manage the challenges and the risks because he will help a lot to make the change much easier for the employees (Anderson, 2016).

Leadership style

The selected leadership style for the merging of X and Y companies is visionary leadership which it depends on three key characteristic. The first is risk taking, change needs a leader that is brave enough to take any un expected risk that occur during the change because taking risks and finding solutions at the same time will help the change process continue without any barriers (Patrick, 2019).

The second is listening, visionary leader accept the advice and don't ignore and stick to what he thinks is the best. The visionary leader listens to his team and take the advantage of their advice to improve and give confidence to his team and build trusted relationship. The third character is taking responsibility, the visionary leader takes responsibility of his actions and vision the reason behind this is to keep the change project move forward. The leader responsibility is to make sure that everyone is treated equally and fairly. A leader with vision guide his people with vision and set for them a clear direction to do the work, he also leads them with passion by making the bad situations to better by finding innovative ideas (The balance careers, n.d.).

Change team

For successful change management it's important to structure the change management team, there are many different effective structures can be used to manage the change (Smith, 2018). In merging X and Y the suggested structure of change team contains five roles, the table below will show the roles and responsibility for each role (Lockitt, 2004) & (Prosci, n.d.).

Role	Responsibility
1. Change management resource/team	- Develop the change management strategy and plans. - Support the executives, project team, supervisors and project support functions.
2. Executives and senior managers	- Participate in the change project actively and visibly which means their participation must be seen from beginning to the end. - Communicate with employees about the change directly. - Take part in managing resistance.
3. Managers and Supervisors	- Communicate with employees about how the change may impact them directly. - They must advocate the change from beginning and be role model for their employees which they follow him. - Coaching employees. - The best way to manage employees' resistance is by the direct supervisor. - Contact and interact with project team and provide feedback.
4. Project team	- Design the change and how people do their work. - Managing the technical side of change. - Work with change management team to ensure that the people side and technical side are aligned. - Combine change management plan with project plan.
5. Project support functions	- Use their experience to support the current change. - Use their knowledge in helping project team and change management team. - Provide the tools that support the change activities.

Change model

There are many models to implement change, using models to implement change provides support and clear direction to the change, it also provides understanding of the processes and the impact of the change (Anastasia, 2015). In the case of merging X company and Y company the suggested model is ADKAR which contains five phases and they are Awareness, Desire, Knowledge, Ability and Reinforcement. The following is the explanation of how to achieve each phase according to (Accipio, n.d.)& (Pearson, n.d.).

1. Awareness

This phase is about identification the need of change, reasons of change, the desired goal, explain expected results of the change and estimate the needed resources to implement the change this must happen through the following tools:
- The result of the internal and external evaluation of both companies based on KPIs.
- Stakeholders' suggestions.
- Work requirement.
- Benchmarking with pioneer companies in merging.

2. *Desire*

It's the process of specifying the desired goal of the change, set the plan and take the decision of the following points:

- Identify steps and stages of the change implementation according to specific period of time and KPIs in order to monitor the progress.
- Identify the responsibilities of each member of the change team and the procedure of the implementation.
- Identify the impacted stakeholders and inform them about the change.
- Identify the expected risks and set procedures to prevent and deal with it.

3. *Knowledge*

It's the phase of providing the required skills and information through designing training programs to fill the gaps of the needed skills.

4. *Ability*

Empower the team to use and implement the skills and information to achieve the change, also to remove the barriers and obstacles to the change. Implementing the change must be in limited scale and then implement it to the whole organization based on the achieved results.

5. *Reinforcement*

Following up the achievement and its aim to achieve and sustain the change through monitoring and measuring the progress of the achievement through the KPIs that helps in developing and improving the change continuously.

New organizational culture

X company and Y company have different culture. It's not a good idea to use both cultures because it's ineffective that means the new merged organization must have new culture to succeed the change (Jacoby, n.d.). The new culture can be integration of both cultures but selecting the best features of each culture and then they have to inform the employees about the new culture (Wisdom jobs, n.d.).

Sustainability issues

The most important issue which cause a barrier to change sustainability is resistance. Resistance to change means the unacceptance to the change that occur in the company because they see it as a risk to them (Changing minds, n.d.). Resistance to change happens because of different reasons such as feeling fear of losing the jobs, thinking that the current situation is better than the new situation and other reasons (Tanner, 2019).

Change sustainability

Sustainability of change is not easy; many organizations fail in sustaining the changes. There are different ways to ensure change sustainability. Leadership is one of the factors that have huge impact on the change sustainability, therefore selecting the suitable leader needs a lot of work. Sustaining change needs a powerful leader which have an influence in the organization,

flexible, align the work with the company strategy and communicate to understand the needs and wants of the internal and external customers (Smith, 2014). Moreover, to ensure change sustainability it's important to find out the main and most important problems and solve them and always monitor these problems (Thwink, n.d.).

Involving customers in change implementation is important as involving employees because they give the organization new ideas from their perspective that the organization might never think of which helps in thinking innovatively and sustaining the change (Ontario, 2013).

Another way is to Use rapid cycle testing which is a method to implement PDSA the purpose of this tool is to test the change in small scale to know what are the strength and weakness and then improve in the next implementations (Niatx, n.d.). PDSA (Plan, Do, Study and Act), plan is to set a plan for the test by identifying the people will involve, team member responsibilities and explain the processes and procedures.

Do is to start doing the planned test. Study is to analyze and study the results of the test. Act is to decide what to do when applying the change again based on the result that was studied (Ontario, 2013). The benefit of this tool is minimizing the resistance to change which is one of the sustainability issues, reduce time and money consuming and learn from the testing and take the good ideas for the next implementations (Niatx, n.d.).

Sustainable change strategy

The selected strategy for the merging of X and Y company is educative strategy. Although it takes long time to implement the change and it cost the company it has advantages to use (Lockitt, 2004). This strategy changes employees values and beliefs in order to support the change and moving it forward. In this strategy consultants and specialists lead different activities, training and educational programs in order to educate the individuals. The advantage of this strategy that it makes the individuals have a positive commitment (Ohtonen, 2012).

Summary

Now we can say that X and Y company is aware enough of the merger. The report explained the possible impacts of merging both companies the impacts are related to employees, managers and stakeholders. It also provides ways to deal with these impacts and they are effective communication, training, stakeholders involvement and change step by step.

The suggested leadership style was visionary leadership since it can help in succeeding the merger and also the change team was addressed each member have different responsibilities all they work together to move the change forward. The recommended change model was ADKAR model, it's simple and very clear model which makes the change implementation easier the model supports the change and provides a clear direction to the change.

When the two companies merged the new company must have new culture therefore the companies must integrate their culture to build one new culture which support the change. No merger is free of change sustainability issue like change resistance but every issue have a solution for this issue the selected solution is to implement educative strategy to ensure the company sustainability.

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4th Industrial Revolution: how people and technology are shaping the future of organizations

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Abstract

We live in a VUCA world, this reality is very well illustrated by current Danone CEO Emmanuel Faber in stating "What Keeps me awake at the pace of change. Are we changing too fast? Or not to fast? And where?". A number of factors contribute to this reality that entire companies, institutions and industries (and the people who work in them) are facing. Let us then analyze these factors from the work of authors such as Eric Ries (Ries, 2017) and Rita McGrath (McGrath, 2019). The phenomenon of globalization means that organizations and their employees do not know today where their main competitors or some of the buyers of their products / services will come from. "... Software is eating the world." wrote Marc Andreessen in 2012, referring to the growing number of businesses / industries that operate using software and offer their services online, and foreseeing that in the next 10 years more industries would be victims of "software disruption." The disruption will be increasing, thanks to the advances made daily in the area of artificial intelligence and machine learning enhanced by the increased capabilities provided by the internet of things. People have changed. They live longer years. They are more active. They are more knowledgeable and demanding consumers and workers. Global communication, rentable means of production, and global supply chains at marginal costs enable you to reduce initial costs and increase successful launch conditions for new products or businesses. McGrath (2019) argues that firms that have already realized this have abandoned the premise that business stability is the norm and are trying to find new ways based on what patterns of change they can identify. It is time to rethink organizational models, management models and labor relations in a way that business, people and society can grow together.

Keywords: 4th Industrial Revolution, Inflection Points, Technology Exponentials Convergence, People Trends, Organizations Competitive Environment, Innovation.

The world we live in

The world is becoming more and more V.U.C.A. (the acronym for volatile, uncertain, complex and ambiguous) and, increasingly marked by the transformations that have been enhanced by something Kelly9 (for whom the computer age only started when computers merged with the phone) called a "robust hybrid", resulting from the convergence between communication and computing, with which we get used to living under the format of a system that combines "internet / web / mobile". This phenomenon was undoubtedly responsible for other changes that have been taking place since the 1980s.

A good way to begin an analysis of the world we currently live in is to build on the concept of strategic inflection points from former Intel CEO Andy Grove:

> "A strategic inflection point is a time in the life of a business when it's fundamentals are about to change "(Grove, 2010)[10].

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[9]Kelly, K. (2016). The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future. Penguin Books.

[10]Grove, AS (2010). Only the Paranoid Survive: How to Exploit the Crisis Points That Challenge Every Company. Currency.

In Rita McGrath's opinion when we look at strategic inflection points, we should compare them to the way Mike Campbell's (character in Hemingway's book *The Sun Also Rises)* responds when asked how he went bankrupt: "Gradually, then Suddenly."

According to her, an inflection point has the power to change the assumptions by which organizations were created, appearing as a shift in the business environment that creates dramatic changes in the competitive dynamics of a functioning system, which may mean the emergence of new entrepreneurial opportunities but may also result in "… potentially devastating consequences for those still operating under the old model or assumptions." (McGrath, 2019)[11].

The most common triggers of a turning point are as follows:
- technological changes,
- regulatory changes,
- social possibilities,
- demographic changes,
- new connections between elements (common to digital disruption)
- political changes.

Inflection points main triggers currently hovering over us and our organizations: technological changes, new connections between elements, and social possibilities.

Technology, what is changing?

Andreessen wrote that "… software is eating the world…" (Andreessen, 2011)[12] when describing how a growing amount of business and / or industrial sectors had started to operate based on software and offered as online services.

History has shown that Andreessen was right, the huge and rapid worldwide expansion of software powered by the "internet / web / mobile" system and the phenomenal growth in the number of smartphones (with ever increasing processing and storage capacity, and access to knowledge) that came into the hands, or pockets, of a large number of the inhabitants of planet earth is helping to fulfill the predictions made by Andreessen in the article cited above, when he anticipated that in the following 10 years, more industries would fall victim to software disruption.

But the technological innovations (and the transformations that their evolution allowed to create) do not stop here, nor stop accelerating at a high pace, in an article published in 2016, Klaus Schwab stated that "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and report to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before." (Schwab, 2016)[13].

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[11]McGrath, R. (2019). Seeing Around Corners: How to Spot Inflection Points in Business Before They Happen. Houghton Mifflin Harcourt.

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Schwab continues his analysis, arguing that the 4th Industrial Revolution and the transformations it brings with it could not be compared with previous revolutions, nor be understood as a mere extension of the 3rd Industrial Revolution because of the "… velocity, scope, and systems impact." adding that "The speed of current breakthroughs has no historical precedent." and that the 4th Industrial Revolution "… is evolving at an exponential rather than a linear pace."

Diamandis and Kotler (2015)[14] help us to have a more concrete notion of the speed with which the changes are and will continue to happen, by clarifying that contrary to the linear progression in which from 1, we pass to 2,3,4, etc., the technology of "*the world we live in*" grows exponentially, that is, from 1 to 2, then to 4, and from 4 to 8 and so on, always doubling its power.

It is this type of growth that:
- enables the smartphone we use today to be a thousand times faster and a million times cheaper than a supercomputer from the 1970s;
- allows us to predict that in 2023 a computer that costs around a thousand dollars will have a computing capacity equal to that of the human brain and that, 25 years later, therefore in 2048, it will have a capacity equal to the totality of the human brains on planet earth ;
- will be responsible for, as Kelly believes, we may cease to have past or future, and we will live in a permanent and endless present, marked by constant updates and upgrades of systems and technologies that transform us into eternal newbies, always looking to stay up to date (which will hardly happen because the obsolescence cycle is also constantly accelerating).
- Makes Vijay Govindarajan[15], argue that the future should be understood as a *software* that is constantly being updated, reaching us in daily doses that must be properly identified and analyzed.

Professors Brynjolfsson and McAfee contend that the world we live in is marked by"… the emergence of real, useful artificial intelligence (AI) and the connection of most people on the planet via a common digital network." They state that these, which are the two most important moments in our history, came about thanks to the coexistence of three elements:"… sustained exponential improvement in most aspects of computing, extraordinarily large amounts of digitized information, recombinant innovation. "(Brynjolfsson and McAfee, 2014)[16]

Let us look a little further at the three elements identified by Brynjolfsson and McAfee. With exponential improvement, the authors seek to convey the idea that what may have previously existed is in no way demonstrative or indicative of what it is to come because "The accumulated doubling of Moore's Law, and the ample doubling still to come, gives us a world where supercomputer power becomes available to toys in just a few years, where ever-cheaper sensors enable inexpensive solutions to previously intractable problems, and where science fiction keeps becoming reality. "

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[14] Diamandis, PH, & Kotler, S. (2015). Bold: How to Go Big, Create Wealth and Impact the World (Exponential Technology Series). Simon & Schuster.

[15] Govindarajan, V. (2016). Planned Opportunism. https://hbr.org/2016/05/planned-opportunism

[16] Brynjolfsson, E., & McAfee, A. (2014). The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. WW Norton & Company.

Regarding digitization, the transformation into zeros and ones (the native language of computers) of all kinds of information and media, be it texts, sounds, photos, videos, data collected by sensors and instruments, news, maps, personal updates, social networks, information requests and their answers, etc., allowed the emergence of "… two of the well-understood and unique economic properties of digital information: such information is non-rival, and it has close to zero marginalization cost of reproduction. ", ie information can be" consumed "by more than one person at a time (non-rival) and, as " Copying bits is also extremely cheap, fast, and easy to do." making additional copies of an original costs almost zero (zero marginalization cost of reproduction).

As for the third element, the authors maintain that "… digital innovation is recombinant innovation in its purest form. Each development becomes a building block for future innovations. Progress doesn't run out; it accumulates." They add that the digital world respects no boundaries, extending itself to the physical world as it's happening with autonomously driven cars and airplanes and printers that create replacement parts. They conclude by giving a sense of digitization potential "…makes available massive bodies of data relevant to almost any situation, and this information can be infinitely reproduced and reused because it is non-rival."

These three elements are at the origin of what Diamandis calls "Six D's of Exponentials", the concept he developed to present us his vision of the new growth cycle of exponential technologies:

1. Digitization. As soon as a technology or branch of knowledge (e.g., biology, medicine, manufacturing, etc.) becomes digital and, it becomes possible to represent it through the binary code of zeros and ones (the native language of computing), hitches a ride from Moore's[17]law and increases the speed (and at the same time expands access) with which everything happens, including knowledge sharing, also increasing the chances of innovation happening. Soon, with quantum computing, the ride will be on the back of Rose's Law,[18] which will certainly make the acceleration much greater.

2. Disappointment. Period during which exponential growth goes largely unnoticed because the duplication of small numbers produces results so tiny that they are often (incorrectly) interpreted as the blossoming of linear growth. However, as soon as doubling reaches the whole numbers barrier (1,2,4,8, etc.), it is only 20 duplications far to achieve a million-fold improvement and 30 duplications to a billion-fold improvement. .

3. Disruption. This is what happens when exponentials really start to make an impact on the world, to put it simply, it is the time when an innovation starts to lead to the discontinuity of existing products, services, markets and industries. As disruption always comes after disappointment, the initial technological threat always seems very small and, as a rule, is not perceived in time.

4. Demonetization. It is about the emergence of new solutions that eliminate the need to purchase something that was previously paid for (eg: camera rollers, music CDs, international phone calls). As the disruption happens immediately after the disappointment phase, the change is not perceived in a timely manner.

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[17]So called after the finding made by Gordon Moore (in 1965) that, every 18 months the number of transistors in an integrated circuit doubled.

[18]In 2012 Geordie Rose, the founder of a quantum computing company, stated that the number of qubits (quantum bits) in a quantum computer doubles each year.

5. Dematerialization. It boils down to the disappearance of goods and services that were previously considered important and that ceased to be important or that started to be offered in a different way (eg: gps devices, voice recorders, digital clocks, cameras, all became offered in smartphone app format).

6. Democratization. This is what happens when the costs that continue to exist to create something become so low that they become available and accessible to almost anyone.

We are currently moving towards a future of convergence between different technologies. This situation seems to be configured as the main turning point that organizations need to be aware of at the technological level. A good example of what is happening is what Diamandis and Kotler report about the development of new drugs, that is accelerating not only because advances in biotechnology are advancing at an exponential rate, but also because artificial intelligence, quantum computing and a series of other technologies are converging, overlapping / stacking on top of each other, producing tsunamis of knowledge and innovations capable of making everything that comes their way disappear.

The same authors argue that when exponential technologies converge, the potential for disruption also increases in terms of scale, that is, while a solitary exponential technology is capable of causing the disruption of a product, service or market "…convergent exponentials wash away products, services, and markets, as well as the structures that support them.".

And it is precisely this type of convergence that we are witnessing and that, enables the emergence of increasingly agile and intelligent robots (the result of the convergence of exponential sensor technologies, AI with neural networks, and the *cloud*), is also allowing for an exponential acceleration in the development and capabilities of autonomous transportation.

What is changing about People?

"Our World in Data" website[19]estimates that the world population in 2020 will comprise approximately 7,800,000,000 people, with 49.6% being female and 50.4% male. About 56% of these people will live in one of the ten most populous countries in the world.

The average age of the world population will be 29.8 years, the fertility rate of 2.5 live births per woman, and the infant mortality rate of 2.61%. Of the entire world population, 43.3% should be considered rural and 55.7% urban. It is estimated that, in 2020, the annual growth rate of the world population will be fixed at 1.05%, and that the average life expectancy will be 72/73 years.

In generational terms, in 2020 the world population will have the following structure:

- 40.6% of the population is between 25 and 54 years old;
- 25.4% are between 0 and 14 years old;
- 15.5% are between 15 and 24 years old;
- 9.3% are 65 or older;
- 9.1% are between 55 and 64 years old

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[19]Ritchie, H., & Roser, M. (2019). Age Structure. Our World in Data. Retrieved from https://ourworldindata.org/age-structure

When we talk about generations pyramids, we should focus on studying the increasing number of people who will be living 65 years or more and, the people who in 2020 will be between 26 and 42 years old (the millennials). In addition to being numerous the two will be responsible for the main socioeconomic changes in the near future.

As for the first group, A United Nations report[20]on aging populations says that we are facing a global phenomenon, with the number of people aged 65 and over projected to double to 1.5 billion by 2050 (an expected increase of 120% between 2019-2050). The report presents other important data, such as: the survival rate after completing 65 years will go from 17 years (estimated value for 2015-2020), to the 19 years between 2045-2050; the aging of the population in countries with lower intergenerational transfers will put substantial pressure on older people to become self-sufficient while testing the sustainability of state support systems.

The previous predictions and the fact that the ageing process is becoming slower brings other challenges, ranging from the increase on the retiring age - what will force to rethink the current model of work (working more years less hours a day will be one of the hypotheses) and the way we are educating ourselves (lifelong learning must be the new normal) - to new consumer needs and customer expectations.

Moving on to millennials, in 2008 Canadian Don Tapscott published a book[21]in which he presented the results of a study, involving almost 8,000 people from 12 different countries, all born between 1978 and 1994. In the book, Tapscott presents 8 norms that according to him almost all participants shared (even if they were from different countries and cultures). These norms were: Freedom; Customization; Scrutiny; Integrity; Collaboration; Entertainment; Speed; Innovation.

Although in many organizations the practice shows that "we have always done things this way" still prevails, the reality is that all the changes we have addressed in the previous paragraphs require organizations to reposition themselves and to do things in different ways.

To cope with new technological, social, labor market, and consumer trends, products/ services and business model innovation it is not enough. Of course it still remains essential but, given the speed with which changes (in habits, in the way of doing things, and in the way of thinking) happen, organizations will also have to innovate in the way they organize themselves (innovation in organizational design) and innovate in the way its management is practiced.

Organizations for a V.U.C.A. world

As Peter Drucker stated[22] "There is only one valid definition of business propose: to create a customer (…) The customer is the foundation of a business and keeps it in existence.", so with no possible doubt the first task for a V.U.C.A. world organization is to have deep knowledge of its customers: who they are, the jobs they need to get done and what their habits and behaviors are.

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[20]United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Ageing 2019: Highlights (ST / ESA / SER.A / 430). Retrieved from https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf on January 24, 2020. It

[21]Tapscott, D. (2008). Grown Up Digital: How the Net Generation is Changing Your World. McGraw-Hill Education

[22]Drucker, P. F. (1954). The Practice of Management. HarperCollins Publishers.

2020 Consumers: the V.U.C.A. world customers

The previously presented trends about changes occuring in technology, in people demography and behaviors and, the way they converge themselfs are the responsibles for the type of consumers of 2020.

In general, we can say that V.U.C.A. world customers:
- Are more aware of the reality that surrounds them, due to the ease they have in accessing information;
- Are more demanding about how they are treated by organizations. This applies to the quality of the products/services that are offered, the shopping and after-sales experience, the transparency with which the whole process takes place and, that the solution being offered (products/services) help them to complete the jobs they need to do without extra effort needed;
- Want freedom of choice: what they buy, where they buy, to customize or not and, when to buy;
- For some of their choices they prefer to consider accessing rather than owning the good(s);

- [Especially the millennials] want speed in the process (the speed with which they can try / buy or get *feedback* on a product / service or question they have asked)

- [Especially the group of people aged 65 and over] need products and services that allow them to enjoy longevity enjoying better health conditions.

The competitive ecosystem

The current pace of convergence in exponential technologies associated with the phenomenon that communication means became global, the means of production became rentable and, global supply chains can be enjoyed almost at their cost price, reduce the initial barriers and increase the conditions for successful launch of new products or businesses.

Currently, support Brynjolfsson and McAfee, a creator of a digital app, no matter how modest its facilities or the size of its team, it becomes a micro-multinational with the capacity to reach global audiences, almost instantly. The power of the cloud allows him, in a matter of minutes, to start a new project with access to the number of servers and computing power he needs, and as soon as he needs to increase the contracted capacity, the process is as simple as the initial one.

As Diamandis and Kotler expose, it is no longer necessary to spend money on buying excessively expensive equipment, spend months installing, configuring and programming that equipment, and worrying about what happens if it breaks down or becomes obsolete. And technology, in this case access to infinite computing, allows you to experiment with ideas and learn from mistakes - which, believing in Jeff Bezos statement[23] is the best way to guarantee an organization's success - while spending less and less time and money.

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[23]Dennis Green, BIU (2019). Jeff Bezos has said that Amazon has had failures worth billions of dollars - here are some of the biggest ones. Business Insider Singapore. Retrieved from https://bit.ly/2SmQrfE

Global means of communication also gave the "app creator/ micro-multinational" access to a global market of collaborators to make his project viable:

- With the help of the crowd, he can now launch a new business or a new product with less risk because, the insights that the "crowd" can contribute in the development phase can help to develop something that corresponds in such a way to the needs and / or expectations of a high number of members that, when going to the market, there are already a large number assured sales among this crowd.
- By being able to recruit on a global level, the chances of finding and attracting the right people increased. And, at least for some tasks, diversifying the offer in terms of talent and, the different levels of expected remuneration.
- Finally, capital has also become more accessible, thanks to the crowd's investment. According to Diamandis and Kotler, in 2025 crowdfunding could be an ecosystem in which it will move around 300 billion dollars.

Meanwhile, the digitization of the economy is contributing to a new reality in terms of competition in the markets. As Brynjolfsson and McAfee reiterate, the economies of scale that can be achieved when an activity (such as accounting) goes digital, allow market leaders to gain a huge cost advantage and the space needed to beat the prices of any competitor, while continuing to generate some profits to.

This factor can lead to a reality where small local markets with several smaller leaders are no longer possible, and that there will only exist global markets in which the most capable (and increasingly powerful) win more customers while the second and third will face greater competition from all sides.

The robotization of the workforce and the automation of production are also changing the face of the competitive environment of the industrial sector. As the gains obtained with the relocation of production to places where the value of labor is lower start to disappear, the relocation of production is no longer a competitive factor. The level of automation that the organization is able to reach, while still meeting the expectations of its customers, has become much more important namely, in terms of delivery times. Therefore, manufacturing will move, more and more, according to the demand of the market and not so much with the demand for cheaper human labor.

Yeung and Ulrich advocate that to seize these opportunities as "The pace of external change guarantees that the right thing will inevitably become the wrong thing, often soon." it is necessary that "... organizations must respond to change and adopt new ways of doing things, even if you fail in the short term." and these changes must be at least as rapid as "… their circumstances do." otherwise the near future can be similar to some of the findings from the authors:

> *"In the last fifteen years, we found that more than 50 percent of the Standard & Poor's companies have disappeared; in the next ten years, estimates are that more than 40 percent will disappear." (Yeung and Ulrich, 2019)*[24]

So, what kind of changes are we talking about? I believe the most important change must be in

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[24]Yeung, A., & Ulrich, D. (2019). Reinventing the Organization: How Companies Can Deliver Radically Greater Value in Fast-Changing Markets. Harvard Business Review Press.

mindsets. We will have to realize that as Barry Diller states[25]one has to learn to unlearn - to give up everything that has helped achieve results before, and learn to do it differently. The scientific method should be adopted, and experimentation should be one of the strongest allies to uncover the best ways forward.

I think the above are two key ingredients for the changes needed in organizations in order to become what I like to call "Synchronized Organizations" that is, they are organized and managed to ensure that they deliver value propositions and design their business models in sync with the present times (ie: focused on its customers[26] present needs and expectations, and in tune with its surrounding environment, which will always be constantly evolving).

It will be necessary to realize that, as Paul Kruger says[27] "Productivity is not everything, but in the long run it is almost everything." And that, as Brynjolfsson and McAfee clarify, "… productivity growth comes from innovations in technology and techniques of production." not from increasing the number of hours worked. For that I believe it is important for organizations to fully embrace the benefits of artificial intelligence and automation, and start looking immediately for all the processes and tasks that can be improved by incorporating them.

But this incorporation should not happen in a logic of simple replacement of people by machines in the accomplishment of some tasks, the logic It should be a matter of finding the tasks for which each one should be responsible, because "Effective production is more likely to require both human and machine inputs, and the value of human inputs will grow, not shrink, as the power of machines increases. (Brynjolfsson and McAfee, 2014).

The path must also be through the transformation of management practices and organizational models to make them more outward-looking, customer centric and more agile, able to take full advantage of the increased productivity and capabilities brought by automation and AI, freeing humans from tasks where the use of their (so far unique) skills - ideation, broad-frame pattern recognition, and complex communication - to "… create opportunities to produce goods and services that could never have been created by unaugmented humans, or machines that simply mimicked people…" providing "… a path to productivity growth based on increased output rather than reduced inputs. (Brynjolfsson & McAfee, 2014)

What will organizations look like in the 4th Industrial Revolution? As I mentioned earlier, In my point of view they will be …

Synchronized Organizations

I believe "Synchronized Organizations" are the ones that can be characterized by adopting innovative organizational designs and management practices that allow them to become ambidextrous and exploit their current business while exploring new opportunities. This combination allows them to continually launch:
- incremental innovations (increasing the value of their current products/services or making their operations more efficient),
- architectural innovations (e.g., the incorporation of artificial intelligence and automation into processes and tasks) and

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[25]Barry Diller - Masters of Scale. (2020, January 09). Retrieved from https://mastersofscale.com/learn-to-unlearn

[26]Customer in the sense of those to whom their services and / or products are intended.

[27]Paul Kruger in Brynjolfsson, Erik. The Second Machine Age (p. 72).

- disruptive innovations (e.g., new products/services, business models), drastically reducing the risk of becoming irrelevant when the people and the world around them change.

You can be a "synchronized organization" regardless of size or age, but one cannot adopt a model that was designed for a time when the external environment of organizations was much different. In order to be in sync with our times, the model for the "synchronized organization" must be designed to thrive and grow amid volatility, uncertainty, complexity and ambiguity.

It should be designed to allow the organization to be disciplined in rigorously running its core business (making the most of its current capabilities) but at the same time, explore new opportunities through a much greater focus outside the organization than within the organization, ensuring close proximity between employees and consumers (to learn more about and sense their needs and desires), and exploring opportunities for effective partnerships (where sharing resources, capabilities and information produces better and more resilient organizations and new and innovative value propositions for customers).

"Synchronized organizations" employees know (and are comfortable with that) the real CEO it's the customer, so organizational design and culture follows that fact with internal functional areas sharing the mission of helping all employees serve the customer and, sharing responsibility for achieving results. In 2004, in an article published in the Harvard Business Review, Charles A. O'Reilly and Michael L.Tushman argue that decision makers need to get their organizations to become ambidextrous, exploring new opportunities while continuing to work in a disciplined manner to take maximum advantage of the exploitation of their current capabilities and products or services.

O'Reilly and Tushman came to the conclusion that few companies could do it competently, and for the ones that did the key success factors were: a) the separation that had been made between the units that had the mission to explore new opportunities from the ones that had to focus on exploiting and improving the existing business; b) the close coordination between exploration and exploitation units that existed at the level of the organization's top executives.

This model, based on the five principles presented in the table below, allows exploration units to launch radical or disruptive innovations while having access to the resources (money, talent and customers) provided by exploitation units. It also makes it possible to protect the units dedicated to exploration from the constraints caused by the anti-innovation stance they might encounter in the existing organization, which is so well summarized in the sentence "this is not how things are done here!". A third gain is that it frees up time for existing units to focus exclusively on improving current operations and products and better serving present customers.

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Table I - 5 Principles for Successful Ambidexterity

5 Principles for Successful Ambidexterity
- A compelling strategic intent that intellectually justifies the importance of both exploration and exploitation.   - An articulation of a common vision and values that provide for a common identity across the exploitative and exploratory units.   - A senior team that explicitly owns the unit's strategy of exploration and exploitation; there is a common-fate reward system; and the strategy is relentlessly communicated.   - Separate but aligned organizational architectures (business models, structure, incentives, metrics, and cultures) for the exploratory and exploitative units and targeted integration at both senior and tactical levels to properly leverage organizational assets.   - The ability of senior leadership to tolerate and resolve tensions from separate alignments.

Another approach that distinguishes "synchronized organizations" it's being market driven. Yeung and Ulrich call Market Oriented Ecosystems (MOEs), to the type of organization that builds on the opportunities detected in the market, organizes people and other resources in a model that presents an ecosystem-inspired design, aiming to succeed in the markets where it is present. They explain that they're made up of platforms, cells / teams, and strategic allies / partners and flourish through the connections and learning that takes place between and within the organizational units.

The great connecting force between this series of Independent units is the recognition that in this way they are able to respond more quickly to changing conditions because together they get more customer information, more innovation capabilities and greater agility. The table below shows the six principles and actions that allow the development of such an organizational design.

Table II - Market-Oriented Ecosystems 6 Principles and Actions

Environment ⇨	Strategy ⇨	Capability ⇨	Morphology ⇨	Governance ⇨	Leadership
Do we understand and anticipate the changing environmental conditions that will shape our future?	Do we have a clear strategy for growth and a pathway for making it happen?	Have we articulated & Implemented the capabilities that leverage the MOE?	Have we designed the right organizational form or structure to enable our growth strategy?	Have we designed and delivered the practice in the six governance mechanisms that leverage the MOE?	Do we have leaders at the top and a shared leadership brand throughout the organization to ensure success?
Appreciate and anticipate	Clarify and facilitate	Diagnose and embed	Design and deliver	Architect and implement	Be, coach, and build

Conclusion

There is no doubt that living in a world where velocity is exponential means that the scale, scope and complexity of the changes and transformations that will occur will be unprecedented. Much more technologies and knowledge branches will be digitized and the continuing convergence of exponentials will be responsible for washing away more and more products, services, and markets, as well as the structures that support them.

So, organizations that lose the ability to be in tune with their target audiences, the ability to perceive trends and anticipate changes and stay too long, doing extremely well what they shouldn't be doing at all will probably join companies like Blockbuster and Kodak as examples of once market leaders that "Gradually, then Suddenly."ceased to exist.

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AN EMPIRICAL EXAMINATION OF THE IMPACT OF ACCREDITATION ON HOSPITALS' QUALITY PERFORMANCE: THE MODERATING ROLE OF CORPORATE GOVERNANCE

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Purpose

Limited knowledge is available regarding the impact of governance and the accreditation process on the healthcare organization and health authorities in the United Arab Emirates. This research project investigated the moderating effect of governance on the relationship between accreditation and hospitals' quality performance in public hospitals of the United Arab Emirates.

Methods

This study included a combination of both quantitative and qualitative techniques to collect and analyse the data. A cross-sectional research approach was used to assemble quantitative data from the questionnaires distributed to 651 employees while the qualitative phase included semi-structured interviews conducted from 15 individuals and 12 focus groups (10-12 members per group) between June 2017 and December 2017. Thematic analysis was used to analyse qualitative data, whereas SPSS was used to analyse descriptive statistics. Pearson's correlation coefficient and multivariate multiple linear regression were used for data analysis. Findings were elucidated in two stages to make it easy for the readers to obtain a clear picture from the results.

Findings

Three hypotheses were tested. The results of the hypothesis demonstrated a statistically significant and positive association between Hospital accreditation and the quality performance (p=0.000; $r = 0.536$) and employees' satisfaction (p=0.000; $r = 0.354$) of the Ministry of Health and Prevention hospitals. These results demonstrate that hospital accreditation is an effective tool for improving hospital quality performance that positively influences the satisfaction of the employees. The third hypothesis suggested that effective governance does have a moderation

effect on the relationship between a hospital's accreditation and the hospital's quality performance as perceived by the hospital employees. When all the survey variables were accounted for in the model, the introduction of governance factor improved the overall quality of the model.

The qualitative findings implied that corporate governance of hospitals including effective board structures, processes, long-range planning, financial oversight and quality oversight might lead to better clinical outcomes, effectiveness, efficiency, patient safety culture within hospitals, as well as improved employee satisfaction. This was also confirmed through face to face interviews where the employees affirmed that accreditation is useful in healthcare settings if an organization has a well-structured governing body.

The respondents in the focus group also confirmed that the governing body also played an essential role in making the organization's mission and vision clear to everyone, putting the strategic and operational plan into action, facilitating the accreditation process, staff engagement, providing the needed resources/support to employees, empowering them to facilitate provision of resources, and in making sure that the employees are compliant with the standards, rules, and regulations. This may serve as a vehicle to promote the voluntary uptake of best practice, increase the satisfaction of employees and bring uniformity in quality and safety among hospitals to achieve excellence.

Originality/value/Contribution

The study is the first to be conducted in the UAE as the factor of governance is unique. Diverse evidence on governance mechanisms and quality performance outcomes will offer decision-makers a better basis for planning future initiatives. This study also contributed to the knowledge by answering the identified gaps such as moderate effect of governance. The study also provided empirical support on the association between accreditation programs and their impact on hospitals' quality performance. The study should, however, be replicated in different cultures, using different structures, and types of hospitals along with concentrating on patient satisfaction in future to have put governance on the agenda of the health service and hospitals.

Limitations

The generalizability of the study is limited due to small sample size. More government, private hospitals, and primary care institutions should be considered in future studies to get a more generalizable and reliable understanding of the subjects. Due to data confidentiality, the degree of access to the information would limit the scope of the current study.

Keywords: *Accreditation; governance; United Arab Emirates (UAE); healthcare; quality performance; employee; satisfaction.*

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Workers and Thermal Environment in the UAE

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Introduction:

In the Arabian Gulf especially in the United Arab Emirates recruits many labors in the construction areas and other industries, these labors are most likely from south Asia. Abu Dhabi and Dubai rely on a huge numbers of these expertise workers, which they form more than the third of the population. (Bates, Graham P., et al).

However, during summer seasons labors and site managers suffers from the torture of the sun, heat and humidity and it's known that the heat temperatures in the United Arab Emirates during the summer days could rises to more than 45 degrees Celsius, while the humidity could be more than 90%. (Gulfnews, 2011).

As a result of the rising temperatures of the heat in 2010 the emirate of Abu Dhabi has witnessed (3,017) cases of heat- related illness and that's according to an official statistics that took place in Abu Dhabi. There are some heat injuries which they are deadly as any other severe injuries. (Gulfnews, 2011)

Hence, these labors and site managers are exposed to heat stroke especially if they were not hydrated enough. Heat stroke can be defined as a hyperthermia; it's a resultant of an abnormal high body temperature with physical and neurological symptoms. These symptoms can be shown as form of: (Gulfnews, 2011)

- Vomiting
- Fatigue
- Nausea
- Headache
- Dizziness
- Muscle cramps

Heat stroke and the dehydration that all the labors are exposed on under the heat, consider as a risk in the workplace which is important to discuss and debate about it. Because; it effects on their health in the workplace and there is an urgent need to conduct risk assessment and identify the actions that should be taken, for some cases are severe and can be fatal. Also, Comparative risk assessment can be useful to identify the significant health problems and set priorities for this heated environment in the management perspective.

Goals and objectives

The objectives of this research is to study the hydration conditions for the labors who perform physical activities in constructions and different industrial areas, which make them loose a lot of sodium amount under the summer heat of the United Arab Emirates, which can result on heat-related illness and severe injuries, and to check the hours that the labors could endure under the stressful heat. (Bates, Graham P., et al). The aim of this research is to prevent the severe injuries of heat related- illness such as heat stroke and provide safety and good health for the labors who works under the sun heat, and to implement the method of risk assessment and to define the ranking priorities by risk management.

Literature Review

The environmental conditions during the summer season are the harshest because of the heat, especially in the United Arab Emirates which is known by its hot semi- arid climate. Labors who work under these harsh environments are at risk of heat illness and they should be protected against it. Some data has been collected to have the knowledge of the physical strain that labors undergo through the rough heat and wither their bodies are hydrated enough. (Bates, Graham, Schneider. 2008).

The significance of hydration

In order to tolerate the rough heat of the sun that cause a stress for the bodies of the labors, the hydration conditions should be very high for it consider as crucial indicator for tolerance. Because; in maintaining an adequate level of hydration the risk of getting heat illness will minimize and it will be easier to avoid excessive fatigue. (Bates, Graham P., et al). Some of the labors who works in the industrial areas or in the construction areas, preform physical activities for many hours, some of them take about 12 hours per day, for six days or a week. (Holmes, Nicola A., et al), which will result of progressive dehydration and that's because of the large volume of fluid loose over the work under the heat. Hence, this would put the worker at risk of heat related illness and tough injuries. (Holmes, Nicola A., et al).

In addition, the process of evaporating the sweat is significant because of the smooth movement of the air and the low humidity would ease the body temperature of the worker. However, since the humidity is very high in the United Arab Emirates a large amount of sweats will run out of the labors skin causing potential skin disorder and depleting fluid reserve. (Miller, Veronica S., and Graham P. Bates. 2009).

Moreover, there are factors affecting the perspiration rates such as the climate conditions, the materials of clothing and the physical activities. (Bates, Graham, Schneider. 2008)
According to few studies showed that the hot environment can effect on the heart rate, body temperatures and the cardiac output, which can reach to the point of exhaustion. Also, with poor hydration can cause of increase the rate of glycogen depletion and decrease of the energy to work. (Bates, Graham, Schneider. 2008).

Hence, the health authority of Abu Dhabi always urge for the labors to stay hydrated through the day specially in summer season, all labor have to drink about two liters of water at least for every two or three hours, because the human body depend on sweating to cool it down under the heat and poor hydration would prevent it, which will result on exhaustion from the heat. (The National, 2010).

So, the health authority of Abu Dhabi provided some shaded areas for the labors and made a law that during the summer seasons there is a mandatory break for the labors who works under the sun and that's from 12:30 pm to 3:00 pm. (The National, 2010).
Also, inspectors from the ministry of labor inspect if there are any labor working during the break time and there are penalties issues for breaking this law which is possible closure for the field and fines up to Dh 15,000. (The National, 2010).

To avoid these penalties, the ministry of labor had distributed some booklets with different languages to all the business owners about the break time for the labors and some workshops to educate about the heat stress. (The National, 2010).

Physical Exhaustion

The prolonged physical effort especially under the heat with level of humidity will result of exhaustion and body fatigue which can be classified as local fatigue and systematic fatigue. (Bates, Graham, Schneider. 2008).

The local fatigue can happen in high intensity work, and can be developed when the blood flow is not enough in an active muscle, resulting to reduce the amount of Oxygen (O_2) and the tissues will increase the anaerobic metabolism and the lactic acid. (Bates, Graham, Schneider. 2008). On the other hand, light to moderate work can be contributed to the systematic fatigue; it can be quantified by measuring the Oxygen (O_2), blood pressure, heart rate, body temperature of a labor. (Bates, Graham, Schneider. 2008).

In addition, the World Health Organization (WHO) recommended that the average heart rate of a worker should not exceed a (110) beats min^{-1}. Also, exhaustion due to lack of sleep could cause prolonged heart rate recovery after overwork under the heat. (Bates, Graham, Schneider. 2008).

During this research the Thermal Work Limit (TWL) have been used as method of environmental risk assessment to indicate the thermal stress index during working hours, it consider as a validate modern heat index which can predict the maximum work that can be done at given environment, especially in hot environments it can determine the safe work periods and providing guidelines. (Bates, Graham, Schneider. 2008).

Moreover, the Thermal Work Limit has five parameters that can be use: (Miller, Veronica, et al)
- Dry bulb
- Wet bulb
- Glob temperature
- Wind speed
- Atmospheric pressure

Methods and Measures

Methods and measures has been taking to assess the hydration conditions for labors during summer season which was on May, and these measures took place in Al Ain city and Abu Dhabi, some of the labors volunteered and participated in this study which was approved by Al Ain Medical District Human Research Ethics Committee. (Bates, Graham, Schneider. 2008).

The labors who participated in this study were from different nationalities in south Asia such as (India, Pakistan and Bangladesh) and they all been informed gave a written consent for this study since it consider as a risk assessment in workplace . (Miller, Veronica, et al).

At the beginning of the study the health risk and the lifestyle behavior were gathered by making interviews with the worker who were about 22 participants and worked in constructional area for 12 hours shift for 6 days per week. (Bates, Graham, Schneider. 2008). The aim of this study was to determine if the labors were experiencing any physical fatigue during these 12 hours by using heart rate monitoring, and to define the hydration conditions for the labors, and using the Thermal Work Limit as an index to perform a workplace heat stress risk assessment. (Bates, Graham, Schneider. 2008).

The hydration conditions were determined by the specific gravity of the urine samples of the participants from the beginning of their shift until the end of it. As for the heart rates each participant wore a monitor to take the measurements of the heart rate, the participant wore these monitors until the study ends. (Bates, Graham, Schneider. 2008). For recording the thermal stress, it was quantified by the Thermal Work Limit (TWL) which was monitored at workplace regularly throughout the day by using heat stress meter. (Miller, Veronica, et al).

Analysis

As for the results and the analysis for this study, it showed that the environmental stress that been measured by the Thermal Work Limit (TWL) altered by the periods of the day, it showed that the stress reading was lower in the morning period and late afternoon. (Bates, Graham, Schneider. 2008).

However, it was harsher during the mid-day period, also the temperature of the labors were constant during the study days and the heart rates as well did not alter during the shift, regardless the increasing of the environmental thermal stress the labors weren't feeling any physical fatigue. (Bates, Graham, Schneider. 2008).

As for the hydration data, it showed that the labors began their work hydrated and maintained their hydration conditions during the working hours. Hence, the results of this study illustrated good hydration prior and at the beginning of the shift, and the labors that begin their work hydrated they remain hydrated during the shift hours which will avoid any risk of heat related illness. (Bates, Graham, Schneider. 2008).

Recommendations and Conclusions

It's recommendable to have an educational program to spread awareness about the significant of hydration and having the need to offer a practical advice to the labors who work under the heat, and such program should contain a debate about health, safety and adequate hydration. (Bates, Graham, Schneider. 2008).
Also, employers who asses in risk management should protect the health of their labors since it's from their responsibilities by ensuring a risk assessment that is implemented, where heat risk hazard is exist and who is at risk from the heat related illness, and ensuring that the worksites having a mid-day break during summer season as the UAE Ministry of Labor required. (Department of health, 2019). In addition, employers should provide shaded areas for the labors, and having medical clearance for any worker having chronic medical conditions such as high blood pressure. (Department of health, 2019).

As for the labors, they should involve in educational program about the importance of maintaining a good hydration by drinking water every two to three hours and the risks of working under the heat and recognizing the signs of heat illness. (Department of health, 2019).

In conclusion, this study showed a data that demonstrated well hydrated labors can work without getting heat stroke or any heat related illness, and the Thermal Work Limit (TWL) it's validate in a controlled environment and it's a measure of heat stress that would be appropriate to use, it can measure all the environment parameters, it takes the clothing into consideration and provide a metabolic rate. (Bates, Graham, Schneider. 2008). Hence, working under the summer heat should be taken into consideration to avoid any heat related illness and the individual should stay hydrated all the time.

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