Contents

The Impact of Understanding and Interpreting The Holy Qur'an Before Translating It into English

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تأثير فهم و تفسير القران الكريم قبل ترجمته الى اللغة االنجليزية

Abstract:

The Holly Qur'an is word of God that carries many implicit messages for us that need to be interpreted and understood from scholars before being translated. It also requires a specific translation methodology, and not all translation methods can convey the meaning in the correct way, and this is what we will explain through this research paper.

الملخص:

القران الكريم هو كلام الله الدي يحمل لنا العديد من الرسائل الضمنية التي تحتاج الى فهم وتفسير من العلماء قبل ترجمته.كما يتطلب منهجية ترجمة معينة وليس كل طرق الترجمة تستطيع نقل المعنى بالطريقة الصحيحة وهدا ما سنوضحه من خلال هده الورقة البحثية .

1_Introduction

Teaching and Learning the methodology of translation involves many steps that should be followed by translators and learners. Because methodology includes semantic use of methods, technique, understanding, and many other steps, especially in translating the Holy Quran. Translating the Holy Quran from Arabic into English is accompanied by many linguistic problems. Because The Holy Quran employs many stylistic linguistic and rhetoricalfeatures.

The Quran is the Arabic speech of Allah, so that the words of Quran deal with sensitivemeanings, not very translator can translate them correctly .the words of Quran need especial

techniques, because they deal with many issues like semantic such as polysemy, homonymy, hyponymy and synonymy.

An ambiguity of lexical words causes a vital problem in both semantic and translation. Words contain ambiguous where they have more than one meaning or senses. Quiroga_Clare (2003) explained that" something is ambiguous when it can be understood in two or more possible senses or ways. According to Palmer (1996 P.100) Polysemy as a case in which the same word may have a set of different meanings. Taylor (1995, P.99) said, "Polysemy means that the association of two or more related sense with a single linguistic form.

2_ Methodology

This paper depends on two parts; the first one is theoretical, while the second is practical.

Part one provides a theoretical information about how to use translation methodology in translating the words of Quran and difficulties that face translators. Part two deals with comparative analytical study related to the problems and misunderstanding of Holy Quran's words from Arabic into English that based on data collected from various translations that selected from web site www.patreon/IslamAwakend .

3_ Hypothesis

The majority of translators face problems to find out the sense and intended meaning of Quran words, this is because:

1_ Translationmethodology that they followed.

2_ The words of Holy Quran have specific meaning and sense not everyone can guess the intend meaning easily.

4_Aim of study

As we know, Arabic language is rich in words and meanings especially in Holy Quran. The aim of this study is to focus on translation methodology and the impact of understanding and interpreting the Holy Qur'an before translating it into English .

5_ previous studies:

Some of the authors and writers talked about similar subjects to this research as: AL_Anani explains that; the translator can convey meaning without simulation the verbal structure. He adds

that the Qur'an is a non-chronological book this means that; its words change in every era. This statement is inaccurate because the words of Qur'an have deep and fixed meanings that impossible to change with time.

Al-Nadwi says that the Qur'an is the basis of Islamic law and the system of the individual and society life. This type of meaning should be translated for those who do not know the Arabic language.

While Abdul Rahim asserts that it is impossible to translate the Holy Qur'an because there are words that do not have any equivalents in other languages, such as Al-Waqi'a, Al-Qara'a, Al-Sakha, and Al-Ghashiya, each of which means the Day of Resurrection.

6_ Methodology:

Data analysis depended on five sentences from Holy Quran and their translations. These sentences are:

1_(﴿إِنَّ هَذِهِ أُمَّتُكُمْ أُمَّةً وَاحِدَةً وَأَنَا رَبُّكُمْ فَاعْبُدُونِ﴾)] (سورة الأنبياء:92-94)

2_ (وَمَا أَهْلَكْنَا مِنْ قَرْيَةٍ إِلَّا وَلَهَا كِتَابٌ مَعْلُومٌ) (سورة الحجر : 4)

3_(فَلَمَّا فَصَلَ طَالُوتُ بِالْجُنُودِ)(البقرة 249)

4_﴿وَمِنَ النَّاسِ مَن يَشْرِي نَفْسَهُ ابْتِغَاءَ مَرْضَاتِ اللَّهِ ۗ وَاللَّهُ رَءُوفٌ بِالْعِبَادِ﴾ (الآية 207من سورة البقرة)

5_ (الَّذِينَ يَظُنُّونَ أَنَّهُمْ مُلَاقُو رَبِّهِمْ وَأَنَّهُمْ إِلَيْهِ رَاجِعُون)(البقرة:46)

6_1 Introduction

Arabic language is rich in meanings and structures, that means we have to be careful with the methods of translation, we have to be concentrate on the structure, culture, content, and sense especially in Holy Quran words. They need more effort, because Holy Quran words contain on special meaning, most of foreign translators do not have full background, and comprehension of Quran words, even some Arabic translators, if they do not have the correct interpretation of the meanings of Quran's words, will not be able to translate it into English.

According to Delisle(1988) in the first stage of the process, comprehending the text, the translator essentially attempts to determine what the author wanted to say. The comprehension of

signified is an operation involving only the linguistic cod, and therefore, however essential it may be, it will not by itself enable the translator to understand an utterance. The translator's equivalences would be based on a partial interpretation.

One of the important steps that should be concentrate on is Polysemy. Michel Breal mentioned that; polysemy occurs when a word denotes a new sense together with the old one. Ullman (1957, p. 117) defines polysemy as " one word can have more than one sense". For Crystal (1980, p. 274) polysemy is a term used in semantic analysis to refer to lexical item which has a range of different meanings.

According to Marzari, (2006, p. 15) in Arabic the case that words have multiple senses called (Al-Ishtirak Al-Lafdi). The most known book in polysemy in Arabic was written by Ali Ibn al-Hassan AL-Anani, who called (Kira al-Namal)." Al-Munjid Fima itafq Lafdah wa Aikhtalafa Manah. "

6_2 Data Analysis

_The first sentence:

1_   (_إِنَّ هَذِهِ أُمَّتُكُمْ أُمَّةً وَاحِدَةً وَأَنَا رَبُّكُمْ فَاعْبُدُونِ)

Some translators translate it as : This is your community that is one community. Here they depended on literal translation to convey the meaning but actually we have to interpreter every word before translate it. That means interpretation is very essential step to translate Holy Qur'an. According to Ibn-Katheer's interpretation , he explained the word :

It means " your religion".(ملتكم).into (امتكم)

_ The second sentence:

2_ (وَمَا أَهْلَكْنَا مِنْ قَرْيَةٍ إِلَّا وَلَهَا كِتَابٌ مَعْلُومٌ)

According to Tabary's interpretation :

"الا ولها أجل مؤقت ومدة معروفة"

But some translators translated it into "we haven't destroyed a town except that it had a known book". While the intend meaning is "Term and limited time "

_The third sentence :

3_(فَلَمَّا فَصَلَ طَالُوتُ بِالْجُنُودِ)

According to Tabari's explanation:

"فصل" بمعنى شخص بالجند و رحل بهم و أصل الفصل هنا أي " القطع"

Most of translators translated it into: "when Tallot Divided the troops" while the sense was " setout" instead of " divided".

_ The fourth sentence:

4_﴿ وَمِنَ النَّاسِ مَن يَشْرِي نَفْسَهُ ابْتِغَاءَ مَرْضَاتِ اللَّهِ ۗ وَاللَّهُ رَءُوفٌ بِالْعِبَادِ﴾

Means Sell. يشري If we look to Tabari's interpretation, we will know that the word

The meaning of this sentence is "some people sell themselves in order to please God"

But most of translators who didn't depend on interpretation in their translation, they translated as "some people who buy themselves in order to please God". This is wrong, because they depended on literal translation before interpreted it.

_Fifth sentence:

الَّذِينَ يَظُنُّونَ أَنَّهُم مُّلَاقُو رَبِّهِمْ وَأَنَّهُمْ إِلَيْهِ رَاجِعُونَ) (5_

According to Al-Qurtubi's interpretation: الظن بمعنى اليقين

While some translators translated into "who expect that they are meeting their Gad and that they return to him". While the correct translation is "who are certain that they will return to Him".

7_ Conclusion

The Qur'an is the words of Allah and these words convey not only general meanings but they convey messages to the people in their life. We have to be aware about their words and meanings.

Thus, the goal of translating the Holy Qur'an is to help Foreigners and Arabs understand the Qur'an and its' meaning, provided that it is first interpreted by Scholars before it is translated so that translators don't make mistakes when transferring the meaning of Holy Qur'an form Arabic into English.

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Studying Phytochemical of the alcoholic (ethanol) and aqueous extract of moringa oleifera seeds and effect on some type gram negative and positive bacteria

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Summary :

It also showed results in E.coli bacteria, and results were given in the alcoholic extract of Moringa oleifera seeds at a concentration of 100. mg/ml , and the result was about 11mm.While in the aqueous extract, the result was about 12mmAs for the concentration of 50. mg/ml , the result was given for the alcoholic extract, and the result was estimated to be about 15mmWhile in aqueous the result was estimated at about 10mmAt a concentration of 25. mg/ml , the result of the alcoholic extract was about 16mmWhile in the aqueous extract, no results were given, and at a concentration of the results were about 20 mm in the alcoholic extract, while no results were given in the aqueous extract. The results were shown in Staphylococcuaurus bacteria of the alcoholic extract of Moringa oleifera seeds and a result was given at a concentration of 100. mg/ml of about 12mm.While in aqueous form the result was given at a concentration of 100. mg/ml of about 2mm   At a concentration of 50. mg/ml , the alcoholic extract was given as a result of about 10mmAnd in the aqueous extract it is about 4mm   As for the concentration of 25. mg/ml , the result of the alcoholic extract was about 14mm   And in the aqueous extract it is about 3mmAs for the alcoholic extract at a concentration of it did not give results While in water the result was given and the result was about 2.4mm. A phytochemical study was conducted on the seeds of the Moringa Oleifera plant. Through chemical tests, the presence of flavonoids, phenols, carbohydrates, glycosides, alkaloids, tannins, and saponins was revealed.

This study also aimed to test the biological effectiveness of the aqueous and alcoholic extracts of Moringa oleifera seeds on two types of bacteria.

One of them is Gram positive, namely Staphylococcus aurous.

The other is Gram-negative bacteria, Escherichia Coli.

According to the results, it was noted that the seeds of the Moringa oleifera plant in the alcoholic extract have a better effect on bacteria than the aqueous extract. This is perhaps due to the solubility of the active ingredients, which previous studies have shown have a better effect on pathogenic bacteria in alcoholic extract than in aqueous extract, and also the effectiveness, as the alcoholic extract is more effective than Aqueous extract

1.Introduction :

Medicinal plants are a source of many effective substances that are used to treat various diseases. Humanity has been known for thousands of years and has recorded a lot of knowledge and information about these plants in ancient civilizations such as the civilizations of Egypt, India and China, and many peoples still use them to this day as they were used thousands of years ago (1).

Medicinal plants currently occupy a large place in agricultural and industrial production and receive great attention in many of the countries that produce them (2).

Medicinal plants have attracted the attention of scientists for a long time after their widespread use in preparing many medicines and medicinal drugs. This is due to the speed of its therapeutic effect and the lack of negative side effects compared to the effects caused by chemically manufactured drugs. When the drugs enter the body, their effect is not limited to the infected cells only; Rather, it affects several healthy and injured organs at the same time, and this effect leads to the accumulation of those pharmaceutical chemicals that have become the cause of many diseases in humans (3).

Many researchers in the field of natural antibiotics for microorganisms have pointed to the use of plant extracts for many reasons, the most important of which are their abundance,

ease of obtaining, low cost, and safer, due to their lack of side effects (4).

Today, we are experiencing a global awakening that is moving towards medicinal herbs. Scientific research has proven that many herbs contain important therapeutic compounds, as they have stability and high effectiveness against many acute and chronic diseases, such as all types of cancers and diseases resulting from injuries. Bacterial diseases (5)

The emergence and spread of antibiotic resistance among Gram-positive and Gram-negative bacteria strains has prompted researchers interested in the field of therapeutics to discover therapeutic alternatives to antibiotics. These alternatives include medicinal plants and the effective antibacterial components they contain, such as phenols, alkaloids, essential oils, resins, and other natural materials. Which confirmed its inhibitory effects in treating bacterial diseases {6}.

Despite the important and beneficial benefits of alternative medicine, especially medicinal plants, in the field of medicine, this field is not free of risks and toxins, as some plants are a double-edged sword {1}.

Through the current study, the focus will be on the seeds of the Moringaoleifera plant, by knowing the effect of the alcoholic and aqueous extract of the seed of the Moringaoleifera plant on Gram-positive and negative bacteria and detecting the active substances contained within the extract from the seeds of the Moringaoleifera plant.

1.1.Research objectives:

1.Phytochemical study of the seeds of the Moringaoleifera plant and identification of the active components within the extract.

2.Study of the biological effectiveness of the alcoholic and aqueous extract of Moringaoleifera seeds on some types of Gram-positive and Gram-negative bacteria.

1.2.Research problem:

The use of medicinal plants instead of the excessive use of antibiotics to treat bacterial diseases, which causes the development of microbes and the occurrence of bacterial resistance

1.3.Moringa oleifera plant:

The Moringaoleifera tree was called the miracle tree because it is used to treat more than 300 diseases, and it is known by several names, the most famous of which is the banan branch or the olive branch. It is also sometimes called the porch tree, because the seeds of its fruits contain oil compounds that have the ability to collect and leak substances suspended in water, making it clear and drinkable. It was also known as the tree of life in the time of the Pharaohs and was used medicinally for mummification. It has also been used for 300 years to treat diseases in India (its original homeland) and has been mentioned frequently in Islamic medicine books. Because of its medical importance, much scientific research has been conducted in the West and East to confirm its therapeutic effectiveness, and many huge and valuable books have been written about it praising its therapeutic and nutritional importance. Some countries, such as Egypt, Sudan, and others, took the initiative to study and cultivate it as an integrated food source for humans and animals. Several governments have developed future plans to eliminate hunger and food shortages in poor countries through moringa cultivation (7)

Moringaoleifera is a tree from which all parts can be used: leaves, branches, seeds, fruits, and roots. The most commonly used are the leaves. It is known that the Moringaoleifera tree grows very quickly and is considered one of the fastest growing trees in the world (7)

Its native habitat is northern India, and it also grows on the slopes of the Himalayas, where its flowers and leaves are used as food and as a medicine. A medicinal substance that repels nematodes is also extracted from its roots. Moringa trees have spread in southern Egypt and northern Sudan, and even in some regions of the Arabian Peninsula (7).

The Moringaoleifera tree is considered one of the trees that is useful in resisting drought. Its oil is used in cooking and in treating some diseases. It also has medicinal uses and high nutritional benefits (8).

In general, the nutritional properties of the moringa tree are excellent, in addition to the low toxicity of the seeds and the ability to adapt to poor soils and dry climates. Moringa can be an alternative to some leguminous seeds as a source of high-quality protein (8).

Another advantage of the Moringa tree is that it is successfully grown in streams, home gardens, and around farms. It is used to improve soil properties, works to resist and control pests, feed animals, and raise bees, in addition to the possibility of using all its plant parts in medicine and treatment (9).

1.4.Scientific nomenclature:

The moringa tree has several names according to the places where it is grown, including (10).

Scientific name: MoringaOleifera.

Arabic name: miracle tree, tree of life, porch tree, banyan tree, banyan branch, ease tree, olive banyan tree.

English naming: Ben tree, Horseradish tree, Drumstick tree.

1.5.Introduction to bacteria:

Bacteria are a group of prokaryotic microorganisms, in which there are about 1,500 or more species. They are organisms that can only be seen with a microscope, and their dimensions are measured in microns, with their width ranging between (2-2).(0) microns, and its length is between (2-10) microns, and does not contain chloroplasts. It consists of a single cell and has several shapes, including spherical, rod-like, and spiral-shaped ones. Some of them are beneficial, which we depend on in our daily lives, and some are harmful, which cause diseases and epidemics. Bacteria are found in soil, water, air, and food, and are also found on the surface of the skin, mucous membranes, and inside the digestive tract and respiratory system (11).

1.5.1.Staphylococcus Aureus bacteria:

Staphylococcus aureus is a gram-positive, non-motile bacterium. They are given this name (staphylococci) because they gather in the form of irregular balls that resemble clusters of grapes when viewed under a microscope. They are called golden because they appear in the form of yellow-colored colonies. They are facultatively anaerobic (they can live in the presence or absence of oxygen), and one of the most important Diseases caused by Staphylococcus aureus bacteria are pneumonia, meningitis, osteomyelitis, and bacteremia. It is one of the most common causes of hospital-acquired diseases (12).

1.5.2.Escherichia Coli bacteria:

They are facultatively aerobic and anaerobic, rod-shaped, Gram-negative bacteria belonging to the Enterobacteriacea family. They move by means of peripheral flagella. Their length ranges from 2 to 4 microns and their width from 0.4 to 0.7 microns. They live in various media (air, soil, in the human and animal bodies).). The most important diseases caused by E.Coli bacteria are vomiting and diarrhea, especially in children, urinary system infections, appendicitis, and wound infections (13)

2.Previous studies:

> A study conducted in 2018 showed that the Moringaoleifera plant contains flavonoids, glycosides, carbohydrates, cardiac glycosides, resins, alkaloids, tannins, and saponins in varying proportions among the extracts, and this is due to solvents (14).

A study was conducted in 2014 in which a chemical examination of the aqueous and alcoholic extract of the Moringaoleifera seed plant showed the presence of flavonoids, tannins, steroids, alkaloids, saponins, and others. The antifungal activity of the aqueous and alcoholic extract of the Moringaoleifera seed plant was very active against Saccharomycin and Candida tropicalis and did not appear Activity against Candida albicans (15).

 -In a study conducted in 2009, he analyzed the Moringaoleifera seed powder using the Folin Denis and Spectrophotometric method, the gravimetric method, and the scattering %, tannins, alkaloids, saponins, and mineral elements, namely aluminum,

calcium, potassium, sodium, and other minerals. The results of the study indicate the medicinal and nutritional potential of the seeds of the Moringaoleifera plant for human and animal uses (16).

A study in 2012 of aqueous Moringaoleifera seed extracts and chloroform showed activity against Gram-positive and Gram-negative bacteria. The results of the chloroform extract were more effective than the aqueous extract in terms of activity against Gram-positive and Gram-negative bacteria (17).

A study conducted in 2013 found that Moringa seeds are an effective, safe, and inexpensive alternative to traditional coagulants that can be widely used to treat drinking water, and then use it with polyaluminum chloride to remove total organic carbon (18).

A study conducted in 2019 showed that all Moringaoleifera extracts (leaves, flowers, seeds, roots) are effective against Gram-positive and Gram-negative bacteria. The results showed that the Moringaoleifera leaf extract is more effective against Gram-positive and Gram-negative bacteria. Compared to extracts from other Moringaoleifera plant parts (19)

A study was conducted in (2011) on aqueous and ethanolic extracts of the seeds of the Moringaoleifera plant on two types of bacteria, Salmonella typhi and E.Coli. Results showed that the presence of the ethanolic extract was effective against E.Coli bacteria, but no effectiveness was shown against Salmonella typhi bacteria. As for the aqueous extract of the seeds Moringaoleifera has not shown results against Salmonella typhi bacteria and has low effectiveness compared to ethanol against E.Coli bacteria (20).

 -In one study conducted in 2006 on rats, treatment with aqueous and alcoholic extracts of the roots of the Moringaoleifera plant led to a decrease in the formation of stones. This indicates that Moringaoleifera has an anti-urinary stones effect (21).

A study was conducted in 2014 to evaluate the toxicity of Moringaoleifera leaves. It was found that they do not cause tissue damage and are therefore safe for consumption, provided that the

amount consumed does not exceed 70 grams per day to prevent the toxicity of its constituent elements (22).

Materials and working methods

Collecting and preparing plant samples for study:

3.Collecting the plant sample:

Seeds of the Moringaoleifera plant were collected during the month of March 2023 from Libyan territory - after cleaning them of dust and removing dirt and obstacles.

3.1.Work methods:

3.1.1.Method of preparing the extract:

20g of dry Moringaoleifera seed powder was taken and placed in a 250ml conical flask. Then 200ml of distilled water was added and we repeated the same method for the alcoholic extract. Then it was placed in a dry and clean place away from light, heat and moisture, and placed in the shaker for 24 hours, and then the solution was filtered on the filter papers and we repeated the filtration process 3 times for each solvent, then they were placed on glass dishes with a known weight, and placed in the Faber router at a temperature of 60 Celsius to obtain a dry extract and get rid of all The solvent, and after complete drying, the dry material was collected and weighed with a sensitive balance, after which 3 different concentrations were prepared from it, to determine the extent of its effect on Gram-positive and Gram-negative bacteria (23)

3.1.2.Preparing the agricultural media:

The Muller-Hinton nutrient medium is melted and sterilized with an Autoclave device at a temperature of 121 degrees Celsius. Then, a group of Petri dishes with equal diameters of 9 cm are prepared and we pour into them the Muller-Hinton nutrient medium that we sterilized and melted. All these steps are done near a gasoline burner to obtain On a sterile medium, and leave the dishes to cool and freeze (24).

3.1.3.Preparation of a bacterial suspension:

The bacterial suspension is prepared by taking a colony of each bacterial strain using a sterile Pasteur pipette, placing it in test tubes containing 5 ml of physiological water, then shaking it

slightly until a homogeneous suspension is obtained and the color becomes turbid (25)

3.1.4.Cultivation of the extract:

The extract was cultured on Petri dishes and we ensured that the extract was free of any bacterial growth.

3.1.5.Bacteria cultivation:

The sterile cotton swab is dipped in the bacterial suspension and then swabbed over the entire agricultural media prepared previously in petri dishes in continuous lines, repeating the process 3 times and rotating the petri dish at an angle of 60 degrees each time (24)

3.1.6.Preparing concentrations of the extract:

3different concentrations of the extract were made, then the extract was weighed dry using a sensitive balance and dissolved in 10ml of distilled water. The rest of the concentrations were prepared in the same way, then they were placed on filter paper discs in order to be applied to the culture media and then determine the extent of their effect. On Gram-positive and Gram-negative bacteria (24).

3.1.7.Method of cultivating bacteria and applying the extract:

The bacteria were grown on3 Petri dishes, where two plates contained gram-positive bacteria Staphylococcus aureus, one plate contained an aqueous extract and the other an alcoholic extract, and two plates contained gram-negative bacteria E. coli, one plate contained an aqueous extract and the other an alcoholic one. They were cultured using a cotton swab. Using a planning method to cover every part of the surface of the medium with bacterial growth, the discs of sterile filter paper were saturated with different concentrations (100, 50, 25,mg/ml) of the aqueous and alcoholic extract, and were placed on the cultured dishes and then inserted into the incubator at a temperature of 37 degrees. Celsius for 24 hours, and then determine the extent of the effect of the aqueous and alcoholic extract on bacteria (24).

3.2.Preliminary phytochemical tests for Moringaoleifera seeds:

A set of qualitative tests (preliminary phytochemical examination) were conducted to identify the active chemical components in plant extracts of Moringaoleifera seeds to test the presence or absence of phytochemical components as follows:

1.2.3.Detection of carbohydrates:

Carbohydrates are detected using the Mulch reagent (26):

Method for detecting carbohydrates using Benedict's reagent (26):

2.2.3.Detection of alkaloids:

Alkaloids are detected using Mayer's reagent (27).

Method for detecting alkaloids using Wagner's reagent (27):

2.3.3.Detection of soaps:

Then perform a foam test to detect soaps (28):

2.3.4.Detection of phenolic compounds:

Phenolic compounds are detected using the lead acetate test 1(28).

2.3.5.Detection of tannins:

Tannins are detected using the ferric chloride test (28):

2.3.6.Detection of flavones:

Flavones are detected using the 1% lead acetate test (27):

2.3.7.Detection of glycosides:

Glycosides are detected using Benedict's reagent (26):

4.Results and Discussion:

1.4.The effect of aqueous extract of Moringaoleifera seeds on bacteria

Table (1.4): shows the reading diameters of different concentrations of the aqueous extract on bacteria.

Concentrations of aqueous extract of Moringaoleifera seedsmg/ml)(			Name of bacteria
25	**50**	**100**	
0	10mm	12mm	*E.coli*
mm3	mm4	2mm	*Staphylo.c aureus*

  -Through Table (1.4), the results showed that the highest inhibitory effect on E.Coli bacteria was at the concentration of 100mg/ml, and the diameter of the inhibitory zone was equal to (12mm), and the lowest inhibitory effect was at the concentration of 50mg/ml, and the diameter of the inhibitory zone was measured equal to 10mm).), while no results were given at the concentration of 25mg/ml and The results of study (14) showed a clear similarity, as there are positive effects of the aqueous extract of the seeds of the Moringaoleifera plant on E.Coli bacteria. Study (19) also showed that the aqueous extract of the seeds of the Moringaoleifera plant The Moringa plant has an effect on E.Coli bacteria, where inhibitory diameters were estimated at 25mm, 25mm, 22mm, and 19mm, respectively. As for the bacteria Stapgylo.c aureus, the highest inhibitory effect was at a concentration of 4mg/ml, and the diameter of the inhibitory zone was measured at 50mm. The lowest inhibitory effect was at a concentration of 100mg/ml, and the diameter of the inhibitory zone was equal to (2mm). The results of study (14) showed a clear similarity, as there are positive effects of the alcoholic extract of Moringaoleifera seeds on S.aureus bacteria. Study (19) also showed that The aqueous extract of Moringa seeds has an effect on S. aureus bacteria, where diameters of inhibition estimated at 23mm, 20mm, 17mm, and 16mm were recorded, respectively.

Figure (1.4) shows the effect of the aqueous extract of Moringaoleifera seeds on E.Coli bacteria.

Figure (2.4) shows the effect of the aqueous extract of Moringaoleifera seeds on bacteria
2.4.The effect of the alcoholic extract (ethanol) of Moringaoleifera seeds on the bacteria Escherichia Coli and Staphylococcus aureus

Table (2.4): shows the reading diameters of different concentrations of alcoholic extract (ethanol) on bacteria

Concentrations of alcoholic extract (ethanol) of Moringaoleifera seeds (mg/ml)			Name of bacteria
25	**50**	**100**	
16mm	15mm	11mm	*E.coli*
14mm	mm10	12mm	*Staphylo.c aureus*

-Through Table (2.4), the results showed that the highest inhibitory effect on E.Coli bacteria was at a concentration of 25mg/ml, and the diameter of the inhibitory zone was equal to (20mm), and the lowest inhibitory effect was at a concentration of100mg/ml, and the diameter of the inhibitory zone was measured as equal to 11mm).), and the results of study (14) showed a clear similarity, as there are positive effects of the alcoholic extract of the seeds of the Moringaoleifera plant on E.Coli bacteria. Study (29) also showed that the alcoholic extract of the seeds of the Moringa plant has an effect on the bacteria S. aureus, as inhibitory diameters estimated at 19mm, 18mm, and 19mm respectively. As for the bacteria Stapgylo.c aureus, the highest inhibitory effect was at a concentration of 25mg/ml, and the diameter of the inhibitory zone was equal to (14mm). The lowest inhibitory effect was at a concentration of 50mg/ml, and the diameter of the inhibitory zone was equal to (10mm) and the results of study (14) showed a clear similarity, as there are positive effects of the alcoholic extract of the seeds of the Moringaoleifera plant on the bacteria S. aureus. Study (29) also showed that the alcoholic extract of the seeds of the Moringaoleifera plant has an effect On S. aureus bacteria, inhibitory diameters estimated at 13mm, 9mm, and 14mm were recorded, respectively.

Figure (3.4): The effect of the alcoholic extract of Moringaoleifera seeds on E.Coli bacteria.

.Figure (4.4) shows the effect of the alcoholic extract of Moringaoleifera seeds on Staphylo C aureus bacteria.

3.4.Results of preliminary phytochemical tests

The results of the phytochemical tests were viewed and recorded as follows:

Table (3.4) presents the results of the preliminary phytochemical tests to study the active substances in the Moringaoleifera seed extract.

Moringaoleifera seed extract	Testing/materials used	Active ingredients
+	Mulch detector	**Carbohydrates**
+	Benedict detector	
+	Mayer reagent	**Alkaloids**
+	Wagner detector	
+	Foam test	**Saponins**
+	Lead acetate test 1%	**Phenolic compounds**
+	Ferric chloride test 1%	**Tannins**
+	Lead acetate test 1%	**Flavones**
+	Benedict detector	**Glycosides**

Through the results of the preliminary tests obtained, we record the presence of all the active substances mentioned previously in the extract from the seeds of the Moringaoleifera plant, where a positive result appeared for carbohydrates using the Molsch reagent and formed a violet ring, while the Pinkt reagent formed a red precipitate, and a positive result appeared for alkaloids using Mayer's reagent and formed a precipitate. White, as for Wagner's reagent, a brown precipitate was formed. A positive result appeared for saponins using a foam test, and we observed the formation of foam. A positive result appeared for phenolic compounds using a 1% lead acetate test, forming a white precipitate. A positive result appeared for tannins, using a 1% ferric chloride test, forming a bluish-green precipitate. A positive result for flavones using the 1% lead acetate test resulted in a yellow precipitate, and a positive result for glycosides appeared using Benedict's reagent and formed a red precipitate.

5.Conclusions:

The alcoholic extract of Moringaoleifera seeds has a high inhibitory effect on the growth of bacterial species compared to the aqueous extract, which has a lower inhibitory effect than the alcoholic extract.

Through phytochemical tests, it was revealed that there are active substances inside the Moringaoleifera seed extract, which are carbohydrates, alkaloids, saponins, tannins, phenols, flavones, and glycosides.

1.5. Recommendations

Through the study we recommend the following:

You can benefit from the seeds of the Moringaoleifera plant and it can be used as a treatment, but you must make sure that it does not have a toxic effect.

- Studying the effect of Moringaoleifera seed extract on other types of bacteria.

- Conducting phytochemical tests on other parts of the Moringaoleifera plant and knowing the active substances contained within the extract.

- Conduct more quantitative tests to determine the amount of active substances contained within the Moringaoleifera seed extract.

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The Design of Anti-Sulfate Erosion Expert System in Concrete (ASEES)

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Abstract

Expert systems have proven to be useful tools to aid the decision-making process for the construction field. Expert systems use rules to represent experts, reasoning in solving problems. The rules are based on knowledge about methods and the problem domain. To acquire knowledge for an expert system, one should rely on a variety of sources, such as text books, research papers, interviews, and surveys. Expert systems should be easy to use, incorporate the best available knowledge, and reveal the reasoning behind the recommendations the make.

This paper is the result of survey of expert/knowledge based systems applications and development methods related to concrete design.

The main topics include:

1. An introduction to expert systems, it's components, characteristics, interface strategy methods, knowledge representations, and general stages in the development of an expert system.

2. Domains, applications with some examples for expert systems.

3. The initial step in the development of Anti-Sulfate Erosion Expert system in concrete(ASEES). Which addresses two topics:

a.   The selection of concrete materials design, which is designed to serve as a tool for concrete specifiers.

b.   Diagnosis and repairmen the faults occurred during the mixing process. This subsystem uses information from the user to diagnosis of failures which can assist the inspector or engineer to:

- Identifying the failures during the mixing process.
- Diagnosis the cause and position of the failures.
- Produces conclusions and recommendations(the recommendations are based on the cause and position of the failure).

Keywords: Expert Systems, Knowledge Representation, ASEES, Design, Diagnosis.

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تصميم نظام خبير لمكافحة تآكل الكبريتات في الخرسانة (ASEES)

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الملخص

أثبتت الأنظمة المتخصصة أنها أدوات مفيدة للمساعدة في عملية صنع القرار في مجال البناء والتشييد.

تستخدم الأنظمة الخبيرة القواعد لتمثيل الخبراء والتفكير في حل المشكلات. وتستند القواعد على المعرفة حول الأساليب ومجال المشكلة. لاكتساب المعرفة لنظام خبير، يجب على المرء الاعتماد على مجموعة متنوعة من المصادر، مثل الكتب المدرسية وأوراق البحث والمقابلات والاستطلاعات.

يجب أن تكون الأنظمة المتخصصة سهلة الاستخدام، وأن تتضمن أفضل المعرفة المتاحة، وتكشف عن الأسباب الكامنة وراء التوصيات المقدمة.

هذه الورقة هي نتيجة مسح لتطبيقات الأنظمة القائمة على الخبرة والمعرفة وطرق التطوير المتعلقة بالتصميم الخرساني. وتشمل المواضيع الرئيسية الاتي:

1– مقدمة عن النظم الخبيرة، مكوناتها، خصائصها، أساليب استراتيجية الواجهة، التمثيلات المعرفية، والمراحل العامة في تطوير النظام الخبير.

2– المجالات والتطبيقات مع بعض الأمثلة للأنظمة الخبيرة.

3–الخطوة الأولى في تطوير النظام الخبير المضاد لتآكل الكبريتات في الخرسانة (ASEES). والذي يتناول موضوعين:

1.   اختيار تصميم المواد الخرسانية والذي تم تصميمه ليكون بمثابة أداة لمحددي الخرسانة.

</div>

2. تشخيص وإصلاح الأخطاء التي تحدث أثناء عملية الخلط. يستخدم هذا النظام الفرعي المعلومات الواردة من المستخدم لتشخيص الأعطال التي يمكن أن تساعد المفتش أو المهندس على:

- تحديد الأعطال أثناء عملية الخلط.
- تشخيص سبب وموقع الأعطال.
- تقديم الاستنتاجات والتوصيات (تستند التوصيات إلى سبب وموضع الفشل).

الكلمات المفتاحية: الأنظمة الخبيرة، تمثيل المعرفة، ASEES، التصميم، تشخيص.

1. Introduction

Artificial intelligence (AI) has many areas of interest. The area of expert system (ES) is a very successful approximate solution to the classic AI problem of programming intelligence. An ES is defined as " an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for to their solution" [Feigenbaum82].

Sulfate erosion is one of serious factors affecting the security of concrete building. There are many destructive factors to enforce the security of concrete building, and sulfate erosion is one of the main factors. How to prevent and ease the sulfate erosion is an important content at all times in concrete engineering field. Though many anti-sulfate erosion knowledge and experiences have been accumulated and into practice, existing knowledge and experiences in anti-sulfate erosion are not made good use because of the complexity of sulfate erosion and other restriction. So based on the field knowledge in anti-sulfate erosion in concrete, to build an anti-sulfate erosion expert system in concrete is a problem desiderating to be solved with the technology of computer. In this field [Waterman 1986] has provided the most widely accepted approach.

Therefore, designers need an affordable expert that will open their eyes to faulty and unsafe aspects of their designs, recommended alternative methods/designs, and report possible

consequences of bad designs. However, further research is needed to show the feasibility of using expert system in the field of designing safety and durability concrete [Akladios 98].

The application of expert systems to the design of concrete mixture proportioning can help to determine compliance with design codes, standards, and guidelines for acceptable practice. The expert systems can aid the designer in the selection of proper constituents to concrete, provide information from experts in the concrete mixture proportioning design area.

In this piece, the knowledge is represented in various formats including high-level reasoning from experts, bibliographic references, and explanatory statements[Lawrence 94]. The knowledge base for ASEES developed using various and available sources. The system designed to represent materials-related activities that involve the material selection, diagnosis of reinforced concrete structures. The system uses the rule based method of representing knowledge. The inference engine employed forward chaining procedure to test true/false conditions.

ASEES consisted of UI interface, knowledge base, database and inference engine. Its function was given in detail based on the field knowledge. It can recommend a good design idea for a concrete building according to the user's input requirement, and can give a good idea to repair the faults occurred during the mixing process.

In ASEE, the frame, whose format is general information, rules, and procedures, was used to represent the different type knowledge. It not only represents the knowledge in the form of rules and processes, but also represents the data in the table. Then, the knowledge base was organizes to be a tree according to the domain knowledge and the function of ASEES.

Meantime, the management function of knowledge base was offered. Furthermore, Forward inference is used and some control strategies are adopted in inference engine. ASEES had been completed in visual c++.

2. The system ASEES

ASEES aims to reduce the misuse and abuses of human resources. The major research objective of the ASEES is to develop an expert system that will help a designer in the selection of proper constituents for concrete, repairmen the faults occurred during the mixing process. A number of steps were needed to meet the objective:

- Conceptually break a mixture into a number of constituents.
- Gather knowledge through knowledge engineering concepts.
- Develop rules and outcomes that use the knowledge.
- Validate and check for the system execution.

An ES offers advanced problem-solving capabilities by prompting the user to answer several questions, explaining the reasons for the questions, and offering conclusions, advice and solutions [Barsanti 90].

The system as illustrated in figure 1 is divided to two subsystems

- Concrete Materials design (CON-MAT-DES).
- Diagnosis and Repairment (MIX-DIAG_REP).

Knowledge
Domain

f

Users   Concrete Specifiers   Engineers
& Specialists

Figure-1 ASEES

Concrete Materials Design (CON-MAT-DES).

The CON-MAT-DES subsystem determines the components of the concrete, such as, type and ration of cement, the mixture, amount of dry sand, amount of coarse aggregate(stone), water ratio, adscititious, strength grade, landslide degree, aseismatic character.

The sub system is designed to serve as a tool to concrete specifiers.

The CON-MAT-DES illustrated in figure-2.
Diagnosis and Repairment (MIX-DIAG-REP).
   This subsystem uses information from the user to diagnosis failures which can assist the inspector or engineer to:
- Identifying the failures during the mixing process.
- Diagnosis the cause and position of the failures.
- Conclusions & recommendations (the recommendations are based on the cause and position of the failure).

Figure-3 illustrates the MIX-DIAG-REP.
3. Design of the system ASEES
3.1 Knowledge base
   A fundamental component of an expert system is the knowledge domain, or what is known about the subject area. The knowledge base contains the knowledge with which the inference engine draws conclusions. The conclusions are the expert system's responses to the user's queries for expertise [Giarratano, and Riley 1989].
The knowledge base of ASEES developed using what is considered to be the best sources available during the development period.
   The process of knowledge acquisition consisted of the following activities:
1. Literature searches.
2. Interviews with concrete experts.
3. Review of published guidelines, standards, and practices.

   Knowledge base is what is known about the domain or subject area. The key operation for ASEES is a base of expert knowledge, and reference details on concrete structures to serve the selection of materials, performing diagnosis and offering guidance to repair faults occurs during the mixing process.
   There are a number of knowledge representation techniques to structuring knowledge in an expert system. The three most widely used techniques are frames, semantic nets, and rule based systems. ASEES is a rule based system.

3.2 Knowledge representation

Rules are developed that tell the inference engine how to use the knowledge. Rules occur in sequences and expressions of the form:

If<*condition*> then <*actions*>

Where, if the *conditions* are true, then *actions* are executed.

For example, if *there is too large concrete mixture landslide degree* and *weeping* and *leaking* and *isolation cause the jam*, then *the failure may be in bumping construct*.

Knowledge area

durability   materials

                              C10

   P.I

                              C20

   P.II

   strength

grade   C30   cement   P.O

                              C40

   P.S

                              C50

   P.F

                              C60

   P.P

                              140

   Common water

      landslide   180   water
      degree   200

   Sea water

                              210

   Grade Powder Coal Ash

                  Yes   mixture

   Grade Scoria

aseismatic
Silicon Ash
character   no

Commo
n Decrease Aqua

Efficient Decrease Aqua

Adhibiting Decrease Aqua

Keeping Plasticity Reagent

adscititi
ous   Adhibiting Gas Decrease

Aqua

Delayed Coagulation Decrease

Aqua

Retarder
Sand
Ston

e
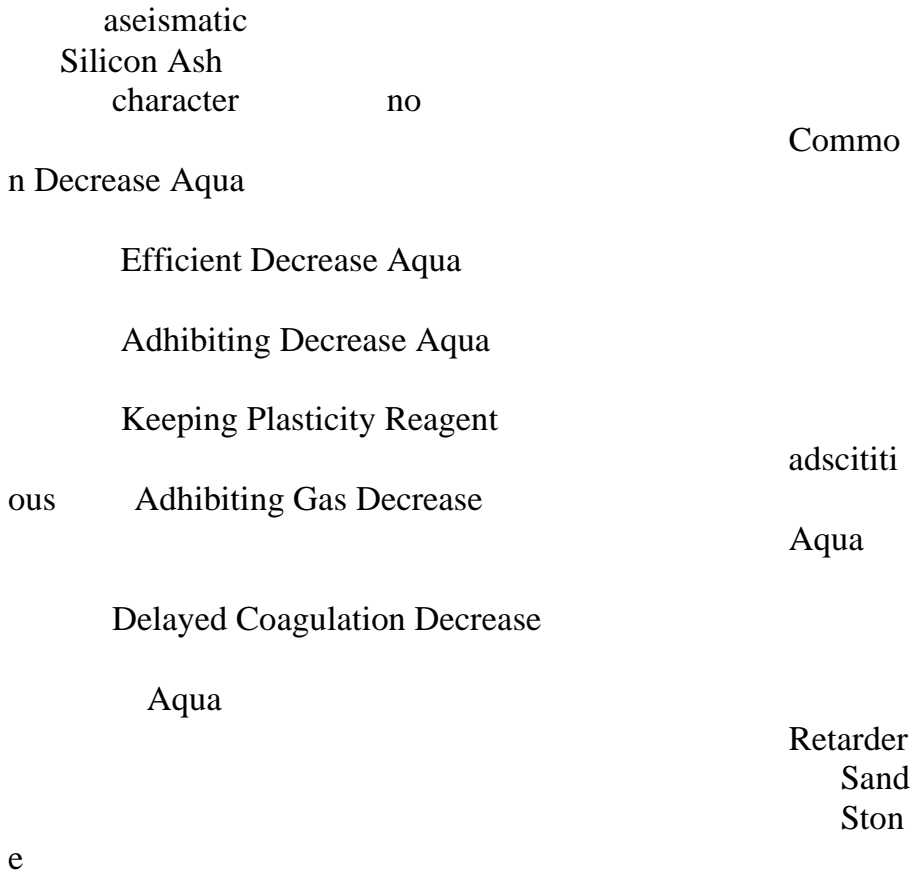
Figure-2 Diagram of CON-MAT-DES

3.3 Database

Database management system represents another form of knowledge. This information can serve to describe the characteristics of graphics and images, represent observations from field inspections, or can supply the expert system with simple data elements needed to achieve a goal. In ASEES Microsoft access used to assist achieving the target.

3.4 Inference engine

Two methods of inference often are used, *forward* and *backward* chaining. Forward chaining is a top-down method which takes facts as they become available and attempts to draw

conclusions (from satisfied conditions in rules) which lead to actions being executed.

Conclusions & Recommendations   Diagnosis

                                                            1
                              pipe is blocked up.
                              In the pipe   landslide degree of concrete mixture is too large

                                                 and   sweeping, leaking and isolation cause the jam.

                                                 landslide degree of concrete mixture is too small
                              Bumping   and transporting difficulty and cause the jam.
                              construct
                              In the bump   failure in the bump.

                                                 concrete   mixture has low converging.

                                                 output of concrete is too small.
                              others   materials designed is not convent.

                                                 the stop time of the bump is too long.

                              water   make water in three-connect or five-connect.
                              phenomenon   make the water in the bump.

                                                 liberation equipment inferring into the hopper is invalid.
                                                 drop difficult.

1

failure type	machine	canister	
general milling machine failure type	milling machine	hopper	the hopper can't rise hopper digression
		milling canister	milling canister jammed. canister allophone.
		Allophone or too hot	Allophone too high temperature. axletree is too hot.
		adhesive tape	skid the middle of two side trained off. adhesive tape is trained off trained off to one side.
		electro-motor	start of electromotor is too high. utters strong vibrating power. electro-tubbiness, reducing its rolling speed and vibrating power. electromotor or its handle is electriferous. the loop burns out.
General vibratory stick		vibrating stick	vibratory stick does not work. difficult working. Switch sparker and switchfuze is easy to fuse. Rotor and starter rub each other.

others   Gluey skinned
cover breaks.

colling sound for
metals.

Some difficulty of
oscillating for a plate vibrator.

Figure-**3** illustrates the MIX-DIAG-REP.

In order to execute ASEES using the method of *forward* chaining, we need to fire (or execute) actions whenever they appear on the action list of a rule whose conditions are true. This involves assigning values to attributes, evaluating conditions, and checking to see if all of the conditions in a rule are satisfied. A general algorithm for this might be:

Step1: while values of attributes remain to be input.

Step2: read value and assign to attribute.

Step3: evaluate conditions.

Step4: Fire rules whose conditions are satisfied.

Step5: until all problems are solved.

Now, let us to develop an inference engine for a rule-based system with the following basic components:

Attributes:T1,T2,... Tk   //T1=varieties of cement,T2= strength grade of cement

Conditions:C1,C2,….Cl   // C1{T1=pf}, C2{T2=ps}, ………

Rules:R1, R2, ……Rm   // if C1 and C2 then A1 ………

Actions: A1, A2, .…An   // name of mixture1=2 grade scoria
                        // name of mixture2=2 grade powder coal ash

- An action need to be executed when a rule containing it is fired.
- A rule fired when all of its conditions are satisfied.
- We assign a counter to each rule to keep track of exactly how many of the conditions in the rule are currently are satisfied.
- The rule is ready to check to fire if one of the conditions has become true.

- A condition need be evaluated if all of its attributes have been defined and one has changed.
- Attributes is flagged as defined or undefined.

	T2			T1			T3
A1	A2	A3	A4	A1	A2	A4	A5

Figure-4 Expert system data structure.

For example if we have the following rules:

R1: if T1=PF and T2=C10 then A1, A2, A3, A4;

R2: if T1=PF and T2=C20 then A1, A2, A4, A5;

Then the various lists are set up and the rules and relationships between attributes, conditions, and actions may be presented as the graph in figure-4.

3.5 Development platform

ASEES program written in VC++, and use Microsoft access as a database, the system is operational on pc computer with Microsoft windows.

4 Implementation of the system ASEES

4.1 Rule Development

The rules were written using "if-then-else" statement. ASEES as introduced before containing two modules, (CON-MAT-DES) and (MIX-DIAG-REP).

5.1.1 Concrete Mixture Design (CON-MIX-DES)

The mixtures are outcomes that could occur due to the identified materials. The process of identifying the whole mixture need to detecting the costituents for:

1. the mixture materials.
2. The adscititious materials.

For both, the user identify the materials by the interface shown in figure-5, then the system starting to introduce the complete mixture for safety and durability concrete, the interface in figure-6 used to getting output.

Figure-5 Input data

Figure-6 Output

5.1.1.1 Identify the mixture costituents

The process to identify mixture costituents is containing 67 rules, the following rules are a sample:

Rule1: if(SNZP="PO")

　　　And (QDDJ="C10") then Dec1

DEC1: CHL1="3Grade Powder Coal ash", CL1=20, XS1=1.75,MD1=2240

Rule2: if(SNZP="PO")

　　　And (QDDJ="C20") then Dec2

DEC2: CHL1="2Grade Powder Coal ash", CL1=30, XS1=1.5,MD1=2250

Rule3: if(SNZP="PS")

　　　And (QDDJ="C20") then Dec8

DEC8: CHL1="2Grade Powder Coal ash", CL1=25, XS1=1.5,MD1=2250

5.1.1.2 Identify the adscititious costituents

To identify the adscititious costituents we could develop 49 rules, the following rules are a sample:

Rule1: if(QDDJ="C10")

　　　And(TLD=140)

　　　And (KZ=yes) then Dec1, Dec2

Dec1: WJJ1="Common Decrease Aqua", CL1=0.25, XS1=8

Dec2: WJJ2="Adhibiting Gas Decrease Aqua", CL2=0.0075, XS2=12

Rule2: if(QDDJ="C10")

　　　And(TLD=140)

　　　And (KZ=no) then Dec1

Dec1: WJJ1="Common Decrease Aqua", CL1=0.25, XS1=8

Dec2: WJJ2="Adhibiting Gas Decrease Aqua", CL2=0.0075, XS2=12

Rule3: if(QDDJ="C10")

　　　And(TLD=200)

　　　And (KZ=yes) then Dec4, Dec5

Dec4: WJJ1="Efficient Decrease Aqua", CL1=0.6, XS1=20

Dec5: WJJ2="Keeping Plasticity Rreagent", CL2=0.15, XS2=0

Note that:

- SNPZ is the varieties of cement.

- QDDJ is the strength grade of cement.
- CHL1 is the name of the mixture.
- CL1 is a parameter1.
- CL2 is a parameter2.
- XS1 is a coefficient1.
- XS2 is a coefficient2.
- MD1 is a mixture weight.
- TLD is a landslide degree.
- KZ is an aseismatic character.
- WJJ1 is a name of adscititious1.
- WJJ2 is a name of adscititious2.

5.1.2 Diagnosis & Repairment Rules

During this phase the system uses information from the user in the form of questions to diagnosis the failures which can assist the inspector or engineer to:

1. Identifying the failures during the mixing process.
2. Diagnosing the cause and position of the failures.
3. Produces conclusions & recommendations based on the cause and position of failures.

We could develop 33 rules as the following sample

Rule1:if(landslide-degree-of-concrete-mixture-is-too-large)
      And(weeping)
      And(leaking`)
      And(isolation-cause-the-jam) then Dec1 & Dec2.

Dec1: bumping construction failure.
Dec2: failures in the pipe.

Rule2:if(landslide-degree-of-concrete-mixture-is-too-small)
      And(transporting-difficulty)
      And(cause-the-jam) then Dec1 & Dec2.

Rule3:if(the-system-is-in-bad-condition)
      And(the-hopper-can-not-rise) then Dec4 & Dec5

Dec4: general milling machine failure.
Dec5: failures in the hopper.

The previous rules are asked the user in the form of selecting an answer, as the following examples:

Q1: is the landslide degree of concrete mixture too large? (yes, no)
Ans: yes
Q2: Is there weeping? (yes, no)
Ans: yes
Q3: Is there leaking? (yes, no)
Ans: yes
Q4: Is isolation causes the jam? (yes, no)
Ans: yes

The system then starting to apply forward chaining to introduce the conclusion, recommendations depending on the answers of questions, as illustrated in figure-7.

Figure-7 Conclusion & Recommendations

6 Conclusion and future work

This article described the development , and implementation of an expert system ASEES for concrete.

ASEES increases the decision-making capabilities of practicing engineers, concrete specifiers, and decision-makers in the concrete materials design, and repairmen of faults occurred during the mixing process by providing current knowledge and high-level reasoning to problem solving.

The result of this work has revealed several key factors relating the development and use of expert systems for concrete design and repairmrnts:

1. The system tends to have a very shallow knowledge domain.
2. The system is prototype and not fully operational.
3. The system uses conventional programming language.
4. The system have been developed for specific and very narrowly defined applications.
5. There are few expert systems in existence that address the concrete design and repairments knowledge domain.

Finally, since there is a need to automate the process of diagnosing and repairing concrete structures, one could expect

that the use of more automated ways of accomplishing these goals will be implemented.

In this piece, the proposal approach for the future work is that to extend the system to include the following modules:

1. distress identification and causes of distresses in concrete structures.
2. guidance on the use of materials and procedures for several repair methods for concrete structures.

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Research and Development (R&D) Contribution to Production of Manufacturing SMEs: AReview

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Abstract

This paper aims to present the contribution of research and development (R&D)to the productions of Small and Medium Size Manufacturing (SMEs). The novelty of this paper is that the contributions of (R&D)to productions of manufacturing SMEs have not been done so far and consequently, this study is a fundamental research. This study has reviewed about 52 journal papers on the relevant field which reveals that the contributions of (R&D)to productions of manufacturing SMEs is significant at a different degree (p<0.05). It is also found that labour and capital are the major contributing elements of inputs to the manufacturing SMEs process but (R&D)is the driving force. However, the contribution of this study is an empirical model with relationship among the elements of (R&D)and productions. Though, this study has focused on internal factors of manufacturing SMEs, relating to (R&D), but its practical implications are huge. Findings of this study would be useful for productions and operations presses to improve productivity and performance of manufacturing SMEs.

Keywords: Manufacturing SMEs, Research and Development (R&D), Production,Actives of R&D

INTRODUCTION

Background of Study:

Aim of this studyto presents a review onmanufacturing small and medium SMEs. It has identified the contributions of research and development (R&D) factors to the production of Manufacturing (SMEs).It goals to evaluate inputs related to elements of (R&D).Additionally, the conceptual framework of this study is based on production and R&D concept of manufacturing that is influenced by productions and R&D literatures.The objective of this study is to contribute to measure the elements of R&D to improve production and performance of manufacturing SMEs (Gassmann and Keupp 2007 Sedita, S. R., and Grandinetti, R. 2023). However, previous studies have not emphasised the evaluation of SMEs in the perspective of R&D

to production of Manufacturing (SMEs)(Ale Ebrahim, N., Ahmed, S., and Taha, Z. 2009 and Ale Ebrahim, N. 2015). Therefore, a gap exists in this sector. Thus, this review study is designed to meet this gap and to address the SMEs" factors issue which previously could not get the right attention. This paper is based on five main sections: (1) Concept of R&D in Manufacturing SMEs (2) (3) findings of literature review (4) Scenario Analysis of Findings and (5) Conclusion.

Concept of (R&D) in Manufacturing SMEs:

Research and development (R&D) is considered as a source for contemporary engineering organizations to gain improved production process in Manufacturing (SMEs) (Ale Ebrahim, N. 2015 and Kim, K. 2018). Approaches to R&D focus either on the efficient use of engineering resources or on the effective response to business environment changes such as the project approach (Zhang et al., 2006and Chandrasekaran, A., 2016). It is important to improve the efficiency of Manufacturing (SMEs) in order to meet the need for coordinated research and development by field of R&D. Manufacturing (SMEs) need competence to organize and development work processes in efficient ways to improve efficiency and effective production (Prasanna, *et al,* 2019).

Concept activities of Research and Development (R&D):

Research and development activities are the source of contribution of production in manufacturing SMEs. R&D activities support the efforts to innovate or improve the existing production in manufacturing SMEs (Ezell and Atkinson, 2011). It likewise permits organisation to analyse several alternatives for internal R&D activities including the use of technological consultants, and recruitment of people (Santamaría, and Barge-Gil, 2009; and Qin, and Smith, 2016). Tassey (2010) indicated that R&D has contributed by increasing 38 percent in production and 8.6 percent significant change in R&D intensity. However, R&D capability is positively correlated with manufacturing SMEs growth" performance in order to improve the manufacturing SMEs growth process by increasing productivity (Islam and Shazali , 2011; Choi, Y. S., and Lim, U. 2017).

Concept of Manufacturing SMEs:

Manufacturing (SMEs) play a significant role in achieving the targets of economies. It plays an important role in the acquisition of artistic and technical skills, export, investigation of new external markets to

enhance gross domestic product (GDP) (Fakieh,.and Busch, 2016). SMEs contribute 90% in the vast majority of economies worldwide and create jobs opportunities 40-80% in addition to contributing the most to GDPs of many countries. The majority of SMEs add up to the overriding form of business organisation, accounting for more than 95% to 99% of enterprises depending on the country (OECD, 2000). In the OECD member countries, SMEs are dependable to create net careers between 60-70% of establishments (OECD, 2002). These Manufacturing (SMEs) need low capital investment per unit to production. They can be located in far-flung areas, use local natural resources and typical skills and meet local needs of limited market for consumer goods and services. SMEs also contribute in increasing and diversifying income using efficient use of capital. In literature, different taxonomies are available to order the wide variety of discrete part manufacture processes (Cubico and Favretto, 2008).

Concept of Production:

Production transforms inputs of processes to finish product productions. It is the process by which products and services are produced. Production includes step by step creation of one form of materials into another (Gupta, S., and Starr, M. 2014). It involves conversion to inputs that include: know-how,capital methods,energy, material, labour, equipment, and management to production products and costs by complex processes of transformation (Monden, 2011). In this way of operating resources and production facilities, it is also possible to include methods and regulations for process routines in the components of a production (Wulfsberg et al., 2010). To sum up, Production is characterized through manufacturing SMEs of products that are produced and stocked in warehouses for sales (O'Reilly,et al., 2015).

Method of Study:

 The method of this study is based on methodical literature review that relates to R&D contribution to production in manufacturing SMEs. The 30 percent of articles published before 2005 and other 70 percent from 2005 to 2023 were reviewed. Eighty articles including from journals and books are reviewed. The researchers narrowed down the search to the articles, published in peer reviewed journals or conferences. In addition, no delineation is imposed on the outlets" field in order to

enable potential research findings from different fields. The search processing based on Google Scholar and library is applied to provide a comprehensive and systematic methodology. The investigation option adopted was limited only to articles" titles and related keywords that include: manufacturing SMEs, R&D, management, production, sustainability and their combinations.

Framework of R&D

Some enterprises give R&D first priority, which studying, analyzing, and designing the subjects. R&D studies the customer needs, complaint, special needs, technical problems and new phenomena throughout using activities (people, process, and tool or equipment). The R&D work is the first step of the production life cycle. The output of R&D has a major effect on the product's quality, cost and success in the market. Today's technological innovations and changing markets make the competition necessary for the new or development of production and improvement of the production. Competition for any production will increase with the time as ways are found; it is better to meet the customer needs. People in R&D must have a deep understanding of natural phenomena and an independent drive for creativity. New technology is generated by a combination of needs, concepts, and tools. Then, the effective R&D area in any manufacturing SMEs must be provided the information, knowledge, and technology to carry out the goal with optimization the time and cost (Ale Ebrahim, N., et al, 2010 and Ebrahim, N. 2015).Then, the input R&D area that includes the new idea, information, knowledge, customer needs, special requirements, and results of other researches, complaint or technical problem depicted in Fig. (1).
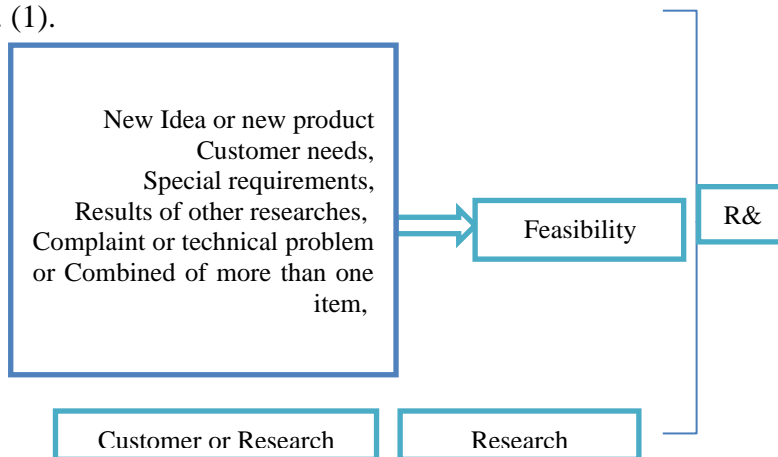
Fig. (1): R&D Activates.

Outcomes of Literature Review:

Manufacturing SMEs usually deal with small size production facility with labour, machinery,R&D and management. The raw materials being used are very specific to the objectives and nature of final products. However, the input output model of manufacturing SMEs is presented in the conceptual model below.
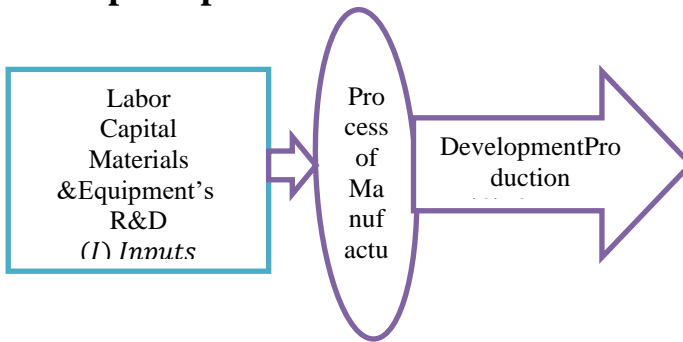
Conceptual production Model Related to R&D

Fig. (2): Conceptual production Model Related to R&D

The model shown above can be represented by the following equation:

$$Q = A. K^{\alpha}L^{\beta}(R\&D)^{\lambda} + \varepsilon$$

The linear log form of the model is:

$\log Q = \log A + \log \propto K + \log \beta L + \log \lambda (R\&D) + \log$

Where, (Q) is production measured in terms of product value (K) is capital of manufacturing SMEs involve in production process, (L) is labour needed for production, (A) is transformation factor from inputs to production, (R&D) is research and developmentneeds to development production. And (α), (β)and (λ) are the elasticity of production from (capital, labour and R&D) to be known as contribution. The estimated error is („ε").

Contribution of Labour to Manufacturing SMEs:

Literature shows that labour made a significant contribution to production process. It is because major percentage of manufacturing SMEs is manually operated (Charoenrat et al., 2013). In this connection, Mahmood (2008) investigated that the most common

measure of contribution of labour to outputs is productivity. Output per labour is also being used to measure the contribution of labour. However, Mahmood (2008) again asserted that the contribution of labour to SMEs output is about 56 percent. Similarly, Kiani and Ahmed (2013) found that one percent increase of the capital for manufacturing process could contribute to increase labour productivity by 0.51 percent. Charoenrat et al., (2013) used Cobb-Douglas production function in Thai manufacturing SMEs to estimate contribution of labour to production and found that it is highly significant at 1 percent level. Hsu and Chen (2000) evaluated labour productivity by comparing between large firms and SMEs in Taiwan; they also found that labour contribution to productivity with respect to capital per labour in large firms was about 88.21 percent, and it was 30.10 percent in SMEs. Pham and Hara (2011) measured labour productivity in industry sector; it had been increasing at rate about 0.05 percent per year from 1990 to 2007. Foresti et al. (2005) used a simulation labour productivity and they found about 21 percent in Italian small size of firms. Njoroge (2013) found that in small manufacturing enterprise the productivity of labour was improved from 6.54 in the year 2008-2009 to 8.25 in the years 2011- 2012. The labour productivity in Malaysian manufacturing sector to evaluate the domestic labour found 1.93 percent (Noor et al., 2011). Subrahmanya (2010) found in Bangalore that positive correlation between labour productivity and capital contributed to production during years 2001-2002 by 0.28 percent and increase by 0.60 percent in 2005-2006.

Contribution of Capital to Manufacturing SMEs:

Capital is one of the most pressing evaluation needs to production of manufacturing SMEs operators since finance is not being provided. Manufacturing SMEs are often using small capital inputs due to size, production, and lack of access to capital and inputs (Padachi, et al., 2012). It is especially interesting that the use of raw materials and machines can contribute to output (Admassie and Matambalya, 2002). According to Taymaz (2005) productivity increases in small firms by contributing raw materials to output by 0.5 percent every year whereas its contribution reaches almost one percent to input of SMEs. Saleh and Ndubisi, (2006) found that rubber and plastic production are increased by 13.1 percent. Similarly, Huang (2003) indicated that capital productivity is higher in urban than rural SMEs for over half of the major industries. Findings in his study of petroleum, fuel and recycling

industry, shows that capital productivity is highly affected by the low capital inputs and results are relatively insignificant. St-Pierre and Raymond (2004) benchmarked the capital productivity in SMEs by using advanced manufacturing systems (AMS) to improve productivity. They found labour productivity increased 14 percent more than capital productivity which remains 3 percent. Due to raw materials and efficient utilisation of machinery and equipment through better maintenance and preventive methods is contribution to capital productivity. These elements worked for the capital productivity growth of manufacturing SMEs in order to deliver products that meet global market standards and provided customer satisfaction.

Labour Skills:

Labour skills are the most important factors for contribution and productivity for better performance in production in manufacturing SMEs (Mahmood, 2008). It is also positively correlated with improvements production, and technical efficiency. For example, Huang (2003) found in Thailand"s SMEs that skilled labour as one of the significant factors contributing to production output. Skilled labour also in Tanzanian manufacturing SMEs was positively related to technical efficiency (Admassie and Matambalya, 2002). Zahid and Mokhtar (2007) and Saleh and Ndubisi (2008) also found skilled labour as a positive effect on the technical efficiency and one of the internal factor was contribution output for challenges in Malaysian manufacturing SMEs. Charoenrat,et al., (2013) found skilled labour as one of the most specific factor that significantly affects the technical inefficiency of production in SMEs.

Technology Level of Machinery and Process:

The technology level of machinery contributes to production in manufacturing SMEs. Manufacturing is precision with more assured handling or control, more reliable, and efficient measurement production output (Qin et al., 2010). If the level technology of machinery in manufacturing SMEs is low, the production are inefficient which leads to conflicting quality product, low productivity level, and lack of competitiveness. This is shown in high materials wastage, high reworks rates, and inability to meet deadlines (Aldaba, 2010).

Quality Control Activities:

Quality control activities are effective in bringing about cost reduction and improved quality. Methods and systems are used as parts of self-inspection tools and techniques (Dale, 2003). In manufacturing and engineering, quality control or quality engineering is a set of measures taken to ensure that defective products may not be created, in order to meet performance requirements quality that include statistical process control (SPC) is as an important step to production output. SPC can be used as a quality control tool and it can contribute to increase the total volume of production output (Farzana Sultana,et al., 2009). According to Grewal and Gill (2007) manufacturing SMEs in the US, about 70 to 80 percent for the strategy, requires application of quality (Vijay, et al., 2013).

Process and Product Design:

Process and product design is a fundamental part of the wider concept of research and development that brings a set of skills, knowledge, and understanding to the origination and production. Moreover, product design is small change in production or assembly that typically results in lower cost and higher quality. It is a product strategy that adds competitive advantage in the global market. Process and product design is well recognized as a part of (R&D) activities, as increasing requirements of product development methods are being incorporated into process and product design (Baxter et al., 2008; 1996 and Paiva, M., and Coutinho, P. 2020).

Process Planning, Implementation and Monitoring:

Attributes of ofResearch and Development (R&D)	Reference
Concept of (R&D) in Manufacturing SMEs	Ale Ebrahim, N.(2015) : Kim, K.(2018):Zhang et al.,(2006) :Chandrasekaran, A., (2016) and Prasanna, *et al,* (2019).

Concept activities ofResearch and Development (R&D)	Ezell and Atkinson, (2011): Santamaría, and Barge-Gil, (2009): Qin, and Smith, (2016): Tassey (2010) and Islam and Shazali , (2011): Choi, Y. S., and Lim, U. (2017).
Framework of R&D	Ale Ebrahim, N., et al, (2010) and Ebrahim, N. (2015)
Concept of Manufacturing SMEs	Fakieh,.and Busch, (2016): OECD, (2000): OECD, (2002) and Cubico and Favretto, (2008).
Concept of Production	Gupta, S., and Starr, M. (2014):Monden, Y. (2011): Wulfsberg, et al., (2010) and O'Reilly,et al., (2015).
Contribution of Labour to Manufacturing SMEs	Charoenrat, el at. (2013); Mahmood, M. (2008);Kiani,andAhmed,(2013);Hsu, and Chen, (2000); Pham, and Hara, (2011);;Foresti et al. (2005);Njoroge, N. R. (2013);Noor, Z. M., et al., (2011) and Subrahmanya, M. B. (2010).
Contribution of Capital to manufacturing SMEs	Padachi., et al.,(2012):Admassie and Matambalya, (2002);Taymaz,E.(2005);Saleh and Ndubisi (2006);Huang, I. W. (2003);St-Pierre and Raymond (2004).
Labour skills	Mahmood, M. (2008); Huang, I. W. (2003);Admassie and Matambalya (2002); Zahid and Mokhtar (2007); Saleh and Ndubisi (2008); Charoenrat, el at., (2013).
Technology level of machinery and process	Qin, Y., et al., (2010);Aldaba, R. M. (2010).
Quality Control Activities	Dale, el at., (2013); Sultana, Razive and Azeem, (2009); Grewal and Gill, (2007); Vijay P. (2013).
Process Planning, Implementation and Monitoring	Ming, X. G., el at., (2008); Ward, and Sobek II, (2014) and Rocha, C. et al.,(2022)
Process and Product Design	Baxter, D. et al, (2008); Braha and O. Maimon, (1997); H. Petroski, (1996) and Paiva, M., and Coutinho, P. 2020).
Performance Evaluation	Starkel, (2000); Heckl, and Moormann, (2010).

 Process Planning is one of the most important activities to improve production. The collaboration between engineering and (R&D) activates implementation requires the processes planning in manufacturing product that develop new technologies and products (Ming et al., 2008and Rocha, C. et al.,2022). Process planning in manufacturing firms makes clear steps of directions about how the product is to be fabricated in a manufacturing feature. In the advanced

manufacturing, it will monitor how the process will be designed and laid out in research and development for the new products (Ward, and Sobek II, 2014).

Performance Evaluation:

 Performance evaluation can be represented via single dimensional units such as work time, meters, nanoseconds, money, number of reports, the number of errors, and length of time to design hardware, and production. Accordingly period of time gives to evaluation process of R&D activates change request (Heckl and Moormann, 2010 Salimi, N., and Rezaei, J. 2018).

Scenario Analysis of Findings:

This paper has reviewed 52 journal papers published on different potential inputs and production of manufacturing SMEs including and development (R&D). Major areas considered in the framework for this study are labour, capital, and research and development (R&D) that contribute to production of manufacturing SMEs. The references matching to each particular area and major findings have been summarized in Table

Most of the above mentioned works are very specific and the following gaps are identified:

1. There has been a lack of empirical research on productivity evaluation related to research and development (R&D).
2. Moreover, these studies have not tried to analyze and optimize the inputs-outputs with regards to production and research and development (R&D).
3. Most of the performance measurement model of SMEs does not have predictive power for future production performance with respect to research and development (R&D).

In that regards, gaps are observed between existing performance measurement models and research and development (R&D) practices.

Conclusion:

This paper has provided a comprehensive literature review covering the topics of productivity evaluation in manufacturing SMEs. The area of research and development (R&D) contribution production of manufacturing SMEs is relatively new. In this regards, there are little practical solutions and experiences in this area, apart from approaches and tools used by large companies, which may not be flexible or applicable to the engineering sub-sector of SMEs. This finding of this study reveals the factors that have an impact on the production of

manufacturing SMEs products development are still ambiguous; hence, in-depth study in this area is suggested. This is because effective research and development (R&D) helps manufacturing SMEs to overcome the barriers of growth. To sum up, the researchers have provided observations and future research suggestions that would enrich newer knowledge in this domain.

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Reasons behind Speaking Skill Weakness by English Language Students at the Faculty of Education/ Jadu

أسباب ضعف طلاب اللغة الانجليزية بكلية التربية جادو في مهارة المحادثة.

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ملخص الدراسة

يعتبر ضعف الطلاب في مهارات اللغة الانجليزية من أوضح المسائل التي لاحظها معلمو اللغة الانجليزية خلال تدريس هذه المادة في الآونة الأخيرة, ومن ضمن هذه المهارات, والتي ستكون موضوع هذه الدراسة, هي مهارة المحادثة, والتي تعتبر ذات طابع خاص تحتاج لنوع محدد من التدريب خلال المراحل الأولى من التعليم.

وبالرغم من أنّ طلاب مرحلة التعليم العالي قد أمضوا ما يقارب الثمان سنوات في تعلم اللغة الانجليزية, ولكن نجدهم لا يتحدثون اللغة الانجليزية بطلاقة.

من هنا قام الباحثان بإجراء هذه الدراسة للوصول إلى الأسباب التي تكمن وراء ضعف مهارة المحادثة عند طلبة السنة الأولى بقسم اللغة الانجليزية بكلية التربية جادو وذلك بإجراء استبيان لمعلمي وطلبة بعض المدارس الثانوية بكل من جادو والحرابة و الرجبان, حيث درس معظم طلبة الكلية, ليتم جمع المعلومات وتحليلها ومن ثَم الوصول إلى نتائج وحلول ناجعة.

Students' weakness in English language skills is the most important issue that teachers notice during the process of teaching and learning in the last years. One of these skills, which the researchers will concentrate on, is speaking skill. This skill is considered to be a specific skill that needs specific training to be performed effectively. This training should be performed during the first years of learning. But although students learn English language at least eight years before reaching the higher education, they cannot speak English fluently. For this reason the researchers conduct this study to find out the reasons behind speaking skill weakness by the first year of English language students at the faculty of education Jadu. That is by conducting a questionnaire

for both students and teachers at some secondary schools in Jadu, Al-Harabah and Al-Rojban, where most of the faculty students had studied their secondary level, which will be analyzed and subsequently reach appropriate and beneficial solutions.

Introduction

Although English language students at the higher education possess a large amount of English words stock, but we notice that they cannot use it appropriately in speaking. The researchers ascribe this weakness to many factors, such as the teaching methods that teachers use at the previous stages of education, the English teachers' lack of experience in teaching, and the limited exposure to authentic materials in English. Students seem to encounter difficulty in mastering the essential English skills such as speaking, by which other skills can be acquired. Therefore, it may be argued that teaching a speaking skill is not the easy one that it may apparently seem. At this point, Islam (2022) argues that "the goal of teaching speaking skill is to make learners communicate using English well." So, the researchers decided to shed light on this problem by concentrating on the methods that English language teachers at secondary schools use and how they teach speaking skills by conducting a questionnaire for ten teachers and fifty students in the 7th of February Secondary School for Girls in Jadu, the 7th of February Secondary School for Boys in Jadu, Tagreft Secondary School in Al-Rojban, and Al-Badarna Secondary School in Al-Haraba.

The questions that should be asked are:

1- How are speaking skills taught in the secondary schools?

2- What techniques are using in teaching speaking?

3- What materials and facilities are available for helping to teach speaking?

English language curriculum

If we have a look to the English language curriculum for secondary schools, we can notice that it is consists of two books (Course book and workbook). In addition, every unit contains the skills which should be taught. These skills include listening and

speaking, reading and writing, structure and language, and vocabulary.

As we notice that speaking is a compulsory subject in the educational curriculum in Libya.

Language teaching approaches and methods

In this part, there will be a brief introduction of some approaches and methods for language teaching. These are the Grammar Translation Method, the Audio-lingual Method and the Communicative Language Teaching Approach. Furthermore the researcher will consider how each of these deals with teaching languages, and attempt to describe which of them may work most effectively in teaching speaking skills.

When teaching any of the four language skills, such as speaking, one or more language teaching approaches should be adopted in the process. That is to say, language teachers should be fully aware of them, so that they can select and use the most appropriate one in order to make teaching and learning as effective as possible.

A brief description will be given for some of these approaches, with an attempt to justify which of them is most useful and appropriate when teaching speaking skills.

The Grammar Translation Method (GTM)

This method was first seen in the nineteenth century, when the Latin language was taught at that time, (Rivers, 1981). However, when Latin ceased to be a means of communication and the use of GTM also declined, other methods had been invented to substitute its position.

The GTM mainly aims to teach the grammar of the target language by training its learners to produce accurate, written language texts. This is done by subjecting them to "regular practice in translating from the native language". In addition, the learners are also required to memorise as many vocabulary items as possible of the language being learned, and teachers largely focus on accuracy more than any other aspect of the target language, (Omar & Gorla, 2013:30). Moreover, another aspect of the GTM which Richards and Rogers (2001) point out is that it drives the learners to be capable of reading written texts in the target language, through

translating them from and to their native language "orally or written". The learners are judged as being good or bad, by the extent to which they fulfil such task.

Considering what the GTM attempts to do, it could be argued that if the secondary school learners are to be taught English speaking skills in an effective way, they should be offered the opportunity to practise by including speaking activities during the lessons at least. Since this method does not give full significance to speaking, but to other skills, then the learners who are subjected to L1 during most of the class will have no real opportunity to communicate, either with their teachers or with one another.

The Audio-Lingual Method (ALM)

The emergence of the Audio-lingual method resulted from the increased attention given to foreign language teaching in the United States toward the end of the 1950s. The launching of the first Russian satellite in the 1957 prompted the need for radical change and rethinking of foreign language teaching methodology (Omar & Gorla, 2013:39).

This method mainly focuses upon teaching a language by listening to everyday language, and then speaking it. The learners of the target language are firstly exposed to drills and exercises on structural patterns of the language, until their response becomes an automatic process. Ibid (2013:40) argue that "According to this method language is speech, not writing. It gives priority to the spoken language that the pupil need as an instrument of communication". Harmer, (1983) mentions that this method is based on three behaviourist stages of learning. These are stimulus, response and reinforcement. In the class, learners are asked to listen carefully to their teacher or to a record of a native speaker until a distinction of sounds, and intonation of phrases is made. Then they repeat them following the model until they reproduce it accurately. This process is done first by the whole class, and then smaller groups until most students show acceptable performance of what is being taught

The challenge about adopting this method in teaching speaking skills is that in real life speaking situations, speakers need to know

how to use what they learn meaningfully. Therefore, if they are just taught how to memorise using this method, there might come a time when they forget what they have learned. It could be that this method of teaching speaking skills may not suit our learners, because it is impossible for them to keep something in mind for a long period when there is no opportunity to practice it frequently. Moreover, learners need to learn how to use what is being learnt in various contexts to express themselves; and this is not stressed by this method.

The Communicative Language Approach (CLA)

The communicative language approach differs from the other methods, in that it stresses the significance of communication in the teaching and learning processes of a language. That is, there should be at least two parties, say a teacher and students, or students working independently, to interact and communicate. (Nunan, 1995) argues that this interactive learning offers learners an opportunity to understand the language before they begin using it. Therefore language teachers can make use of real situations that require communication, and which may be encountered by learners in their everyday life (Galloway, 1993). Moreover, contextualised chunks of language may be presented to them, to be used for communication purposes (White, 1997). Teaching the target language as a means of communication is the main goal of this approach.

This method can be applied in our schools because it aims to involve learners in communicative interaction through the speaking activities that teachers introduce during the lesson. This communication in turn leads to a practical usage of what is being learnt, which in turn enables the learners to learn more. They may not be able to learn to speak the language without practising it. In other words, theoretical lessons do not necessarily replace practical ones. For these reasons, it could be argued that CLT approach seems to be the most appropriate method, where students lack the speaking environment of the English language. Such an approach creates better opportunities for them, especially when teachers are aware of how to make use of it effectively.

Teaching speaking skills techniques

As the speaking skill is considered to be the main skill that the teacher should concentrate on in the secondary school curriculum, many techniques such as group work and pair work can be applied in the classroom. Poodll, (2022) suggested nine tips for teaching speaking techniques:

1- Introduce a topic and prepare relevant vocabulary.

2- Give students time to prepare.

3- Divide students into groups or pairs.

4- Have a student speak for four minutes without interrupting, the others listen.

5- Give them time to rest.

6- Students change partners or groups and give the same speech in three minutes.

7- Rest again.

8- Students change again and have two minutes to give the speech.

9- Students reflect together.

This technique works effectively because when students given four minutes, they generally speak slower and with more pauses as they develop their thoughts. But in the following intervals, the will have to get the same information across in a shorter period. They will most likely limit their pauses and increase their speaking speed, especially because they have already practiced talking about the topic.

This technique can have many advantages such as it provides students more opportunity for using the language being learned and they may help and can correct each other as well.

Data collection

The questionnaire questions were distributed and answered by ten teachers and fifty students in the 7th of February Secondary School for Girls in Jadu, the 7th of February Secondary School for Boys in Jadu, Tagreft Secondary School in Al-Rojban, and Al-Badarna Secondary School in Al-Harabah. (see appendices1&2)

Data Analysis and Presentation

Ten copies of the questionnaire were completed by the teachers and fifty copies were completed by the students. The

questionnaire answers were collected and analyzed in order to get the teachers and students' opinions and find out the reason behind the weakness of speaking skill.

Teachers' questionnaire

Q.1. Does the text book you use include teaching speaking skills?

a) yes   b) no

No.	Responses	No. of teachers
1	Yes.	10
2	No.	0

All the teachers confirm that the text book includes teaching speaking
skills. This means that speaking is a part of the lessons that the teachers should teach.

Q.2. What technique(s) do you use to teach the students speaking skills?

No.	Responses	No. of teachers
1	Group work	3
2	Pair work	5
3	Text book	2

The table shows that 50% of the teachers use pair work when teaching
speaking skill and the others use group work and text book.

Q.3. Do you think that techniques you use help the students to learn   speaking?

No.	Responses	No. of teachers
1	Yes.	10
2	No.	0

All the teachers (100%) agree that the techniques they use help their students when learning speaking skill.

Q.4. What resources are available for teaching speaking in your school?

No.	Responses	No. of teachers
1	Books	0
2	Videos	0
3	CDs	0

4	None	0
5	Other	10

The figure shows that all the teachers mention that there are not any resources available except text books. That means it would be difficult for teachers to teach speaking skill using only the text books.

Q.5. Do you think that resources available in the school help the students to learn speaking?

No.	Responses	No. of teachers
1	Yes.	0
2	No.	10

From the responses, it is noticed that (100%) of the teachers believe that the resources available in the school do not help to teach speaking. That is because the teachers depend only on the text books, which are not sufficient.

Q.6. Do you think the time allocated for speaking is sufficient?

No.	Responses	No. of teachers
1	Yes.	10
2	No.	0

All the teachers agree that the time allocated for speaking is sufficient. That is because the deficiency of resources for teaching speaking.

Q.7. What problem(s) do your students face when learning speaking English?

No.	Responses	No. of teachers
1	Vocabulary	2
2	Accuracy	0
3	Both	6
4	Other	2

The table shows six teachers believe that students face vocabulary and accuracy problems and two teachers mention other problem,

which is pronunciation that students face when learning speaking English.

Q.8. On which aspects do you mostly focus on when monitoring students' speaking?

No.	Responses	No. of teachers
1	Pronunciation	7
2	Meaning	1
3	Accuracy	2

From the responses, it is noticed that seven teachers focus on pronunciation when monitoring students' speaking, two teachers focus on accuracy, and only one teacher focuses on meaning.

The main findings from the teachers' questionnaire

The first main point concerns the presence of speaking skills within every unit of the curriculum; therefore the teachers should teach these skills using the available resources.

The second main point concerns the deficiency of resources, such as language laboratories and CDs, which makes the teachers neglecting most of the speaking skill lessons.

The third main point is the problems that students face when learning speaking. These problems include vocabulary and accuracy (see question 7). That is because the teachers focus most on students' pronunciation compared with other aspects (see question 8).

Students' Questionnaire

Q.1. What skills does your teacher focus on the most?

No.	Responses	No. of students
1	Listening	5
2	Speaking	7
3	Reading	29
4	Writing	9

The table shows that (58%) of the students say that their teachers focus on reading skill, while only (14%) mention speaking, (10%) mention listening, and (18%) mention writing.

Q.2. Do speaking activities that are introduced to you have something to do with your real life?

No.	Responses	No. of students
1	Always	3
2	Sometimes	18
3	Never	29

From the above figure, it is noticed that (58%) of the students say speaking activities do not have anything to do with their real life situations, which asserts that they do not benefit from the speaking skill they expose to inside the classroom in their real life situations. 36% choose sometimes and 6% choose always.

Q.3. What does your teacher focus on when monitoring speaking activities?

No.	Responses	No. of students
1	Pronunciation	22
2	Meaning	11
3	Vocabulary	17
4	Other	0

The table shows that (44%) of the students mention pronunciation, (22%) mention meaning, (34%) mention vocabulary, and none of them thinks of other aspects.

Q.4. How do you find the speaking activities provided in the lesson?

No.	Responses	No. of students
1	Easy	9
2	Difficult	26
3	Neither easy nor difficult	15

The figure shows about half of the students (52%) find the speaking activities provided in the lesson difficult, only nine

students (18%) find them easy and fifteen students (30%) find them neither easy nor difficult.

Q.5. Do you think speaking skill lessons are important?

No.	Responses	No. of students
1	Yes.	7
2	No.	43

The majority of the students assert that speaking skill lessons are not important.

Q.6. Do you think speaking weakness by students related to?

No.	Responses	No. of students
1	The difficulty of speaking lessons	2
2	The teacher neglecting of speaking activities	2
3	Deficiency of speaking resources in your school	3
4	All of the above	43

The above figure shows that the majority of the students (86%) believe

that all the given points are the main reasons behind their speaking weakness, (4%) see that the speaking lessons are difficult, (4%) see the teacher neglecting of speaking activities, and (6%) of the students see deficiency of speaking resources in their schools. The teacher neglecting of speaking activities may ascribe to the deficiency of speaking resources in schools.

The main findings from the students' questionnaire

The first main point, as students mentioned in question one, is that teachers concentrate more on reading than other skills. That is because it is easier for teachers to deal with reading than other skills, which need more effort and resources to be applied.

The second main point is that students do not benefit from the speaking activities inside the classroom in their real life situations. Therefore all the students believe that speaking skill lessons are not important because their speaking is not improved and they

cannot apply what they have learnt inside or outside the classroom (see questions2&5).

Finally, it was noticed that students' problem in speaking could be as a result of the teaching methods that teacher use.

Conclusion

In conclusion, we can say that speaking activities are important for students to improve their speaking skills. This cannot be achieved with the lack of speaking resources, such as language laboratories, CDs etc., and the dependence on only the available ones which are text books. However, well trained teachers, equipping schools with speaking activities resources, and limited number of students in the classroom can result in accurate speaking skills.

Recommendations

Based on the findings reached, the following recommendations have been proposed:

1- The education authorities needs to supply schools with resources, materials and facilities which English language teachers can depend on in teaching language skills, especially listening and speaking.

2- Teachers should focus on all the language aspects and do not give more attention to only one aspect.

3- Teachers need to be equipped with specific qualifications and language training courses regularly so that they can carry out teaching tasks efficiently.

4- Limiting the number of students in one classroom.

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Appendix 1
Teachers' Questionnaire
Dear Teacher,
The following questionnaire is about a study of reasons behind speaking skill weakness by English language students at the faculty of Education Jadu. Your participation by answering the questionnaire honestly would help with the success of the study. Your views are valuable and are appreciated.

Please underline the appropriate answer for each question.

Q.1. Does the text book you use include teaching speaking skills?
a) yes   b) no

Q.2. What technique(s) do you use to teach the students speaking skills?

………………………………………………………………

Q.3. Do you think that techniques you use help the students to learn speaking?

a) yes   b) no

Q.4. What resources are available for teaching speaking in your school?

a) books   b) videos   c) CDS   d) none

e)other …………

Q.5. Do you think that resources available in the school help the students to learn   speaking?   a) yes   b) no

Q.6. Do you think the time allocated for speaking is sufficient?

a) yes   b) no

Q.7. What problem(s) do your students face when learning speaking English?

a) vocabulary   b) accuracy   c) both   d) other ………………..

Q.8. On which aspects do you mostly focus on when monitoring students' speaking?

a) pronunciation   b) meaning   c) accuracy   d) other……………….

Thank you for your cooperation

Appendix 2

Students' Questionnaire

The questions will be translated into Arabic to make it easier for students answering them.

Please underline the appropriate answer

Q.1. What skills does your teacher focus on the most?

a) listening   b) speaking   c) reading   d) writing

Q.2. Do speaking activities that are introduced to you have something to do with your

real life?

a) always   d) sometimes   c) never

Q.3. What does your teacher focus on when monitoring speaking activities?

a) pronunciation   b) meaning   c) vocabulary   d) other…………

Q.4. How do you find the speaking activities provided in the lesson?

a) easy   b) difficult   c) neither easy nor difficult

Q.5. Do you think speaking skill lessons are important?

a) yes   b) no

Q.6. Do you think speaking weakness by students related to?

a) the difficulty of speaking lessons

b) the teacher neglecting of speaking activities

d) deficiency of speaking resources in our school

e) all of the above

Thank you for your cooperation

Morafeq: A Modern, Self-Hosted Educational Management System Built with Flutter and PocketBase

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Abstract

This paper presents Morafeq, a modern, self-hosted educational management system (EMS) designed for flexibility, affordability, and a seamless user experience. The system utilizes the Flutter framework for its cross-platform frontend, delivering a native-like experience across various devices. Its lightweight backend, powered by PocketBase, ensures efficient data management and real-time updates. Deployment is streamlined using Coolify on a VPS, and Shorebird facilitates rapid code push updates for agile development. This paper details the motivations, architectural choices, and implementation of Morafeq, highlighting its potential to modernize educational management across diverse institutional contexts.

Keywords: Flutter, PocketBase, VPS, Coolify, Shorebird, self-hosting, EMS, educational management system, mobile app development, usability, cost-effectiveness, security, code push, Cloudflare DNS.

Introduction

Many educational institutions currently rely on a patchwork of consumer-grade tools for essential communication and resource sharing. Facebook often serves as the de facto platform for announcements, while instant messaging applications like Telegram and WhatsApp are used for communication and exchanging learning materials. This fragmented approach leads to inefficiencies, a lack of control over data and communication, and potential security and privacy concerns.

Morafeq emerges as a direct response to these challenges. It is a unified, modern, and user-centric educational management system (EMS) designed to replace fragmented communication and content sharing with a single, secure, and institutionally-controlled platform. Morafeq seeks to streamline educational workflows and empower institutions

with greater control and flexibility by addressing the shortcomings of relying on disparate consumer tools and embracing a user-focused approach.

System Architecture and Implementation

Morafeq is built on a client-server architecture, chosen to facilitate cross-platform compatibility, self-hosting, scalability, agile development, and robust security. Figure 1 provides a visual representation of the system's architecture.
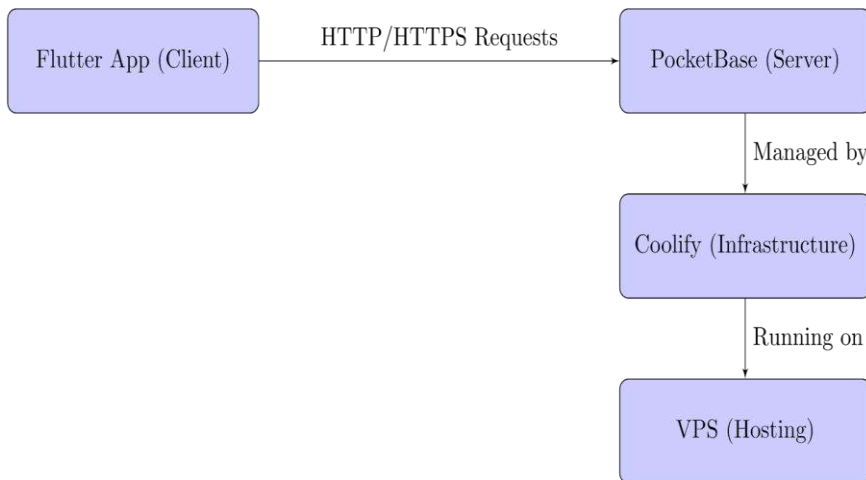
Client-Server Architecture with Flutter, PocketBase, Coolify, and VPS

Frontend Development
- **Technology:** Flutter

- **Rationale:** Flutter allows for the creation of high-quality, native-like apps for both Android and iOS from a single codebase. This approach reduces development time and effort, ensuring cross-platform compatibility.

- **Key Features:**

    – **User Authentication:** Secure login and logout, tailored to student, teacher, and administrator roles.

- **Announcements:** A centralized platform for disseminating announcements to specific user groups.

- **Course Materials:** Efficient uploading, organization, and delivery of course content.

- **Discussions:** Interactive, course-specific forums to facilitate student and teacher collaboration.

Backend Development

- **Technology:** PocketBase

- **Rationale:** PocketBase is a lightweight, self-hosted, open-source platform. Its features make it a cost-effective and customizable solution for developing Morafeq's backend.

- **Key Features:**

  - **User Management:** Comprehensive handling of user registration, authentication, and role management.

  - **Content Management:** Provides APIs for managing announcements, course materials, and discussion forums.

  - **Real-Time Data Updates:** Leverages PocketBase's real-time capabilities to deliver instant notifications and updates to users.

Backend Deployment and Management

Deployment

- **Infrastructure:** Morafeq is hosted on a VPS (Virtual Private Server) running Debian Linux. This choice was made for its stability, security, and the wide range of software available in its package repositories.

- **Deployment Tool:** Coolify streamlines the deployment and simplifies the management of the PocketBase backend on the VPS.

Management

- **Code Push:**

    – **Technology:** Shorebird

    – **Rationale:** Shorebird is integrated into the Flutter app to allow for instant code push updates. This facilitates agile development practices, allowing for rapid bug fixes and feature deployments without requiring users to download new app versions.

- **Domain Management:**

    – **Technology:**Cloudflare DNS

    – **Rationale:**Cloudflare DNS provides robust, high-performance, and secure management of Morafeq's domain.

Security Considerations

Security is a top priority in Morafeq. The following measures are implemented:

- **User Authentication:** Leverages PocketBase's built-in authentication system, with plans for future enhancement to include two-factor authentication when it becomes natively available in PocketBase.

- **Data Encryption:** Sensitive data is encrypted at rest using PocketBase's encryption capabilities.

- **Server Security:** The VPS is secured using strong password policies, firewalls, and regular security updates.

- **Data Backups:** Automated regular backups are implemented to prevent data loss.

Connecting Flutter App to PocketBase

Login Implementation

The login functionality in Morafeq exemplifies how the Flutter app interacts with the PocketBase backend using its API and a BLoC (Business Logic Component) state management pattern.

Code Snippet

```dart
import 'package:pocketbase/pocketbase.dart';

final pb = PocketBase('https://morafeqpocket.hazembook.com');
final authData = await pb.collection('users').auth With Password
'YOUR_USERNAME_OR_EMAIL',
'YOUR_PASSWORD',
// after the above you can also access the auth data from the authStore
print(pb.authStore.isValid);
print(pb.authStore.token);
print(pb.authStore.model.id);

// "logout" the last authenticated account
pb.authStore.clear();
```

Login Page Preview
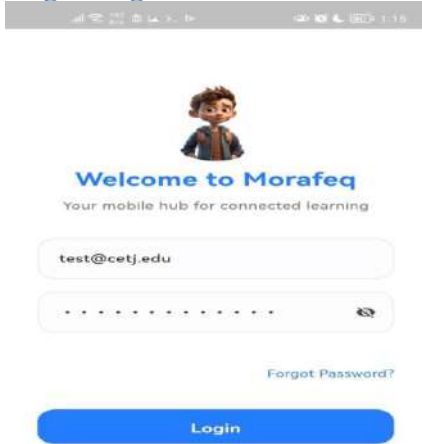
Results

Performance testing and user feedback collection are currently in progress and will be included in a future update of this paper.

Discussion
Benefits of Self-Hosting Morafeq

- **Cost-Effectiveness:** Utilizing open-source technologies and a VPS hosting solution minimizes costs compared to proprietary EMS solutions or reliance on external cloud services.

- **Customization:** The flexibility of Flutter and PocketBase allows Morafeq to be tailored to the specific needs and workflows of individual institutions.

- **Scalability:** The VPS infrastructure provides a scalable solution that can grow to accommodate increases in users, data, and features.

- **Data Control and Sovereignty:** Self-hosting gives institutions complete control over their data, ensuring privacy and compliance with relevant data regulations.

- **Rapid Updates and Agility:** Shorebird's code push functionality enables instant updates, which allows for a quick response to user feedback and facilitates the rapid deployment of new features and bug fixes.

Challenges and Lessons Learned

- **Learning Curve:** Familiarizing the development team with relatively new technologies, such as Flutter, PocketBase, and Coolify, required a time investment.

- **Integration Complexity:** Ensuring the seamless integration of the Flutter frontend, PocketBase backend, and other system components required meticulous planning, thorough testing, and careful coordination.

Conclusion

Morafeq represents a viable and innovative approach to building a modern, self-hosted EMS. By leveraging Flutter, PocketBase, Coolify, and Shorebird, Morafeq provides a cost-effective, customizable, and scalable solution to meet the evolving needs of educational institutions. The system's design prioritizes user experience, agility, and data security.

Future Work

- **Performance Testing and Optimization:** Rigorous performance tests will be conducted to assess the system's behavior under various load conditions. The results will guide further optimization to ensure optimal performance.

- **Enhanced Feature Set:**Morafeq's functionality will be expanded to include features like attendance tracking, online quizzes and assessments, grade management, and integration with existing Student Information Systems (SIS).

- **Offline Capabilities:** We aim to provide offline access to course materials, enabling students to continue learning even when internet connectivity is limited.

- **Advanced Analytics:** Data analytics capabilities will be incorporated to provide insights into student performance, engagement patterns, and system usage. These insights will enable data-driven decision-making to improve both the system and teaching methodologies.

Acknowledgments

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Obstacles Facing the Application of the Six Sigma in HigherTechnical Education
(From the Point of view of Management and Faculty Members)

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Abstract

This research studies the obstacles facing the application of Six Sigma in colleges and higher technical institutes in Libya, from the point of view of management and workers in technical education: faculty members, teaching assistants, and office managers. In order to reach an understanding and evaluation of this point of view, a theoretical study was conducted that identified most of the possible obstacles to applying Six Sigma. These obstacles were placed in a questionnaire that was divided into five aspects. Its questions addressed the obstacles related to the specificity of the Six Sigma philosophy, as well as obstacles from leaders, workers, the weak internal environment of higher technical education, and the specificity of higher technical education. It was distributed to random samples of those targeted in technical education, with a sample size of 80. After analyzing the results of the questionnaire, some results were reached, including: It is important for everyone to understand the different concepts and appropriate tools for applying Six Sigma. The study also found the importance of management presence in higher technical education and the importance of applying change management and good planning and organization to apply Six Sigma. The study also highlighted the importance of amending administrative and legal aspects so that the regulations and legal structure are appropriate for applying Six Sigma in the technical colleges and institutes in Libya. The study made several recommendations, including: the importance of allocating the

necessary human and financial resources for the training and qualification required to implement Six Sigma. It was also recommended that the management be committed to and supportive of implementing Six Sigma. It is also important to make the necessary changes to the regulations and law for the purpose of facilitating the management procedures for implementing Six Sigma.

Key words: six sigma, High Technical Education, Obstacles

الملخص

يتناول هذا البحث بالدراسة المعوقات التي تواجه تطبيق ستة سيجما في الكليات والمعاهد الفنية العليا في ليبيا، من وجهة نظر الإدارة العليا، والعاملين في التعليم التقني: من أعضاء هيئة التدريس، و مدراء مكاتب، ومعيدين، وذلك لغرض للوصول إلى فهم وتقييم هذه الوجهة تم إجراء دراسة نظرية حددت أغلب المعوقات المحتملة لتطبيق ستة سيجما، وتم وضع هذه المعوقات في استبانة تم تقسيمها إلى خمسة جوانب، تناولت أسئلتها المعوقات المتعلقة بخصوصية فلسفة ستة سيجما، وكذلك المعوقات من الجوانب التالية: القيادة العليا، والعاملين والبيئة الداخلية الضعيفة للتعليم التقني العالي، وكذلك خصوصية التعليم التقني العالي، وتم توزيعها على عينات عشوائية من المستهدفين في التعليم التقني في الكليات والمعاهد التقنية العليا بليبيا، بحجم عينة بلغ (80) فرداً، وبعد تحليل نتائج الاستبانة تم التوصل إلى بعض النتائج منها: أهمية أن يفهم جميع العاملين في التعليم العالي التقني المفاهيم المختلفة والأدوات المناسبة لتطبيق ستة سيجما، كما توصلت الدراسة إلى أهمية وجود الإدارة في التعليم التقني العالي، وأهمية تطبيق إدارة التغيير والتخطيط والتنظيم الجيد لتطبيق ستة سيجما، كما أبرزت الدراسة أهمية تعديل الجوانب الإدارية والقانونية بحيث تكون اللوائح والبنية القانونية مناسبة لتطبيق ستة سيجما في الكليات والمعاهد التقنية في ليبيا، وقدمت الدراسة عدة توصيات منها: أهمية تخصيص الموارد البشرية والمالية اللازمة للتدريب والتأهيل اللازمين لتطبيق ستة سيجما، كما أوصت بضرورة التزام الإدارة ودعمها لتطبيق ستة سيجما، وأهمية إجراء التغييرات اللازمة على اللوائح والقوانين بغرض تسهيل إجراءات الإدارة لتطبيق ستة سيجما.

Introduction

Six Sigma has gone beyond the conventional level of quality that can be envisaged, by achieving a degree of quality assurance for a product or service that is exceptionally high. Six Sigma has been applied in many different fields, whether in industry or services, and its application faces various challenges. Some of these challenges result from the nature of Six Sigma itself, taking into

account its philosophy striving for perfection, as well as factors related to the environment in which it is applied, the management style, the relationships between all sectors, and the diversity of available resources. These elements may pose obstacles to successful application.

The field of university education is one of the areas in which efforts are being made to implement Six Sigma in different countries around the world. However, the attempts to apply Six Sigma in this field may not always succeed in achieving the desired results, or the application may be limited to producing partial successes.

It is important to note that the application of Six Sigma may not always lead to successful implementation. Organizations should carefully consider the appropriateness and feasibility of applying Six Sigma within their specific contexts, rather than resorting to it as a universal solution

Research Problem:

There are many obstacles that stand in the way of the possibility of implementing the Six Sigma system in technical education, including obstacles on the part of human resources: the lack of support from senior management for its implementation, as well as the lack of employee knowledge about Six Sigma or the statistical programs necessary to measure performance, in addition to resistance to change. we also find the complexity of systems and the nature of organizational structures that limit the ability to change. There are also financial obstacles represented in the lack of the necessary financial capabilities to implement the development programs required by Six Sigma standards. These obstacles have not been well identified and have not been evaluated. In an accurate manner, it needs to be evaluated from the point of view of those working in the field of education.

Research Hypothesis:

By defining the various obstacles to the application of Six Sigma in technical education, and using them as the basis for questionnaire questions designed specifically for that context, we

can explore the perspectives and experiences of those working in the field of technical education. And this is the Research hypothesis:

1. There are significant obstacles to due to Six Sigma philosophy while implementing it.

2.There are significant obstacles due to leaders and senior managers While implementing six Sigma in colleges and higher technical institutes.

3. There are significant obstacles from the side of Employees of higher education institutions While implementing (six Sigma) in colleges and higher technical institutes.

4. There are significant obstacles that due to the weakness of the internal environment in higher education institutions that face the application of (six Sigma) in colleges and higher technical institutes.

5. There are significant obstacles due the nature of higher education institutions facing the application of (six Sigma) in colleges and higher technical institutes

Research Question:

1.Is There any significant obstacles to the specificity of the Six Sigma philosophy from the point of view of management and faculty members.

2. Is There any significant obstacles due to leaders and senior managers in implementing six Sigma in colleges and higher technical institutes from the point of view of management and faculty members.

3. Is There anysignificant obstacles from the side of the employees of higher technical education institutions in implementing (six Sigma) in colleges and higher technical institutes from the point of view of management and faculty members.

4. Is There anysignificant obstacles due to weakness of the internal environment in higher technical education institutions that face the application of (six Sigma) in colleges and higher technical institutes from the point of view of management and faculty members.

5. Is There any obstacles that are deepened by the nature of higher education institutions facing the application of (six Sigma) in colleges and higher technical institutes from the point of view of management and faculty members.

Research Objectives

1. StudyingTheoretically the Main obstacles facing the implementation of six in the high technical education.

2 Studying the obstacles to applying Six Sigma in technical education from the side of its philosophy and from senior management in technical education from the point of view of management and faculty members.

3. Studying the obstacles to applying Six Sigma from the side of the nature of technical education, the weakness of the internal structure of its institutions, and the characteristics of the weakness of its workers from the point of view of management and faculty members.

Research Limits:

Human Limits: leaders, faculty members, office and quality mangers,Teaching Assistant in colleges and higher technical institutes.

Objective Boundaries: studying the obstacles FacingApplication of Six Sigma in High Technical Education from the point of view of: leaders, faculty members, office and quality mangers, and employees in Higher technical education Institution.

Spatial Boundaries: Colleges and higher technical institutes in Libya.

Time limits: Spring semester 2024 .

Methodology:

In this research, the descriptive approach will be used to study the obstacles that may appear when implementing Six Sigma, in order to identify and classify them. Then, the analytical method will be employed to analyze the study questionnaire that links the obstacles to implementing Six from the point of view of management and faculty members, This will allow the study to

examine the importance and impact of each obstacle from their perspective.

Previous studies

1.Study of Alkhlewi, L. S. (2023), The study aimed to evaluate the implementation of the Six Sigma methodology to enhance the administrative performance of employees at the Planning and Development Agency within the Ministry of Education in the Kingdom of Saudi Arabia. Utilizing a comprehensive census method, the study revealed that project selection and priority setting were ranked highest in importance. This was followed by teamwork and effective communication, executive leadership and commitment, continuous improvement, organizational performance effectiveness, and, lastly, development and motivation as the least critical dimension.

2.Study of (Kremcheeva, D. A., &Kremcheev, E. A. (2019, November)). The study aims to assess the application of the Six Sigma methodology in the educational process and to examine the primary challenges associated with its implementation. The article discusses both the theoretical and practical aspects of Six Sigma and highlights its application to enhance the educational process. A crucial element for the successful implementation of Six Sigma in an educational setting is the presence of skilled and committed professionals. Moreover, the quality of the student's knowledge and skills—considered the "customer" of the process—depends not only on the quality of the process itself but also on external factors such as the student's personal attributes, motivation, and health status.

3. Study of (Omer, A. A. W., & Ahmed, A. F. A. (2019)) The objective of this study is to apply the Six Sigma methodology at the College of Management and Economics at the University of Sulaymaniyah and to identify the challenges encountered by the college during the academic year 2015-2016. The study's key findings reveal that the Economics Department aligns more closely with the Six Sigma standards, followed by the Accounting Department. Additionally, it was found that female participants

are more aligned with Six Sigma principles than their male counterparts.

4. Study of (Sony, M., Antony, J., Park, S., &Mutingi, M. (2019))The objective of this paper is to conduct a systematic review of the existing literature concerning criticisms of Six Sigma. The analysis is performed using various electronic databases, including Academic Source Premier (EBSCO), Google Scholar, Business Source Premier (EBSCO), Emerald Insight, IEEE Xplore Digital Library, JSTOR, ProQuest, Science Direct, Taylor & Francis, PubMed, Wiley, Inder science Online, Scopus, and the Global Public Library. A total of sixty-one relevant articles were identified and thoroughly examined. This paper pinpoints twelve major areas of criticism regarding Six Sigma. Based on the findings, sixteen future research directions are suggested. Despite the abundance of literature reviews focused on the success of Six Sigma, this study stands out as the first comprehensive systematic review addressing its criticisms

5.Study of (Jasem, G. A. H)he research aimed to assess the implementation of Six Sigma within Kuwaiti higher education institutions, as perceived by their academic staff. The study encompassed all faculty members across Kuwaiti universities, with a random sample of 121 participants selected from the State of Kuwait, including those from the main university and the Public Authority for Applied Education and Training. Findings revealed that the overall average scores for the application of Six Sigma, as viewed by the faculty members, were moderate. The dimensions were ranked in descending order as follows: management support and commitment, measurement and feedback, improvement tools and techniques, systems and processes, resources, and education and training.

6. Study of (Prasad, K. D., Subbaiah, K. V., &Padmavathi, G. (2012)) This research aims to create a new curriculum aimed at enhancing quality within an engineering educational institution by utilizing the five-stage Six Sigma methodology, specifically the DMAIC (Define, Measure, Analyze, Improve, and Control)

approach. The study recommends using a set of suitable tools for each phase of implementing the Six Sigma methodology. It emphasizes that a quality-focused mindset within the institutional management is crucial for the successful application of Six Sigma in engineering education. Furthermore, the unconditional commitment and ongoing effort of every participant in the education system are essential. The study highlights significant criticisms of Six Sigma, such as high failure rates, substantial initial costs, low employee motivation for creativity and innovation, and the need to integrate with emerging trends like Green and Industry 4.0 in the future.

7. Study of (Weinstein, L. B., Petrick, J., Castellano, J., &Vokurka, R. J. (2008) The study presents a practical program dedicated to developing a course on Six Sigma practices for MBA students specializing in quality, aiming to bridge the divide between theoretical knowledge and practical application. These projects, which address real-world issues, enable students to strengthen their classroom learning and deepen their understanding. In this article, the authors outline a method used to lead students through Six Sigma process improvement projects at local businesses, with the ultimate aim of equipping them to become skilled professionals in the future.

Obstacles of implementing six sigma in education:

In this research, we will seek to determine which qualitative obstacles are most influential when trying to implement Six Sigma. The variables of the study will be the different points of view of each of the following: leaders, faculty members, office managers, and Teaching Assistants of colleges and higher technical institutes in libya.

We have found, by reviewing the research literature, that the main obstacles that stand in the way of implementing Six Sigma can be classified into: the following:

First: Obstacles related to the specificity of the Six Sigma philosophy

This is because the volume of work required in Six Sigma and the degree of perfection sought by those seeking to implement it

impose a strict, organized approach that requires an understanding of the characteristics and nature of Six Sigma and the provision of various trained and qualified work teams. It also requires working to document the process statistically, and this is what causes the following possible obstacles:

1. One of the obstacles is that implementing Six Sigma requires a comprehensive understanding of it, which may not be achieved unless everyone is aware of the different concepts of how to apply Six Sigma, its packages, methodological steps, analysis tools, and techniques used.

2.One of the obstacles is the Poor alignment and matching of interventions with the strategic plan. It's important to link Six Sigma to business or organization strategy, and combine Six Sigma visions with the strategic plan, especially since strategic analyzes Tools like (PESTEL) and (SWOT) Certified as analysis tools within the analysis phase of Six Sigma (Waterbury, T. 2015) , (Kruger, D. 2015)

3. Difficulties of understanding and defining of the clientin the field of education and added value given to him (Radnor&Bucci 2011).

Second: Obstacles from side of college leaders and senior mangers

leaders and senior managers are the most important factor of having six sigma implemented in the high education as many researcher argued that : "Six sigma requires top management dedication and contribution to resources and effort with good vision and wise thinking" (Kwak&Anbari 2006)

1. poor planning, coordination of the actions and the changes brought to the university or college processes (Thirkell& Ashman2014)

2. Lack of commitment and involvement from leadership and upper management Six Sigma requires continuous adoption by senior management of the application of Six Sigma (Antony &Banuelas 2002)

According to some researcher one of the most important Key factors for implementing a successful six sigma program is the Management commitment and involvement (Kwak et al., 2006).

3. Dealing with processes as partial activities or isolated topics previous studies argued that that" Lack of process thinking and process ownership. Everything is treated as an activity or task or procedure but not processes. Process thinking is not at all prevalent in many HEIs and establishing processes at the workplace requires a change of mindset. ". (Antony, Krishan, Cullen & Kumar 2012)

4. the Lack of vision and awareness from senior management, Lack of wise leadership make any organization: university, coleedge, company under risk. (Antony et al., 2012)

Third: Obstacles on the part of those working in HEI:

1. Deficient commitment and training of staff(Coowar et al., 2006) and students is one important barrier to six sigma implementing in HEI. (Verma& Crossman2006)

2. Misunderstanding concepts, tools and vocabulary of six sigma (Radnor et al., 2011) [22] also Deficient definition of the problem to be solved] (Balzer, W.K. 2010)

3. Resistance to change and inadequate justification with culture of blame, poor management of conflicts within the organization (Balzer 2010) also (Thirkell et al., 2014)

4.Employees may feel that Six Sigma will destroy their creativity and development in light of the abundance of questionnaires and other tools. In the field of education, it can be clearly visualized among faculty members (Emiliani, M. L. 2005) who may feel that they will lose freedom in scientific research. also (Thirkell et al., 2014)

Weakness of the inside environment of the HEI:

1. Lack of clarity and openness in communications and bad communication between HIS staff. (Comm&Mathaisel 2005)

2. Little resources allotted to the interventions (Commet al., 2005)

 3.poor administrative base or previous application of quality programs.

Fifth: obstacles due to the nature of the HEI

Challenges that are specific to the university, college and high institute community arise primarily from:

1. It's important to change The regulations and organizational structures which are not implementing quality education or Six Sigma. To achieve Six Sigma, it requires enhancing the authority of management to take supportive measures for its implementation, an organizational structure that includes various work teams, and even the ability for the institution to include what it wants in its structure, which is What is not available in the public education sector.

 2. The complexity of the community and its processes in the HEI. (Larouche&Savard 2012).

 3. Dearth of documented experience in the HEI sector (Albliwi et al., 2014) [21] also . (Hines &Lethbridge 2008) .

4. Difficulties of contextualizing certain tools in the sector sector(Albliwi et al., 2014) and also At times deficient links between research and teaching activities (Kwak et al., 2006).

Study Population and sample:

The study population consists of the administration and faculty members of colleges and higher technical institutes. A random sample of 80 individuals was selected from the study population. The following table shows the distribution of the study sample and its characteristics, which indicates its diversity and suitability for conducting the study.

Table No, 1: Distribution of the Study Sample According to the Field of Work.

Work filed	Count	Percent
Director	12	15%
Faculty Member	37	46.25%
Quality/ Office Manger	14	17.5%
Teaching Assistant	17	21.25
Total	80	100.0%

Table No (2) Distribution of the study sample according to the academic Qualification

Academic qualification	Count	Percent

PHD	22	27.50%
Master	39	48.75%
Bachelor's	14	17.5%
Higher Institute	5	6.25%
Total	80	100.0%

Table No. (3) Distribution of the study sample according to TheAge.

Age	Count	Percent
51 Years and above	18	22.5%
From 41 – 50 Years	29	36.25%
From 30 – 40 Years	23	28.75%
Under 30 Years	10	12.5%
Total	80	100.0%

Table No. (4) Distribution of the study sample according to Experience

Experience	Count	Percent
26 years and more	11	13.75%
From 16 – 25 years	26	32.5%
5 – 15 years	28	35%
Less than 5 years	15	18.75%
Total	80	100.0%

Methods of Statistical Analysis of Study Data:A descriptive analysis method was conducted using frequency tables and arithmetic means. The degree of agreement was determined as follows in Table 5:

Mean	From 1 to less than 1.8	From 1.8 to less than 2.6	From 2.6 to less than 3.4	From 3.4 to less than 4.2	From 4.2 to 5
Answer	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Degree of approval	Very low	Low	Medium	High	Very high

One Sample t Test to determine the general trend around each axis of the study questionnaire, so that if the value of the significance level P-value is greater than 0.05, this indicates that the general trend around this statement is that the score is average. However, if the value of the level of significance P-value is Less than 0.05, this indicates that the general trend around this statement is that the score is low or high, and in this case we look at the mean value. Cronbach's Alpha coefficient was used to study the validity and reliability of the study tool. The study tool is appropriate and meets the standards of validity and reliability if the value of thiscoefficient is greater than 60%.

Study and Analysis of Data:

First Axis: Obstacles Related to the Specificity of the Six Sigma Philosophy

This hypothesis, which states 'There are significant obstacles related to the specificity of the Six Sigma philosophy,' was examined in the study population through the study sample. Each item of the questionnaire related to this hypothesis was analyzed using appropriate statistical methods. The calculations were performed using SPSS statistical software, and the results are presented in Table No. 6

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation	Rank	Degree of approval
It is important for everyone to be aware of the different concepts of how to apply Six Sigma.	F	0	0	4	35	41	Mean 4.46	Std. Deviation 0.59	Rank 1	Degree of approval Very high
One of the basics for implementing (Six Sigma) is awareness of Six Sigma, its tools, methodological steps, analysis techniques, and its supporting frameworks.	%	0.0	0.0	5	43.8	51.3	4.36	0.64	2	Very high
One of the basics for implementing (Six Sigma) is awareness of Six Sigma, its tools, methodological steps, analysis techniques, and its supporting frameworks.	F	0	0	7	37	36	4.36	0.64	2	Very high
It is necessary to align Six Sigma initiatives with the organization's business or organizational strategy.	%	0.0	0.0	8.8	46.3	45	4.31	0.61	4	Very high
It is necessary to align Six Sigma initiatives with the organization's business or organizational strategy.	F	0	0	6	43	31	4.31	0.61	4	Very high
It is necessary to ensure that target customers are clearly defined, and the added value offered to them is well understood.	%	0.0	0.0	7.5	53.8	38.8	4.35	0.58	3	Very high
It is necessary to ensure that target customers are clearly defined, and the added value offered to them is well understood.	F	0	0	4	44	32	4.35	0.58	3	Very high
One of the obstacles is the existence of alternative programs that replace (Six Sigma).	%	0.0	0.0	5	55	40	3.39	0.93	5	high
One of the obstacles is the existence of alternative programs that replace (Six Sigma).	F	1	13	29	28	9	3.39	0.93	5	high
It is necessary to integrate the goals and vision of (Six Sigma) into the strategic plan of the technical education institution.	%	1.3	16.3	36.3	35	11.3	4.31	0.65	4	Very high
It is necessary to integrate the goals and vision of (Six Sigma) into the strategic plan of the technical education institution.	F	0	1	5	42	32	4.31	0.65	4	Very high
Total	%	0.0	1.3	6.3	52.5	40	4.20	0.42	-	Very high
Total	-	-	-	-	-	-	4.20	0.42	-	Very high

Table 6: Results of the Statistical Analysis for the First Axis

The results in Table 6 indicate a high degree of agreement for the statements in this axis. The statement with the highest agreement (i.e., the most significant obstacle) is 'It is important for everyone to be aware of the different concepts of how to apply Six Sigma,'

with a mean of 4.56, indicating a very high degree of agreement. The statement with the lowest agreement (i.e., the least significant obstacle) is 'One of the obstacles is the existence of alternative programs that replace Six Sigma,' with a mean of 3.39, still indicating a high degree of agreement. To examine the overall trend of this axis and test its hypothesis, a one-sample t-test was conducted. The results are presented in Table 7.

Table 7 Results of the One-Sample t-Test for the First Axis

N	Mean	Std. Deviation	P-value
80	4.20	0.42	0.000

The results in Table 7 show that the p-value is less than 0.05, which indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis, with a high degree of agreement. Thus, we can conclude that there are significant obstacles related to the specificity of the Six Sigma philosophy.

Second Axis: Obstacles Related to Leaders and Senior Managers

This hypothesis, which states 'There are significant obstacles due to leaders and senior managers in implementing Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members,' was examined in the study population through the study sample. Each item of the questionnaire related to this hypothesis was analyzed using appropriate statistical methods. The calculations were performed using SPSS statistical software, and the results are presented in Table 8.

Table 8: Results of the Statistical Analysis for the Second Axis		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation	Rank	Degree of approval
It is important to avoid poor planning and coordination. Also, the application of change management must be adopted in higher technical education institutions when implementing (Six Sigma).	F	0	1	3	38	38	4.41	0.63	2	Very high
	%	0.0	1.3	3.8	47.5	47.5				
One of the most important factors for success in implementing the Six Sigma program is strong management commitment and participation.	F	0	0	0	32	48	4.60	0.49	1	Very high
	%	0.0	0.0	0.0	40	60				
Six Sigma standards must be dealt with completely as an integrated methodology for improving operations, not as partial activities.	F	0	2	5	39	34	4.31	0.70	3	Very high
	%	0.0	2.5	6.3	48.8	42.5				
It is necessary to address the lack of vision and awareness from senior leadership.	F	0	1	9	37	33	4.28	0.71	4	Very high
	%	0.0	1.3	11.3	46.3	41.3				
The continuous presence of senior and middle management is indispensable at every stage of Six Sigma implementation.	F	1	0	11	40	28	4.18	0.76	5	high
	%	1.3	0.0	13.8	50	35				
Total	-	-	-	-	-	-	4.36	0.45	-	Very high

The results in Table 8 indicate a high degree of agreement for the statements in this axis. The statement with the highest agreement (i.e., the most significant obstacle) is 'One of the most important factors for success in implementing the Six Sigma program is strong management commitment and participation,' with a mean

of 4.60, indicating a very high degree of agreement. The statement with the lowest agreement (i.e., the least significant obstacle) is 'The continuous presence of senior and middle management is indispensable at every stage of Six Sigma implementation,' with a mean of 4.18, still indicating a high degree of agreement. To examine the overall trend of this axis and test its hypothesis, a one-sample t-test was conducted. The results are presented in Table 9.

Table 9: Results of the One-Sample t-Test for the Second Axis

N	Mean	Std. Deviation	P-value
80	4.36	0.45	0.000

The results in Table 9 show that the p-value is less than 0.05, which indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis, with a high degree of agreement. Thus, we can conclude that there are significant obstacles facing leaders and senior managers in implementing Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members.

Third Axis: Obstacles Related to Employees of Higher Education Institutions

This hypothesis, which states 'There are significant obstacles from the employees of higher education institutions in implementing Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members,' was examined in the study population through the study sample. Each item of the questionnaire related to this hypothesis was analyzed using appropriate statistical methods. The calculations were performed using SPSS statistical software, and the results are presented in Table 10.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation	Rank	Degree of approval
It is important to avoid poor planning and coordination. Also, the application of change management must be adopted in higher technical education institutions when implementing (Six Sigma)	F	0	0	3	29	48	4.56	0.57	1	Very high
	%	0.0	0.0	3.8	36.3	60				
One of the most important factors for success in implementing the Six Sigma program is strong management commitment and participation.	F	0	0	12	35	33	4.26	0.71	4	Very high
	%	0.0	0.0	15	43.8	41.3				
Six Sigma standards must be dealt with completely as an integrated methodology for improving operations, not as partial activities.	F	0	0	12	36	32	4.25	0.70	5	Very high
	%	0.0	0.0	15	45	40				
It is necessary to address the lack of vision and awareness from senior leadership.	F	0	0	9	37	34	4.31	0.67	3	Very high
	%	0.0	0.0	11.3	46.3	42.5				
The continuous presence of senior and middle management is indispensable at every stage of Six Sigma implementation.	F	0	0	5	36	39	4.43	0.61	2	Very high
	%	0.0	0.0	6.3	45	48.8				
Total	-	-	-	-	-	-	4.36	0.47	-	Very high

Table 10: Results of the Statistical Analysis for the Third Axis.
The results in Table 10 indicate a high degree of agreement for the statements in this axis. The statement with the highest agreement (i.e., the most significant obstacle) is 'It is important to avoid poor planning and coordination. Also, the application of change management must be adopted in higher technical education

institutions when implementing Six Sigma,' with a mean of 4.56, indicating a very high degree of agreement. The statement with the lowest agreement (i.e., the least significant obstacle) is 'Six Sigma standards must be dealt with completely as an integrated methodology for improving operations, not as partial activities,' with a mean of 4.25, still indicating a very high degree of agreement.To examine the overall trend of this axis and test its hypothesis, a one-sample t-test was conducted. The results are presented in Table 11.

Table 11: Results of the One-Sample t-Test for the Third Axis

N	Mean	Std. Deviation	P-value
80	4.36	0.47	0.000

From the results in the previous table, we find that the P-value is less than 0.05, which indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis. The degree of agreement is high. Thus, it can be said that there are significant obstacles facing the employees of higher education institutions in implementing Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members.

Fourth Axis: Obstacles related to the weakness of the internal environment of the higher education institution

This hypothesis was studied in the research community through the study sample. It states: 'There are obstacles that exacerbate the weakness of the internal environment in higher education institutions, hindering the application of Six Sigma in colleges and higher technical institutes from the perspective of administration and faculty members.' This hypothesis was examined for each relevant questionnaire item using appropriate statistical analysis. The calculations were conducted using the SPSS statistical program, and the results are presented in Table No. (12).

Table No. (12) shows the results of the statistical analysis of the Fourth axis

		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation	Rank	Degree of approval
To achieve Six Sigma, the necessary material and human resources must be provided to train employees in higher technical education institutions on the application of Six Sigma.	F	0	0	3	45	32	4.36	0.56	2	Very high
	%	0.0	0.0	3.8	56.3	40				
It is extremely necessary for workers to have a comprehensive understanding of Six Sigma concepts, tools, and vocabulary and master statistical programs.	F	0	0	2	32	46	4.55	0.55	1	Very high
	%	0.0	0.0	2.5	40	57.5				
Workers in technical education institutions must have the necessary commitment required by the nature of Six Sigma work.	F	0	1	10	38	31	4.24	0.72	4	Very high
	%	0.0	1.3	12.5	47.5	38.8				
Resistance to change among employees is considered one of the most important negative elements that must be addressed proactively and with strong change management.	F	0	0	13	36	31	4.23	0.71	5	Very high
	%	0.0	0.0	16.3	45	38.8				
Employees must be integrated and a teamwork spirit must be built to implement It.	F	0	1	6	41	32	4.30	0.66	3	Very high
	%	0.0	1.3	7.5	51.3	40				
Total	-	-	-	-	-	-	4.34	0.45	-	Very high

From the results in the previous table, we find that the degree of agreement for the statements of this axis is high. The most agreed-upon statement (i.e., the most significant obstacle) is: 'It is extremely necessary for workers to have a comprehensive understanding of Six Sigma concepts, tools, and vocabulary and master statistical programs,' with a mean of 4.55, indicating a very high degree of agreement. The least agreed-upon statement (i.e., the least significant obstacle) is: 'Resistance to change among employees is considered one of the most important negative elements that must be addressed proactively and with strong change management,' with a mean of 4.23, still indicating a very high degree of agreement. To study the general trend of this axis

and test its hypothesis, a one-sample t-test was conducted. The results are shown in Table No. (13).

Table No. (13) shows the results of the t-test for the fourth axis.

N	Mean	Std. Deviation	P-value
80	4.34	0.45	0.000

From the results in the previous table, we find that the P-value is less than 0.05, which indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis. The degree of agreement is high. Thus, it can be said that there are obstacles that exacerbate the weakness of the internal environment in higher education institutions, hindering the application of Six Sigma in colleges and higher technical institutes from the perspective of administration and faculty members.

Fifth Axis: Obstacles related to the nature of higher education institutions:

This hypothesis was examined in the research community through the study sample. It states: 'There are obstacles inherent to the nature of higher education institutions that hinder the application of Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members.' This hypothesis was examined for each relevant questionnaire item using appropriate statistical analysis. The calculations were conducted using the SPSS statistical program, and the results are presented in Table No. (14).

Table No. (14) shows the results of the statistical analysis of the Fifth axis

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation	Rank	Degree of approval
To achieve the success of implementing Six Sigma, it is necessary to change the organizational regulations to give senior management the flexibility necessary to implement Six Sigma. F	0	2	6	36	36	4.33	0.73	2	Very high
%	0.0	2.5	7.5	45	45				
The complexity of the higher education institutions community and the lack of documented experience in the higher education sector constitutes an obstacle to the implementation of (Six Sigma). F	0	0	20	38	22	4.03	0.73	3	high
%	0.0	0.0	25	47.5	27.5				
It is important that the organizational structure of higher technical education institutions includes the components necessary to implement (6 Sigma) to make decisions decisive and not rely on legal or administrative overreach when trying to implement (6 Sigma). F	0	0	8	31	41	4.41	0.67	1	Very high
%	0.0	0.0	10	38.8	51.3				
The unique nature of university education, which includes teaching, learning, scientific research, and community service, creates challenges in linking these activities together, such as weak integration between scientific research and teaching. F	0	2	17	44	17	3.95	0.73	4	high
%	0.0	2.5	21.3	55	21.3				
There is a difficulty in defining the customer when working on implementing (Six Sigma) in technical education, due to what was mentioned in the previous point regarding the nature of the multiple goals of university education: teaching, learning, higher research, community service and the environment. F	0	3	18	39	20	3.95	0.79	4	high
%	0.0	3.8	22.5	48.8	25				
Total	-	-	-	-	-	4.13	0.47	-	high

From the results in the previous table, we find that the degree of agreement for the statements of this axis is high. The most agreed-upon statement (i.e., the most significant obstacle) is: 'It is important that the organizational structure of higher technical education institutions includes the components necessary to implement Six Sigma to make decisions decisive and not rely on legal or administrative overreach when trying to implement Six

Sigma,' with a mean of 4.41, indicating a very high degree of agreement.

The least agreed-upon statement (i.e., the least significant obstacle) is: 'The unique nature of university education, which includes teaching, learning, scientific research, and community service, creates challenges in linking these activities together, such as weak integration between scientific research and teaching. There is also difficulty in defining the customer when implementing Six Sigma in technical education, due to the multiple goals of university education: teaching, learning, higher research, community service, and environmental considerations,' with a mean of 3.95, indicating a high degree of agreement.

To study the general trend of this axis and test its hypothesis, a one-sample t-test was conducted. The results are shown in Table No. (15).

Table No. (15) shows the results of the t-test for the fifth axis

N	Mean	Std. Deviation	P-value
80	4.13	0.47	0.000

From the results in the previous table, we find that the P-value is less than 0.05, which indicates the rejection of the null hypothesis and the acceptance of the alternative hypothesis. The degree of agreement is high. Thus, it can be concluded that there are obstacles inherent to the nature of higher education institutions that hinder the application of Six Sigma in colleges and higher technical institutes from the perspective of management and faculty members.

Conclusions

1. It is essential to inform and train all employees in technical higher education on the various concepts and appropriate statistical and administrative tools for applying Six Sigma.

2. It is important for success implantation of six sigma the continuous presence of senior management and their daily follow-up of the application Activity.

3. To apply Six Sigma effectively, it is important to link the Six Sigma strategy to the institution's overall strategy.

4. It is important to apply change management, planning, and good organization to apply Six Sigma.

5. To implement Six Sigma, management should seek to change the administrative and legal aspects to ensure that regulations and legal structures are appropriate for applying Six Sigma in colleges and technical institutes in Libya.

6. It is essential to apply Six Sigma to motivate employees and delegate senior management to specialists who hold belts in applying Six Sigma.

7. To implement Six Sigma successfully, technical institutions must have the necessary material and human resources.

Recommendations:

The researcher recommends the following:

1. Employees in technical higher education should be trained on the various concepts and appropriate statistical tools for applying Six Sigma.

2. It is important for senior management to be continuously present and follow up on the application of Six Sigma.

3. It is important to link the Six Sigma strategy to the overall strategy of the organization.

4. It is important to apply change management, planning, and good organization to implement Six Sigma.

5. It is important to modify the administrative and legal aspects so that the regulations and legal structure are appropriate for implementing Six Sigma in colleges and technical institutes in Libya.

6. It is important to motivate employees and delegate senior management to specialists with belts in implementing Six Sigma.

7. It is necessary to provide the required material and human resources to implement Six Sigma.

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FIXED POINT THEOREMS FOR MAPPINGS WITH A BANACH CONTRACTION PRINCIPLE

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ABSTRACT

Fixed point theory is a fascinating subject, with an enormous number of applications in various fields of Mathematics. The present paper aims to provide a survey of Banach space that have been used to obtain fixed points for maps satisfying a variety of contractive conditions. In most cases, it noticed that a fixed points pop up when they are needed.

Key Words: Banach space, Fixed points theorems, Lipschitz continues, Ordinary differential equations, Riemann integral.

INTRODUCTION

In mathematics, more specifically in functional analysis, a Banach space is a complete normed vector space. Thus, a Banach space is a vector space with a metric that allows the computation of vector length and distance between vectors and is complete in the sense that a Cauchy sequence of vectors always converges to a well-defined limit that is within the space.

Banach spaces are named after the polish mathematician Stefan Banach, who introduced this concept and studied it systematically in 1920-1922 along with Hans Hahn and Eduard Helly. Maurice René Fréchet was the first to use the term " Banach space " and Banach in turn then coined the term "Fréchet space".

Banach spaces originally grew out of the study of function spaces by Hilbert, Fréchet, and Riesz earlier in the century. Banach spaces play a central role in functional analysis.

In other areas of analysis, the spaces under study are often Banach spaces. Fixed point theorems concern maps f of a set X into itself, under certain conditions, admit a fixed point, that is a point such that The knowledge of the existence of fixed points has relevant applications in many branches of analysis and topology.

Let us show for instance the following simple but indicative example

PRELIMINARIES

Here, I recall the definitions of Banach space in fixed points theorems

Definition 1

Let X be a metric equipped with a distance d. A map $f:x\to x$ is said to be Lipschitz continuous if there is 0 such that

$$df(\ x1),f(x2)\le\ \lambda d$$

$x1,x2$ $\forall\ x1,x2\in X$

The smallest for which the above inequality holds is the Lipschitz continuous of f. if $\lambda\le1$ is said to be non-expansive, if $\lambda<1$ f is said to be a contraction.

Theorem 1 [Banach]

Let f be a contraction on a complete metric space X. then f has a unique fixed point $x\in X$.

Proof

Notice first that if $x1,x2\in X$ are fixed points of f, then

$$dx1,x2=df(\ x1),f(x2)\le\ \lambda d\ x1,x2$$

Which imply $x1=x2$. choose now any $x0X$, and define the iterate sequence

$xn+1=fxn.$

By induction on n

$$dxn+1,xn\le\ n\ df\ (x0),x0$$

If n N and $m\ge1$,

$$dxn+m,xn\le\ dxn+m,xn+m-1\ +\ldots+\ dxn+1,xn$$
$$\le\ (\ n+m+\ldots+\ n)\ df\ (x0),x0$$
$$\le\ n1-\ df\ (x0),x0$$

$x\in X$, Hence ,xn is a Cauchy sequence, and admits a limit Since f is continuous, we have $f\ x===x$

Example 1

Let $x=(0,1]$ with the usual distance. Define $f:x\to x$ as $f\ (x)=x2$

Definition 2

For f:x→x and n N , we denote by fn the nth-iterate of f , namely, f o ... o f n-times (f0 is the identity map).

Corollary 1

Let X be a complete metric space and let f:x→x . if fn is a contraction, for some $n \geq 1,$ then f has a unique fixed point x∈X.

Proof

Let x be the unique fixed point of fn given by theorem 1. then fn(f (x)) =f(fn(x))=f(x), which implies f (x) =x a fixed point of f is clearly a fixed point of fn , we have uniqueness as well.

Definition 3

Let X be a metric space with a distance d. A map f:x→x is a weak contraction, if

$$df(x1),f(x2)< d x1,x2 \qquad \forall x1x2$$

∈X

Being a weak contraction is not in general a sufficient for f in order to have

a fixed point, as it is shown in the following simple example.

Example 2

Consider the complete metric space X = [1, +∞), and let f:x→x Be defined as f(x) =x+1x . it is easy to see that f is a weak contraction with no fixed points.

Theorem 2

Let f be a weak contraction on a compact metric space X . then f has a unique fixed point x∈X .moreover, for any x0∈X the sequence fn(x0) converges to x.

Corollary 2

Let X be a compact metric space. and let f:x→x. If fn is a weak contraction, for some $n \geq 1$, then f has a unique fixed point xX.

Sequences of maps and fixed points

Let (X, d) be a complete metric space. we consider the problem of convergence of fixed points for a sequence of maps fn :x→x. Corollary 1 will be implicitly used in the statements of the next two theorems.

Theorem 3

Assume that each fn has at least a fixed point xn =fn (xn) . let f:X→X be a uniformly continuous map such that fm is a contraction for some $m \geq 1$.

If fn converges uniformly to *f*, then xn converges to x=f(x).

Theorem 4

Let *X* be locally compact. Assume that for each $n \in N$ there is mn ≥ 1 such that fnmn is a contraction. Let f:X→X be a map such that fm is a contraction for some $m \geq 1$. If fn converges pointwise to *f*, andfnis an equicontinuous family, then xn=fn(xn)converges to x=f(x).

Fixed points of non-expansive maps

Let *X* be a Banach space. C⊂X nonvoid, closed, bounded and convex, and let f:C→C be a non-expansive map. The problem is whether *f* admits a fixed point in *C*. The answer, in general, is false.

Example 3

Let X=c0 with the supremum norm. Setting C=Bx0,1, the map f:C→C defined by

$$f(x) =(1, x0, x1,...) \text{ for } x =(x0, x1,x2 ...) \in C$$

Is non-expansive but clearly admits no fixed points in *C*.

Theorem 5 Browder-Kirk

Let *X* be a uniformly convex Banach space and $C \subset X$ be nonvoid, closed, bounded and convex. *If* f:C→C Is a non-expansive map, then *f* has a fixed point in *C*.

Corollary 3

In the hypotheses of theorem 5, the set F of fixed points of *f* is closed and convex.

Proof

The first assertion is trivial. Assume then x0, x1F, with x0x1 and denote

$$xt=(1-t)x0+tx1 \text{ , with } t \ (0,1). \text{ we have}$$
$$\|f(xt)-x0\|= \|f(xt)-f(x0)\| \leq \|xt-x0\| =t\|x1-x0\|$$
$$\|f(xt)-x1\|= \|f(xt)-f(x1)\| \leq \|xt-x1\| =(1-t)\|x1-x0\|$$

That imply the equalities
$$\|f(xt)-x0\|=t\|x1-x0\|$$
$$\|f(xt)-x1\|=(1-t)\|x1-x0\|$$
  The proof is completed if we show that $f(xt)=(1-t)x0+tx1$.
Some applications of fixed-point theorems
The implicit function theorem
Fréchet differentiability: let *X,Y* be (real or complex) Banach spaces, U⊂X
 U open, x0∈U , and f:U→Y.
Definition 4
f is Fréchet differentiable at x0 is there exists T∈L(X,Y) and   :X→Y, with
$$\|\sigma(x)\|y \ \|x\|x \ \to 0 \qquad \text{uniformly}$$
as $\|x\|x \to 0$
Such that
        $f(x) - f(x0)=T(x - x0) + \sigma(x - x0) , \quad \forall \ x\in U$
The operator *T* is called the Fréchet derivative of *f* at x0 , and is denoted by $\grave{f}(x0)$
The function *f* is said to be Fréchet differentiable in *U* if it is Fréchet differentiable at every x0U.
It is straightforward to verify the Fréchet derivative at one point, if it exists is unique.
Corollary 4
Let *X,Y* be Banach spaces, let f:Bx0,r→Y be Fréchet differentiable and $\|\grave{f}(x)\|$ for every x Bx0,r and some $\lambda \geq 0$.
Then *f* is Lipschitz continuous with Lipschitz constant less than or equal to λ.
Theorem 6 (Dini)
Let *X,Y,Z* be Banach spaces, U X×Y be an open set, ,u0= *(x0,,* y0) U ,and F:UZ , Assume that
        a.   *F is continuous and* Fu0=0
        b.   DyFu *exists for every* u= *(* x, y) ∈U
        c.   DyF is continuous at u0 and DyF u0 is invertible.

Then there exists $\alpha,\beta>0$ for which $Bx_{x0,\alpha}\times BY_{y0,\beta}$ $\subseteq$ U and a unique continuous function $f:$ $Bx_{x0,\alpha}\to BY_{y0,\beta}$ such that the relation

$$F(x,\,y)=0 \qquad\qquad y=f(x)$$

holds for all (x,y) $\in$ $Bx_{x0,\alpha}\times BY_{y0,\beta}$.

Corollary 5

Let the hypotheses of Theorem 4 hold. If in addition F is Fréchet differentiable at $u0=(\,x0,,\,y0)$, then f is Fréchet differentiable at $x0$, and

$$\grave{f}(x0) = -DyF_{u0-1} DxF_{u0}$$

Theorem 7

Let X,Y be Banach spaces, and let $Lreg(X,Y)\subseteq L(X,Y)$ be the set of invertible bounded linear operators from X onto Y. Then $Lreg(X,Y)$ is open in $L(X,Y)$. Moreover, the map $T\to T-1$ is continuous.

Location of zeros

Let X,Y be Banach spaces, and $f:Bxx0,r\to Y$ be a Fréchet differentiable map. In order to find a zero for f , the idea is to apply an iterative method constructing a sequence xn (starting from $x0$) so that $xn+1$ is the zero of the tangent of f at xn. Assuming that $\grave{f}(x)-1\in L(X,Y)$ on $Bxx0,r$, one has

$$xn+1 \quad =xn \qquad - \quad \grave{f}(xn)-1$$
$\grave{f}(xn)$ $\qquad\qquad$ (1)

Provided $xnBxx0,r$ for every n.

This procedure is known as the Newton method. However, for practical purposes, it might be complicated to invert $\grave{f}$ at each step. So one can try the modification

$$xn+1 \quad =xn \qquad - \quad \grave{f}(x0)-1$$
$\grave{f}(xn)$ $\qquad\qquad$ (2)

Clearly, using (2) in place of (1), a lower convergence rate is to be expected.

The following result is based on (2)

Theorem 8

Let X, Y be Banach spaces, and $f : Bx_0, r \to Y$ be a Fréchet differentiable map.

Assume that, for some > 0,

a. $\dot{f}(x_0)$ is invertible

b. $\|\dot{f}(x) - \dot{f}(x_0)\|_{L(X,Y)}$ $\|x - x_0\|_x$, $\forall x \in Bx_0, r$

c. $:= 4 \| \dot{f}(x_0)^{-1} \|_{2L(X,Y)} \|f(x_0)\|_y \ 1$

d. $s := 2\| \dot{f}(x_0)^{-1} \|_{L(X,Y)} \|f(x_0)\|_y < r$

Then there exists a unique x $Bx x_0, s$ such that $f(x) = 0$.

Ordinary differential equations in Banach spaces

The Riemann integral

Let X be a Banach space, $I = \alpha, \beta \subset R$. The notion of Riemann integral and the related properties can be extended with no differences from the case of   real-valued functions to X-valued functions on I. In particular, if $f \in C(I, X)$ then f is Riemann integrable on I,

$$\|f(t)dt\|_x \ \|f(t)\|_x \ dt$$

and

$$\frac{d}{dt} \int_t f(y)dy = f(t)   \forall t \in I$$

Recall that a function $h: I \to X$ is differentiable at $t_0 \in I$ if the limit

$$h(t) - h(t_0) t - t_0$$

Exists in X. This limit is the derivative of h at t_0 and is denoted by

$\dot{h}(t_0)$ *or* $\frac{d}{dt} h(t_0)$

If $t_0 \in (\alpha, \beta)$ we recover the definition of Fréchet differentiability.

It is easy to that if $\dot{h}t = 0$ for all $t \ \alpha, \beta$, then ht is constant on α, β.

The Cauchy problem

Let X be a Banach, $U \subset R \times X$, U open, $u_0 = (t_0, x_0) \in U$, $f: U \to X$ continuous.

The problem is to find a closed interval I, with t_0 belonging to the interior of I and a differentiable function $x: I \to X$ such that

$$\{\dot{x}(t) = f(t, x(t)) ,   t \in I \ x(t_0)$$
$= x_0$ *(3)*

It is apparent that such *x* is automatically of class C1 on *I*. Also, it is readily seen that (3) is equivalent to the integral equation

$$x(t)= x0$$

+t0tf(y,x(y))dy,   t∈I   (4)

Namely, x is a solution to (3) if and only if it is a solution to (4).

Theorem 9 Local solution

Assume the following hypotheses:

a. *f* is continuous
b. The inequality

‖f(t,x1) -f(t,x2) ‖x≤k(t)‖x1-x2‖x,   ∀ (t,x1) ,f(t,x2)∈U

holds for some *k(t)0,∞*

   c. kL1((t0-a,t0+a)) for some a >0

d. There exist m≥0 and BR×X u0,s ⊂U such that

‖f(t,x)‖x≤m,   ∀ (t,x) BR×X u0,s

Then there is 0>0 such that, for any τ<τ0, there exists a unique solution

*x*C1(Ir,X) to the Cauchy problem, with Ir= t0-τ,t0+τ

Corollary 6

Notice first that from (b), since *U* is open, k is defined in a neighbourhood of zero. If k is constant then (c)-(d) are automatically satisfied. Indeed, for

(x,t) BR×X u0,s, we have

‖f(t,x)‖x≤ks +‖f(t,x0)‖x

Also, (d) is always true if X is finite-dimensional, for closed balls are compact.

In both cases, setting

s0=sup>0:BR×X u0,U

We can choose any s<s0

Theorem 10 (Global solution)

Let, $U = (α,β)×X$ .Assume (a) and (b) of Theorem 7, and replace (c) with

(ċ) kL1((α,β))

Then there exists a unique solution *x*C1(I,X) to the Cauchy problem for every *I* (α,β).

Conclusion

Notes of Banach spaces and their applications in various fields of mathematics has been introduced. Maybe due to this transversal character. It has been supposed that the measure theory, Banach and Hilbert spaces, locally convex topological vector spaces, and in general with linear functional analysis are familiar by the reader.

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