

مجلة

كلية المصطفى الجامعة

مجلة علمية محكمة نصف سنوية

تعنى بالدراسات والبحوث العلمية والإنسانية

العدد الخاص بالمؤتمر العلمي الدولي الرابع المدمج

(رؤية علمية في حاضر العراق ومستقبله للتنمية المستدامة)

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وزارة التعليم العالي والبحث العلمي
كلية المصطفى الجامعة

وقائع المؤتمر العلمي الدولي الرابع المدمج

الجزء الرابع

(رؤية علمية في حاضر العراق ومستقبله

للتنمية المستدامة)

للمدة من

٢٧-٢٨/٦/٢٠٢١



وزارة التعليم العالي والبحث العلمي كلية المصطفى الجامعة

وقائع المؤتمر العلمي الدولي الرابع المدمج

قال تعالى :

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

برعاية معالي وزير التعليم العالي والبحث العلمي

(أ.د. نبيل عبد الصاحب كاظم) المحترم

وتحت شعار (رؤية علمية في حاضر العراق ومستقبله للتنمية المستدامة)

تقيم كلية المصطفى الجامعة مؤتمرها العلمي الدولي الرابع المدمج

وذلك على قاعة كلية المصطفى الجامعة في تمام الساعة التاسعة من صباح يومي

الاحد والاثنين الموافق ٢٧-٢٨/٦/٢٠٢١

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- ٧- السيدة ايمان ليث اكرم التصميم الداخلي والاعلام

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- | | |
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| عضواً / | ٥- د. علي حسين علي |
| عضواً / | ٦- د. سرمد سلام عبد الله |
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| عضواً / | ١٢- م.م. مروة محمد راشد |
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| عضواً / | ١٤- م. نور قصي عبد الرزاق |
| عضواً / | ١٥- السيد سامر صفاء عدنان |
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| الاعلامية عضواً / | ١٧- السيد حاتم المسعودي |

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- ١- أ.د. هادي حسن جاسم / عميد كلية المصطفى الجامعة رئيساً
- ٢- أ.د. عبد جواد كاظم / عميد كلية النور الجامعة عضواً
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- ٩- أ.د. ماجد صخي جابر / الجامعة التكنولوجية عضواً
- ١٠- أ.د. عامر سليم الامير / وزارة التعليم العالي والبحث العلمي عضواً
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- ٢٠- م.د. أسماء محمد سليمان / الكلية التقنية الصحية والطبية كركوك عضواً
- ٢١- م.د. حسين تيبنة كاظم / كلية المصطفى الجامعة عضواً
- ٢٢- د. جمال كامل الرديني / كلية النور الجامعة عضواً
- ٢٣- أ.م.د.محمد علي عبد الرحمن / الجامعة المستنصرية عضواً

قواعد النشر في المجلة

- ١- تخصص المجلة بنشر البحوث ذات التخصصات العلمية والإنسانية .
- ٢- تعرض البحوث المقدمة للمجلة على هيئة التحرير؛ لبيان ملاءمتها ويحق لهيئة التحرير أن تعتذر عن قبول البحث .
- ٣- يتم عرض البحث مسبقاً على لجنة السلامة اللغوية ولجنة السلامة الفكرية بالنسبة للتخصصات الإنسانية قبل إرسال البحث إلى التحكيم العلمي .
- ٤- تلتزم هيئة التحرير بإرسال البحوث إلى خبراء علميين من الاختصاص نفسه عدد (٢) وفي حالة الرفض من أحدهم يرسل إلى خبير ثالث لغرض الترجيح .
- ٥- تلتزم هيئة التحرير بعدم الكشف عن أسماء المحكّمين ، لضمان سرية التحكيم و لرفع، الرصانة العلمية وكذلك تكون المعلومات الخاصة بهوية الباحث في الصفحة الأولى من البحث فقط . وأن يلتزم الباحث بعدم الإشارة إلى هويته أو مكان عمله في ثنايا البحث .
- ٦- تكون حقوق الطبع للبحث ملكاً للمجلة عند قبوله للنشر، ولا يحق النقل والاقتباس عنه إلا بعد الإشارة إلى المجلة .
- ٧- لا يجوز نشر أكثر من بحث للباحث في العدد الواحد .
- ٨- تحتفظ هيئة التحرير بحق أولوية النشر للبحوث مع مراعاة التنويع في النشر بحسب المحاور المعتمدة .
- ٩- ما ينشر في المجلة من بحوث ودراسات تعبّر عن رأي أصحابها ولا تعبر بالضرورة عن وجهة نظر هيئة تحرير المجلة أو وجهة نظر الكلية .

شروط النشر :

- ١- أن لا يكون البحث مشاركاً في مؤتمر أو ندوة علمية سابقاً أو مقدماً للنشر في مجلة علمية أخرى .
- ٢- يقدم البحث على قرص مدمج مع نسخة ورقية أو يرسل على البريد الإلكتروني: info@almustafauniversity.edu.iq
- ٣- أن لا يزيد عدد صفحات البحث عن ٣٠ صفحة .
- ٤- أن لا يزيد عدد المشتركين على ثلاثة باحثين في البحث الواحد .
- ٥- يكون آخر موعد لاستلام البحوث ٢٠ / ٦ / ٢٠٢١ .
- ٦- يطبع البحث على ورق (A4) ونوع الخط (Simplified Arabic) بالنسبة للبحوث باللغة العربية و(Times New Roman) بالنسبة للبحوث باللغة الانكليزية ويكون حجم الخط (١٤) للمتن والهامش (١٢) .

حقوق الطبع محفوظة لكلية المصطفى الجامعة

رقم الإيداع في دار الكتب والوثائق ببغداد : ٢٢٤٨ لسنة ٢٠١٧

اهداف المؤتمر :

- ١- دراسة وتحليل حاضر العراق ومستقبله من وجهة نظر علمية .
- ٢- تقديم الرؤية الواضحة للتنمية المستدامة في العراق .
- ٣- تكريس الجهود من أجل الدفع بعملية نشر البحوث العلمية للارتقاء بواقع التنمية المستدامة في مختلف التخصصات .
- ٤- تفعيل دور التكنولوجيا الحديثة من أجل الدفع بعملية التنمية المستدامة.
- ٥- تشخيص المشكلات الاقتصادية ووضع الحلول المناسبة للارتقاء بالواقع الاقتصادي في المجتمع العراقي .
- ٦- معالجة الإشكاليات الخاصة بالعمل الإداري في المؤسسات الحكومية والأهلية ووضع الحلول المناسبة للدفع بعجلة التنمية المستدامة في العراق.

محاور المؤتمر:

- ١- المحور الانساني
- ٢- المحور الطبي
- ٣- المحور العلمي

كلمة المؤتمر:

بسم الله الرحمن الرحيم

السيد ممثل وزير التعليم العالي والبحث العلمي المحترم .

السادة عمداء الكليات ومن ينوب عنهم المحترمين.

السادة الباحثين والمشاركين الأفاضل.

حضرات الضيوف والزملاء الكرام.

السلام عليكم ورحمة الله وبركاته.

طيب الله اوقاتكم بالخير والبركات واسعدتم صباحا.

من دواعي الفرح والفخر والاعتزاز ان تقيم كليتي المصطفى والنسور الجامعتين مؤتمرهم العلمي الرابع المدمج تحت شعار « رؤية علمية في حاضر العراق ومستقبله لتنمية مستدامة » للفترة من ٢٧-٢٨ حزيران ٢٠٢١ .

هذه المؤسسات التعليمية الفتية التي وضعت نصب أعينها منذ اليوم الأول لتأسيسها بناء شخصية الطالب وتزويده بالمعارف والمهارات وتدعيم خبراته وإطلاق قدراته وتعزيز روح البحث والريادة والإبداع لديه مع الالتزام بقواعد الخلق القويم والقيم الوطنية الأصيلة ليكون عنصرا فاعلا ومؤثرا في المجتمع.

وعلي الرغم من كل الظروف الاستثنائية التي يواجهها التعليم في العالم بشكل عام والعراق بشكل خاص فقد استطاعت هاتين الكليتين ان تشق خطاها وأن يحتلا مكانتهما بين الجامعات المحلية والعربية حيث اولتا منذ بداية تاسيسهما اهمية كبرى نحو تحقيق الرصانة العلمية والعمل على التؤمة مع مثيلاتها من الجامعات الرصينة والمؤسسات العلمية والاكاديميه والبحثيه كما عمدتا على الدخول في التصنيفات العالمية وتحقيق الارتقاء بها .

وأخيرا اتقدم بالشكر الجزيل لكل من أسهم في فكرة انعقاد هذا المؤتمر المبارك واخص بالذكر اللجان العلمية والتحضيريه .

والشكر موصول للاخوه والاخوات الباحثين لمشاركتهم وإثراء المؤتمر ببحوثهم القيمه والتي ندعوا ان تأخذ طريقها في التطبيق والاستفادة منها.

الشكر والترحيب بالضيوف الكرام لحضورهم وقائع هذا المؤتمر مع الأمنيات الصداقه لنجاح هذا المؤتمر.

وختاماً نشيد بالجهود المبذوله من قبل القائمين على تنظيم هذا المؤتمر متمنين ان يخرج بنتائج وتوصيات يكون لها الانعكاس الايجابي على تطور المجتمع . وفق الله الجميع والسلام عليكم ورحمة الله وبركاته .

د. خالد علي عبيد

رئيس اللجنة التحضيرية للمؤتمر

توصيات المؤتمر

- ١- السعي إلى تطوير آليات التكامل بين التعليم الجامعي الحكومي والتعليم الجامعي الأهلي بما يحقق التكامل المبني على أسس علمية رصينة .
- ٢- العناية بالتعليم الجامعي الحكومي والأهلي وتفعيل دورها في بناء رأس المال الفكري الذي يسهم في بناء الوطن .
- ٣- وضع أسس واضحة للتعاون والتكامل بما يضمن تحقيق المصالح المشتركة للقطاعين العام والخاص .
- ٤- تعزيز تكامل الأدوار بين الشركاء لتحقيق التنمية الاقتصادية .
- ٥- توسيع النشاطات الإنتاجية بما يخدم تطوير القطاعين العام والخاص ، وتوفير فرص العمل اللازمة لمعالجة مشاكل البطالة .
- ٦- تعزيز الاستثمار وتفعيل دور القطاع الخاص في التنمية الاقتصادية .
- ٧- إعادة النظر في التشريعات والقوانين بما يوفر بيئة ملائمة لآلية التكامل بين القطاع العام والخاص .
- ٨- إعطاء القطاع الخاص دوره الريادي في البلد ضمن القوانين والتشريعات النافذة .
- ٩- تفعيل التكامل بين الأقسام المتناظرة والمتوائمة في الجامعات الحكومية والأهلية في جوانب المناهج والأنشطة والفعاليات التطبيقية كافة .

برنامج الجلسة الافتتاحية للمؤتمر العلمي الدولي الرابع المدمج

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٢	تلاوة أي من الذكر الحكيم	٩:٤٠	
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٥	فيلم وثائقي عن كليتي المصطفى و النصور	١٠:٠٥	
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مقرر الجلسة أ.د. احمد ياسين		رئيس الجلسة أ.د. طلال خليفة العبيدي	
رابط الجلسة	الوقت	عنوان البحث	اسم الباحث
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Webinar ID ٢٧٤٦ ٧١٣٦ ٩١٢ https://zoom.us/j/91271362746	9:٤٥ AM	Plasmid profile and Antibiotic Sensitivity of Uropathogenic Escherichia coli isolated from children under five years	م.م. علي فاضل احمد
Webinar ID ٢٧٤٦ ٧١٣٦ ٩١٢ https://zoom.us/j/91271362746	١٠:٠٠ AM	The GC/MS analysis of the crude drug extracted from the aerial parts of Plantago lanceolata that grown in Iraq	م.م. سارة سعد عبدالرضا
Webinar ID ٢٧٤٦ ٧١٣٦ ٩١٢ https://zoom.us/j/91271362746	١٠:١٥ AM	Influence of HLA-DR alleles on Rheumatoid Arthritis: Age onset & Disease severity	أ.د. بتول علي احمد

اليوم الثاني ٢٠٢١/٦/٢٨

محور الدراسات الهندسية		الجلسة الثانية	
مقرر الجلسة م.د. موسى عبدالصاحب موسى		رئيس الجلسة أ.م.د. مكي عبدالحسن	
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Webinar ID ٩٢٥٧ ٨٣٤٧ ٩٨١ https://zoom.us/j/98183479257	9:45 AM	Prediction of the compressive strength of high-performance concrete using random forest algorithm with training-testing dataset sizes	م.م. حمزة علي عمران
Webinar ID ٩٢٥٧ ٨٣٤٧ ٩٨١ https://zoom.us/j/98183479257	10:00 AM	Investigating the Pull-out Capacity of a Horizontal Plate Anchor Embedded in Sandy Soil	م.م. زينب سعدون علي
Webinar ID ٩٢٥٧ ٨٣٤٧ ٩٨١ https://zoom.us/j/98183479257	10:15 AM	DESIGN AND DEVELOPMENT OF MULTI BAND RING RESONATOR MATCHED BANDSTOP FILTER	د. جمال عباس

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وزارة التعليم العالي والبحث العلمي
كلية المصطفى الجامعة

البحوث المشاركة في المؤتمر (المحور العلمي)

ملاحظة: جميع البحوث خاضعة للاستلال الالكتروني

سياسات إدارة الموارد البشرية وأثرها في اغتراب العقول
العراقية
وفق منظور التنمية المستدامة
دراسة استطلاعية لآراء عينة من حاملي شهادة الدكتوراه
في محافظة صلاح الدين للفترة ٢٠١٤ - ٢٠١٦

اعداد

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المخلص

تهدف هذه الدراسة الى تسليط الضوء على سياسات إدارة المؤسسات العراقية والتعرف على الية تعاطيها مع العقول داخل العراق ثم بيان أثر تلك السياسات على هجرة او توطين تلك العقول، حيث اتبعت الدراسة المنهج الوصفي التحليلي وتكون مجتمع الدراسة من حملة شهادة الدكتوراه العاملين في الجامعات والمؤسسات التربوية ضمن الرقعة الجغرافية لمحافظة صلاح الدين وقد بلغت عينة الدراسة (١٢٢) عينة. ولقد توصلت الدراسة الى مجموعة من النتائج واهمها الاستهداف الواضح للكفاءات العراقية من خلال التهديد او الاغتيال والتي أجبرتهم على الاغتراب، بناء على النتائج التي توصلت إليها الدراسة تم تقديم توصيات أهمها اعادة النظر بسلم الرواتب والأجور التي تمنح للكفاءات العلمية وتقديم الحوافز التشجيعية وربطها بالإنتاج العلمي والبحث الأكاديمي

الكلمات الدالة: اغتراب العقول، إدارة الموارد البشرية، الكفاءات العلمية

Abstract

The study is aim to focus on the polices of the Iraqi organizations and recognize its mechanisms to deal with Iraqi brains inside Iraq and clarified the results of these polices, the study adopted descriptive analytical approach depending on PHDs carriers who works in universities and educational foundations in Salaadin governorate with 122 samples. The study reached to several of results the important that the Iraqi efficient faced a serious security problem, which pushed them to alienation. Based on the findings of the study, a number of recommendations were presented, the most important of which is to establish a new salary ladder and connect it with academic production and research.

المقدمة:

في مفهوم الاقتصاديات الحديثة تعتبر الموارد البشرية ثروة الأمم الرئيسية نظراً لإسهامها في تحقيق الأهداف الاستراتيجية لأغلب بلدان العالم، حيث تزايدت أهمية هذا المورد نتيجة تراجع الثروات الطبيعية وعدم استدامتها. ان الموارد البشرية تشكل اليوم جزءاً أساسياً من الاستراتيجية العامة للمنظمات الحكومية وغير الحكومية، لقد وجهت المنظمات جلّ اهتمامها لمواردها البشرية والتي تبتدئ منذ لحظة البحث عنها في سوق العمل وحتى لحظة انتهاء علاقتها بالمنظمة. ويوصي المختصين بتوسيع نشاط إدارة الموارد البشرية حتى بعد انقطاع علاقة الفرد بالمنظمة وذلك لاستدامة عملية تأهيله لاستلام وظائف في منظمات أخرى.

ولقد ذكر (Banfield at.el,2018) بان إدارة الموارد البشرية هي فن الحصول على القوى العاملة المتخصصة وتمييزها والحفاظ عليها بشكل يسمح للمنظمة بتحقيق الأهداف المحددة والوصول الى الكفاءة والاستفادة من الطاقات وجهوده هذه الموارد البشرية ، أي ان دورها قد تجاوز الدور التقليدي داخل المنظمة واصبح دورها يستجيب للمتغيرات البيئية التي تؤثر على تلك الموارد ومنها ظاهرة الهجرة والتي يمكن تعريفها بأنها الانتقال الإرادي او القسري للأشخاص المؤهلين والحاصلين على درجة معينة من التعليم (فوجو ، ٢٠١٢).

وهنا تبرز أهمية السياسات المتبعة من قبل إدارة الموارد البشرية لتوفير البيئة الملائمة لبقاء تلك العقول لكن تلك السياسات أصبحت غير كافية بسبب عوامل الجذب المقدمة من البلدان الأخرى، بالإضافة الى ان هجرة العقول تحمل في طياتها أبعاداً سياسية واقتصادية واجتماعية وثقافية (الشمري، ٢٠١٦). وهي بحد ذاتها مشكلة دائمة لتتعدد أسبابها ودوافعها والتي ستخلق اثاراً سلبية على المديين القريب والبعيد، ولعل من أهمها هجرة الكفاءات المتخصصة في حقول المعرفة والبحث العلمي، غير ان الكثير من المهاجرين من الدول

العربية يعود بسبب الظروف الاقتصادية التي تمر بها بلدانهم على الرغم من الاستقرار السياسي النسبي الذي يتمتعون به، ولكن هجرت العلماء العراقيين يعود لأسباب أخرى قاسية منها كثرة الحروب وعدم الاستقرار السياسي والذي دفع بالأكاديميين والعلماء العراقيين للهجرة الى الخارج (الحسناوي، ٢٠١٦). ان استمرار الاغتراب وتفاقمه يعود لبقاء اسبابها ودوافعها والمتمثلة بالوضع الاقتصادي المتردي والوضع الأمني والسياسي الغير مستقران وإهمال الكفاءات العلمية والبحث العلمي في العراق، شكل خطراً كبيراً على تطور المجتمع العراقي وتقدمه نتيجة الوضع الذي عاشه العراق للفترة ما بعد ٢٠٠٣، وبناء على ما تقدم ولغرض تقليل وإيقاف ظاهرة الاغتراب يجب وضع السياسات الناجعة للحد من هجرة العقول والكفاءات العلمية العراقية من خلال توفير بيئة ملائمة من جهة وتطوير قدراتهم من جهة أخرى (كاظم، ٢٠١٠).

مشكلة الدراسة:

تعد ظاهرة اغتراب العقول واحدة من أكثر المشكلات حضوراً والتي تواجه بلدان المنطقة وفي مقدمتها العراق فهي تشكل ظاهرة سلبية وخطيرة من الناحيتين العلمية والاقتصادية والتي تؤثر على الخطط التنموية للبلد، لكونها انعكاساً لحالة عدم الاستقرار السياسي والاقتصادي والأمني التي يعيشها العراق ، فقد أصدر مكتب حقوق الانسان التابع للأمم المتحدة بيانات تخص عدد المهاجرين بعد عام ٢٠٠٣ والذي تجاوز (١٨٠,٠٠٠) الف مهاجر عراقي من بينهم مجموع من الكفاءات والنخب العلمية الذين نجو من الاغتيالات المبرمجة والتي سقط فيها اكثر من (١٦٠) طبيب واكثر من (٢٠٠) أستاذ جامعي (بعثة الأمم المتحدة، ٢٠٠٧). بالإضافة الى تقرير وزارة الهجرة والمهجرين العراقية والذي حدد عدد الأكاديميين والاطباء والعلماء المهاجرين بعد عام ٢٠٠٣ وحتى نهاية عام ٢٠٠٦ بـ (٣٠,٠٠٠) ألف مهاجر (وزارة الهجرة والمهجرين، ٢٠٠٧). لذا جاءت هذه الدراسة لتحديد

مواطن الخلل في سياسة مؤسسات الدولة تجاه الكفاءات العلمية، والسبل الكفيلة للحد من اغتراب العقول والكفاءات العراقية.

اهداف الدراسة:

- ١- تحديد حجم الكفاءات من حملة شهادة الدكتوراه الذين غادروا العراق.
- ٢- التعرف على مسببات الاغتراب للكفاءات العراقية وتحديد المعالجات المثلى للحد من تلك الظاهرة.
- ٣- إيجاد الحلول المناسبة من خلال وضع سياسات ناجعة لإدارة الموارد البشرية في العراق.

فرضيات الدراسة:

- "الفرضية H0 : لا يوجد أثر ذو دلالة إحصائية عند مستوى ($\alpha = 0.05$) لسياسات إدارة الموارد البشرية على اغتراب العقول العراقية".
- "الفرضية H1 : يوجد أثر ذو دلالة إحصائية عند مستوى ($\alpha = 0.05$) لسياسات إدارة الموارد البشرية على اغتراب العقول العراقية".

أهمية الدراسة:

- ١- عمل الباحثان على ربط سياسات إدارة الموارد البشرية المتبعة في بعض المؤسسات الحكومية محل البحث مع ظاهرة الاغتراب التي باتت منقشية بين الأكاديميين والعلماء والمفكرين من حملة شهادة الدكتوراه والتي تؤثر سلباً على التنمية المستدامة.
- ٢- جاءت هذه الدراسة لإيجاد خطة مستقبلية للحد من اغتراب الكفاءات العراقية وتحقيق التنمية المستدامة .
- ٣- سعى الباحثان في هذه الدراسة الى تزويد متخذي القرار بمجموعة بيانات يمكن من خلالها تحديد احتياجات الكفاءات والعلماء والتي من الممكن ان تكون سبباً للحد من ظاهرة الاغتراب وتحقيق التنمية المستدامة .

٤- تقديم مجموعة "مقترحات وتوصيات للمؤسسات العراقية" التي تعاني من نفس المشكلة لمعالجة ظاهرة الاغتراب.

حدود الدراسة:

"تمثلت حدود الدراسة فيما يلي":

١. الحدود المكانية: "اقتصرت الدراسة على مؤسسات التربية والتعليم في محافظة صلاح الدين /العراق.
٢. الحدود البشرية: "اقتصرت الدراسة على آراء حملة شهادة الدكتوراه العاملين في (مديرية تربية صلاح الدين / جامعة تكريت / جامعة سامراء)".
٣. الحدود الزمانية: انجزت الدراسة خلال الفصل الاول من العام ٢٠١٩.

محددات الدراسة:

- لا بد لأي بحث من متاعب وصعوبات وتحديات تواجه الباحث خلال فترة اعداد البحث، وفي هذا البحث يمكن تلخيصها بما يلي:
- ١- عزوف بعض افراد العينة في ابداء آرائهم حيث كان البعض منهم يرفض الاجابة على الاستبانة لأسباب امنية بحتة.
 - ٢- تحددت نتائج هذه الدراسة بدرجة صدق أداة الدراسة وثباتها، وبدرجة موضوعية استجابة المبحوثين من أفراد عينة الدراسة وأمانتهم العلمية.

المخطط الاجرائي للدراسة:

يتناول المخطط الاجرائي للدراسة التأثير "ذو دلالة إحصائية لسياسات إدارة الموارد البشرية على اغتراب العقول العراقية لحاملي شهادة الدكتوراه في محافظة صلاح الدين" وحسب الشكل رقم (١).



الشكل (١) نموذج البحث

مصطلحات الدراسة:

إدارة الموارد البشرية: بأنها تلك الإدارة المسؤولة عن بقاء القوى العاملة في المنظمة والمحافظة عليها وتهيئة الظروف المناسبة للعمل بالإضافة الى تدريبهم وتحفيزهم من أجل الحصول على الأداء الأفضل (Lee et.al, ٢٠١٩). وقد ذكر (أبو

شعير، ٢٠١٦) بان إدارة الموارد البشرية ماهي الا مجموعة من الوظائف الإدارية والقواعد والأساليب المنظمة للعلاقة بين الموظفين وادارتهم والموظفين والعمل بهدف الحصول على أقصى إمكانياتهم وطاقاتهم بما يحقق كفاءة الأداء والوصول للنتائج والأهداف المرغوبة وبمقابل توفير حقوقهم المادية والمعنوية أثناء الخدمة في المؤسسة أو خارجها.

الاغتراب: وهي الهجرة الدائمة للكفاءات والعقول الأكثر تعليماً وتأهيلاً الى خارج أوطانهم بحثاً عن فرص اوسع في مجال تخصصاتهم او عن بيئة مجتمعيه أكثر جاذبية ومستوى معيشة أفضل لهم ولأسرهم (العربي، 2006). ان هجرة العقول هي نوع شاذ من انواع التبادل العلمي بين الدول يتسم بالتدفق في اتجاه واحد نحو البلدان الجاذبة والذي

يطلق عليه بالنقل العكسي التكنولوجية وحسب راي منظمة اليونسكو (الاتحاد البرلماني العربي، ٢٠٠١) وبناء على ما تقدم فان ظاهرة اغتراب العقول ماهي الا شكل من أشكال التبادل العلمي الغير السليم بين الدول والذي يكون عادة بتجاه واحد ولصالح الدول الأكثر تقدماً والاكثر جذباً واستقراراً والتي تعمل على الاستخدام الأمثل لمهاراتهم وكفاءتهم بسبب ما يعانونه من معاناة علمية أو سياسية أو أمنية أو اقتصادية او قانونية داخل بلدانهم الأصلية (Brock & Blake,2014).

الدراسات السابقة:

دراسة (Docquier and Rapoport,2007) بعنوان "هجرة الكفاءات من منظور البلدان النامية " هدفت الدراسة لمعرفة تأثير الهجرة الخارجية على رأس المال البشري في الدول النامية المصدرة للعمالة واعتمدت الدراسة في الحصول على البيانات على الدراسة المعدة حول دول منظمة التعاون الاقتصادي والتنمية خلال الفترة 1990 - ٢٠٠٠ إضافة إلى التحديث الذي تم في العام 2007 كما استعانت الدراسة بتقارير الأمم المتحدة المتعلقة بظاهرة هجرة العقول، ونتائج التعداد السكاني في عدد من الدول محل الدراسة، و "توصلت الدراسة الى مجموعة من النتائج أهمها أنه من الصعب منع الهجرة للعقول والكفاءات في ظل ضعف القدرات المؤسسية ووجود فجوة واضحة في التنمية الاقتصادية والاجتماعية للبلدان محل البحث" . وتوصلت الدراسة الى جملة من التوصيات أبرزها العمل بشكل دؤوب على عودة المغتربين لبلادهم والاستفادة من خبراتهم من خلال توفير الموارد المالية والسياسات اللازمة لجذبهم، من خلال صياغة استراتيجية وطنية لجذب ودمج هذه الكفاءات. دراسة (مطرية واخرون، ٢٠٠٨) بعنوان "هجرة الأدمغة من المجتمع الفلسطيني مع دراسة استكشافية لقطاعي الصحة والتعليم العالي" هدفت الدراسة لتحديد ظاهرة هجرة الأدمغة في قطاعي الصحة والتعليم العالي في الضفة الغربية وقطاع غزة حيث استخدمت الدراسة المنهج الوصفي التحليل قد بلغت العينة المبحوثة (240) مبحوث و

توصلت الدراسة إلى نتائج أهمها ان نسبة الهجرة في المجتمع المبحوث قد بلغت (30.8 %) كانت (٧%) هجرة دائمة و (23.8 %) هجرة مؤقتة وكان منها (79.7%) بسبب الوضع السياسي والأمني بالإضافة الى (٧٧,٢%) كانت رغبتهم في التطور العلمي في مجال تخصصاتهم "وأوصت الدراسة بمجموعة توصيات أهمها العمل على خلق البيئة الاقتصادية والاجتماعية والتعليمية والصحية المواتية لجذب الكفاءات والحفاظ عليها والتي بدورها ستحد من ظاهرة هجرة العقول" .

دراسة (السوداني ، ٢٠١٢) بعنوان "هجرة الكفاءات العراقية أسبابها ومعالجتها" هدفت الدراسة لتحديد اهم مشكلة تواجه العراق اليوم هو حرمانهم من علمائهم وكفاءته والتي ألحقت الضرر الكبير في عجلة تقدم العراق، لذا جاءت هذه الدراسة لتحديد أسباب الرئيسية التي دعت إلى هجرة الكفاءات العراقية وتوصلت الدراسة الى مجموعة من النتائج أهمها أن العولمة كانت سبباً من الاسباب الرئيسية التي دعت إلى هجرة الكفاءات والخبرات وهو مبتغاة الدول العظمى المصدرة للعولمة بهدف تحقيق الثراء والنعيم والتحكم بمصير الشعوب الفقيرة، خرجت الدراسة بمجموعة من التوصيات كان ابرزها تأسيس دائرة متخصصة تعنى بأمر الكفاءات والعلماء وتحدد المشاكل التي تواجههم وإيجاد المعالجات المناسبة من خلال التنسيق مع الوزارات العراقية والمؤسسات كافة لأغراض الحد من هجرتهم .

دراسة (Theodoropoulos et.al,2014) بعنوان " ظاهرة "هجرة الأدمغة" في اليونان: العلماء اليونانيون الشباب في طريقهم إلى الهجرة ". المواقف والآراء والمعتقدات تجاه الهجرة" هدفت الدراسة إيجاد الطرق المناسبة للتعامل مع ظاهرة هجرة الأدمغة في اليونان وخصيصا للتحقيق في مواقف الطلاب الجامعيين وطلاب الدراسات العليا في حالة التفكير في الهجرة إلى الخارج لأغراض العمل وفي سياق الأزمة الاقتصادية التي تمر بها اغلب البلدان في العالم، "حيث استخدمت الدراسة المنهج الوصفي التحليل حيث بلغت عينة الدراسة (٤٠٠) طالب و توصلت الدراسة الى مجموعة من النتائج أهمها أن نمط الحياة

والبيئة المنظمة والرواتب المرتفعة التي تقدمها الدول المضيفة تزيد من احتمالية عدم العودة الطلبة اليونانيين"، ودور الأسرة الذي يعتبر في بعض الاحيان العامل الأكبر في قرار العودة أو البقاء في الخارج، "كما بينت الدراسة أن طول فترة الإقامة في البلد المضيف يقلل من احتمالية العودة. "وتوصلت الدراسة الى جملة من التوصيات أبرزها تشجيع الكفاءات والعقول المهاجرة على العودة إلى اوطانهم الأصلية للمساهمة في معالجة الآثار السلبية المترتبة على هجرتهم"، بالإضافة لتقديم حوافز شخصية ومعنوية لهم تحثهم على العودة.

دراسة (الشمري ، ٢٠١٦) بعنوان " ظاهرة نزيف هجرة العقول العربية أسبابها انعكاساتها سبل معالجتها العراق حالة دراسية لمدة من ١٩٨٠-٢٠٠٦" هدفت الدراسة التعرف على مفهوم الهجرة وتاريخه بشكل عام وهجرة العقول العربية بشكل خاص وانعكاساتها السلبية على التنمية في الدول العربية واقتراح السياسات والإجراءات الكفيلة بمعالجة هذه الظاهرة حيث استخدمت الدراسة "المنهج الوصفي التحليل، وتوصلت الدراسة الى مجموعة من النتائج أهمها وجود علاقة متبادلة بين التنمية وهجرة الكفاءات العلمية لذلك فان مسيرة التنمية الاقتصادية والاجتماعية في البلدان العربية" ستبقى معطلة ومتعثرة بسبب فقدان الكفاءات العلمية.وتوصلت الدراسة الى جملة من التوصيات أبرزها على الدول العربية ومن ضمنها العراق اتخاذ قرارات مناسبة لتشغيل الكفاءات العلمية المحلية في مشاريع البناء والتطوير والتنمية لبلدانهم وعدم تفضيل الخبرات الأجنبية عليهم.

دراسة (Muthanna & Sang,2018) بعنوان " هجرة الأدمغة في التعليم العالي اراء التدريسيين في اليمن" هدفت الدراسة إلى معرفة الأسباب الموضوعية الكامنة وراء استنزاف الكفاءات العلمية اليمنية، وتوضيح الانعكاسات السلبية لهجرة هذه الكفاءات على عملية التنمية المحلية حيث اعتمد الباحثان على المنهج الوصفي التحليلي من خلال وصف الظاهرة من الناحية النظرية وامتدادها التاريخي والمعرفي إلى أن يصل التحليل إلى البيانات المستمدة من الواقع من خلال المقابلة التي اجراها الباحثان لمجموعة من التدريسيين من

حملة شهادة الدكتوراه في احدى الجامعات اليمنية، وتوصلت الدراسة الى مجموعة من النتائج أهمها، هجرة الكثير من للتدريسيين اليمنيين بسبب الصراعات الداخلي والاقتتال الطائفي، بالإضافة قلة الدعم المقدم للبحث العلمي بسبب نقص الموارد. وتوصلت الدراسة الى جملة من التوصيات أبرزها العمل على معالجة الوضع الأمني والسياسي في اليمن من خلال اتخاذ سياسات اقتصادية، ثقافية، علمية، اجتماعية مشجعة للكفاءات العلمية للعمل في بلادهم وتعزيز قيم الحرية والديمقراطية والمساواة.

إجراءات الدراسة:

"من أجل تحقيق أهداف الدراسة، فقد استخدم الباحثان المنهج الوصفي التحليلي للتعامل مع البيانات وتصنيفها بحيث تصف الظاهرة والمجتمع المبحوث، من خلال قيام الباحثان بتسجيل مشاهدات وأحداث متاحة للدراسة والقياس وبعد المعالجات الإحصائية قام الباحثان باستقراء المعلومات والتوصل للنتائج واقتراح التوصيات المناسبة حول موضوع الدراسة".

مجتمع الدراسة ووحدة المعاينة:

"تكون مجتمع الدراسة من حملة شهادة الدكتوراه العاملين في (مديرية تربية صلاح الدين/ جامعة تكريت/ جامعة سامراء). حيث اخذت العينة بطريقة العينة العشوائية البسيطة وذلك لكبر حجم هذا المجتمع".

اما وحدة المعاينة فتم اختيار (٢٠٠) عينة، "وقد تم توزيع (٢٠٠) استبانة على وحدة المعاينة، وتم استرداد (١٤٥) استبانة كان الصالح منها للتحليل الاحصائي هو (١٢٢)، اي ما نسبته (٦١%) من مجموع الاستبانات التي تم استرجاعها".

أداة الدراسة:

لغرض الحصول على البيانات والمعلومات في تنفيذ مقاصد الدراسة، تم الاعتماد على الاستبانة وهي اداة قياس إدراكية تم الاعتماد "في تطويرها على آراء مجموعة من الكتاب والباحثين والدراسات السابقة ذات العلاقة للحصول على البيانات الأولية والثانوية اللازمة

لاستكمال الجانب التطبيقي للدراسة لقد قام الباحثان بتطوير استبانة الدراسة بحيث تغطي جميع أبعاد متغيرات الدراسة المستقلة والتابعة، والتي تألفت من جزئيين "رئيسيين: الجزء الأول يتعلق بالمتغيرات الديمغرافية لأفراد عينة الدراسة وعددها (٤) وهي (الجنس، والعمر، المؤهل العلمي، وعدد سنوات الخدمة)، أما الجزء الثاني من الاستبانة فتكون من أربعة أبعاد ، هي:

- البعد الأول وهو بعد الاوضاع السياسية، ويشمل على (٥) فقرات.
 - البعد الثاني وهو بعد الاوضاع الاقتصادية والأمنية، ويشمل على (٥) فقرات.
 - البعد الثالث وهو بعد الأوضاع والإدارية والقانونية، ويشمل على (٥) فقرات.
 - البعد الرابع وهو بعد اغتراب العقول والكفاءات، ويشمل على (٥) فقرات.
- "توزعت إجابات أفراد عينة الدراسة على فقرات الاستبانة وفقاً لمقياس ليكرت الخماسي" الجدول (١).

جدول (١)

مقياس ليكرت الخماسي المستعمل لقياس فقرات الاستبانة

موافق بشدة	موافق	محايد	غير موافق	غير موافق بشدة
(٥) درجات	(٤) درجات	(٣) درجات	(٢) درجة	(١) درجة

وقد استخدم الباحثان المقياس الآتي في تحليل البيانات:

الحد الأعلى للمقياس - الحد الأدنى للمقياس / عدد الفئات =

$1-5 = 3/4 = 3/1 = 1,33$ طول الفئة وبهذا تصبح الفئات على النحو الآتي:

- من (١-٢,٣٣) منخفض.

- من (٢,٣٤-٣,٦٧) متوسط.

- من (٣,٦٨-٥) مرتفع.

وتم تقسيم الدرجات إلى ثلاثة مستويات وعلى النحو الآتي:

- مستوى منخفض إذا تراوحت المتوسطات الحسابية بين (١-٣٣,٢).
- مستوى متوسط إذا تراوحت المتوسطات الحسابية بين (٣٤-٢,٦٧,3).
- مستوى مرتفع إذا تراوحت المتوسطات الحسابية بين (٦٨-٣,٥).

صدق وثبات أداة الدراسة:

صدق الأداة: "للتأكد من أن المقياس المستخدم في هذه الدراسة يقيس بالفعل ما ينبغي أن يقاس، تم إعداد الاستبانة بشكلها الأولي، ومن ثم عرضت على الخبراء والأكاديميين المتخصصين، في حقل إدارة الأعمال لإبداء ملاحظاتهم حول انتماء كل فقرة إلى المجال الذي تقيسه وحسن الصياغة ووضوح الفقرات وإعادة صياغة بعض الفقرات وإجراء التعديلات المطلوبة على مضامين الاستبانة في فقراتها وإخراجها بشكلها النهائي".

ثبات الأداة: "ولحساب ثبات أداة الدراسة تم تطبيق اختبار كرونباخ ألفا (Cronbach Alpha) لكل متغير بجميع أبعاده من متغيرات الدراسة، نتائج الاختبار حيث كانت قيم كرونباخ ألفا لجميع متغيرات الدراسة وللاستبانة بشكل عام، هي أعلى من (٦٠%) وهي النسبة المقبولة في البحوث والدراسات المتعلقة بالإدارة والعلوم الإنسانية، وفي هذه الدراسة حازت الاستبانة على معاملات ثبات تراوحت ما بين (٦٦% - ٨٥%) كما هو موضح في الجدول" (٢):

الجدول (٢): معامل الثبات لمتغيرات الدراسة (مقياس كرونباخ ألفا)

المتغيرات	كرونباخ ألفا
المتغير المستقل: سياسات إدارة الموارد البشرية	٠,٨٨
بعد الاوضاع السياسية	٠,٦٦

٠,٨٥	بعد الاوضاع الاقتصادية والأمنية
0.89	بعد الأوضاع والإدارية والقانونية
٠,٨٥	المتغير التابع: اغتراب العقول والكفاءات

نتائج اختبار الفرضيات:

بهدف ضمان ملائمة "بيانات الدراسة للفرضيات، فقد قام الباحثان بإجراء اختبار معامل تضخم البيانات "Variance Inflation Factor-VIF"، واختبار معامل التضخم المسموح به "Tolerance" وذلك للتحقق من عدم وجود ارتباط عالي بين المتغيرات المستقلة".

الجدول (٣): "اختبار معامل تضخم التباين (VIF) والتباين المسموح به ومعامل الالتواء لأبعاد سياسات إدارة الموارد البشرية"

الأبعاد	معامل تقييم التباين (VIF)	التباين المسموح به Tolerance	قيمة معامل الالتواء (Skewness)
الايوضاع السياسية	١,٣٠٩	٠,٧٦٤	-٠,٦٧٢
الايوضاع الاقتصادية والأمنية	١,٣٠٩	٠,٧٦٤	-٠,٦٣٦
الأوضاع والإدارية والقانونية	١,٢١٨	٠,٦٣١	-٠,٦٥٩

وكما في الجدول (٣) والذي يحتوي على المتغيرات المستقلة فضلاً عن معامل تضخم التباين (VIF) والتباين المسموح "Tolerance" ولكل متغير، حيث يلاحظ أن قيمة (VIF) لجميع المتغيرات كانت أقل من (٥) وبلغت قيمة ابعاد المتغير المستقل (١,٢٧٨)، وأن "قيمة التباين المسموح (Tolerance) لجميع المتغيرات كانت أكبر من (٠,٠٥) وبلغت (٠,٧١٩) وبناءً على ذلك يمكن القول إنه لا توجد مشكلة حقيقية تتعلق بوجود ارتباط عالٍ بين ابعاد المتغيرات المستقلة".

اختبار الفرضية H0 "التي تنص على أنه لا يوجد أثر ذو دلالة إحصائية عند مستوى الدلالة ($\alpha=0.05$) لسياسات إدارة الموارد البشرية بأبعادها (الأوضاع السياسية، الأوضاع الاقتصادية والأمنية، الأوضاع والإدارية والقانونية) على اغتراب العقول العراقية".
 "ولأجل التعرف على مدى احتمالية الإيجاب والقبول لهذه الفرضية، قام الباحثان بإجراء تحليل الانحدار الخطي (Standard Multiple linear Regression Analysis).

الجدول (٤): ملخص نتائج تحليل تباين الانحدار الخطي المتعدد للفرضية الرئيسية

Std. Error of the Estimate	Adjusted R Square	R ²	R	النموذج	
٠,٣٠٦٨٠	٠,٦٦٠	٠,٣٧١	٠,٦٠٩ ^a	١	سياسات إدارة الموارد البشرية

يظهر جدول (٤) أن معامل الارتباط بين المتغير المستقل والمتغير التابع بلغ (٠,٦٠٩)، وبلغت قيمة معامل التحديد (R^2) (٠,٣٧١)، وتشير تلك النتائج إلى أن المتغير

المستقل فسر ما نسبته (٦٦%) من التغيرات الحاصلة في المتغيرات التابعة، "وفيما يخص النسبة المتبقية من التأثير فتعزى إلى أسباب أخرى".

جدول(٥): "تحليل تباين الانحدار للفرضية الرئيسية ANOVA"

Sig.	F	Mean Square	Df	Sum of Squares		سياسات
.,.,.,.b	٣٥,٠٨٨	٣,٣٠٣	٢	٦,٦٠٥	Regression	إدارة الموارد
		٠,٠٩٤	١١٩	١١,٢٠١	Residual	البشرية
			١٢١	١٧,٨٠٦	Total	

يبين جدول(٥) تحليل تباين الانحدار للفرضية الرئيسية، ويمكن من خلاله معرفة القوة التفسيرية الكلية لمتغيرات سياسات إدارة الموارد البشرية، وبالتالي فقد تم صياغة الفرضيات كما في الآتي:

الفرضية الصفرية: "لا يوجد أثر دال إحصائياً عند مستوى الدلالة ($\alpha = 0.05$) لسياسات إدارة الموارد البشرية بأبعادها (الاضاع السياسية، الاوضاع الاقتصادية والأمنية، الأوضاع والإدارية والقانونية) على اغتراب العقول العراقية".

الفرضية البديلة: "يوجد أثر دال إحصائياً عند مستوى الدلالة ($\alpha = 0.05$) لسياسات إدارة الموارد البشرية بأبعادها (الاضاع السياسية، الاوضاع الاقتصادية والأمنية، الأوضاع والإدارية والقانونية) على اغتراب العقول العراقية".

ويتضح من الجدول(4) وجود علاقة معنوية بمستوى دلالة ($\text{Sig} = 0.000$) وهو أقل من مستوى الدلالة ($\alpha = 0.05$)، وعليه يكون نموذج الانحدار ملائم لقياس العلاقة بين المتغير المستقل والمتغير التابع.

وبناءً على ذلك فقد تم رفض الصفرية وقبول الفرضية البديلة أي أنه: يوجد أثر دال إحصائياً عند مستوى الدلالة ($\alpha = 0.05$) لسياسات إدارة الموارد البشرية بأبعادها (الاضاع

السياسية، الاوضاع الاقتصادية والأمنية، الأوضاع والإدارية والقانونية) على اغتراب العقول العراقية.

وبالتالي فإن هناك أثر لسياسات إدارة الموارد البشرية المتبعة في المؤسسات محل البحث كانت تحد من اغتراب العقول العراقية التي تؤثر وبشكل اساس على التنمية المستدامة.

وبناء على ما تقدم يمكن القول بأنه يوجد بُعد مستقل واحد على الأقل يؤثر في المتغير التابع، والذي يمكن أن يكون معنوياً، ويوضح الجدول (٦) نتيجة تحليل الانحدار ومعرفة تأثير لسياسات إدارة الموارد البشرية كوحدة واحدة على اغتراب العقول العراقية.

الجدول(٦) نتيجة تحليل الانحدار (Coefficients) للفرضية الرئيسية"

Sig*	T	Standardized Coefficients	Unstandardized Coefficients		المتغيرات
		Beta.	Std. Error	B	
*٠,٠٠٠	٤,٦٢٦		٠,٣٢٤	١,٤٩٩	(Constant)
*٠,٠١٩	٢,٣٢٢	٠,١٨٨	٠,٠٨٦	٠,٢٠٠	الايوضاع السياسية
*٠,٠٠٠	٦,٤٦٠	٠,٥٢٣	٠,٦٦	٠,٤٢٨	الايوضاع الاقتصادية والأمنية
*٠,٠٣٨	٤,١١٩	٠,٢٣٦	٠,٧٢	٠,٣١١	الأوضاع والإدارية والقانونية

* "ذات دلالة إحصائية عند مستوى دلالة ($\alpha = 0,05$)"

يظهر من الجدول (٦) تحليل نتيجة الانحدار (Coefficients) للفرضية الرئيسية، وتبين أن كلا ابعاد المتغير المستقل كان له تأثيراً دالاً إحصائياً في اغتراب العقول والكفاءات العراقية وذلك باعتبار أنهم "أقل من المستوى المعنوية البالغ (٠,٠٥)", حيث بلغ

مستوى الدلالة لُبُعد الاوضاع السياسية (٠,٠١٩)، و Beta (٠,١٨٨) أما بُعد الاوضاع الاقتصادية والأمنية قد بلغ مستوى الدلالة (0.000) و Beta (٠,٥٢٣)، بالإضافة بُعد الأوضاع والإدارية والقانونية فقد بلغ مستوى الدلالة (0.038) و Beta (0.236) وكانت نتيجة اختبار (T) لُبُعد الاوضاع السياسية وُبُعد الاوضاع الاقتصادية والأمنية وُبُعد الأوضاع والإدارية والقانونية على التوالي (٢,٣٢٢)، (٦,٤٦٠) (٤,١١٩).

النتائج:

لقد أجرينا مسحا شاملا لأدبيات الموضوع لغرض فهم حدود الظاهرة المطلوب دراستها، الامر الذي مكنا من الوقوف على حدود مشكلة الدراسة، "وبعد تحليل النتائج التي توصلنا اليها من خلال الاسئلة التي تم توجيهها الى الشرائح مدار البحث فقد توصلنا للنتائج التالية":
١- أظهرت نتائج الدراسة عدم تناسب الدخل مع الجهد البدني والذهني المقدم من قبل حملة شهادة الدكتوراه، حيث اتضح ان سلم الأجور والرواتب التي تمنح للكفاءات العلمية بحاجة الى تعديل وهو جزء من سياسات إدارة الموارد البشرية التي سوف تؤدي بالنهاية الى تحقيق التنمية المستدامة.

٢- أظهرت نتائج الدراسة ضياع الجهود والطاقات الإنتاجية والعلمية لهذه العقول والتي تستقبلها وتحضنها بلدان أخرى بسبب السياسات الإدارية المتهاكمة.

٣- أظهرت النتائج أن هناك استهداف واضح للكفاءات العراقية من خلال التهديد او الاغتيال والتي أجبرتهم على الاغتراب في تلك الفترة وهذا دليل على ضعف السياسات المتبعة من قبل إدارة الموارد البشرية فيما يخص الامن وحماية الكفاءات العراقية.

٤- أظهرت النتائج أن هناك عجز المؤسسات العراقية العامة في استيعاب الكفاءات والعقول من خلال القصور في توفير فرص عمل لائقة تضمن لهم عيشاً كريماً بالإضافة الى عجز القطاع الخاص عن استيعاب تلك الكفاءات وتوظيفها.

- ٥- أظهرت النتائج ان تحسين الأوضاع السياسية والإدارية والقانونية له تأثيراً ذو دلالة إحصائية في الحد من اغتراب العقول وهجرتها.
- ٦- أظهرت النتائج وجود تقصير واضح من قبل المؤسسات التعليمية فيما يخص البحث العلمي، حيث لوحظ من خلال إجابات افراد العينة محل البحث بان الموازنات الخاصة بالبحوث العلمية والبعثات الخارجية قليلة جداً مقارنة مع البلدان العربية الأخرى.
- ٧- ضعف الخطط الاستراتيجية التنموية الموضوعة من قبل المؤسسات العراقية وهو احد اهم الاسباب هجرة الكفاءات العراقية الى بلدان الأخرى والتي كان لها الاثر السلبي في تحقيق التنمية المستدامة في العراق في تلك الفترة .

التوصيات

- "وفي ضوء النتائج التي تم التوصل إليها، يقترح الباحثان جملة من التوصيات وهي كما يلي":
- ١- اعادة النظر بسلم الرواتب والأجور التي تمنح للكفاءات العلمية وتقديم الحوافز التشجيعية وربطها بالإنتاج العلمي والبحث الأكاديمي.
 - ٢- إجراء مسح شامل لمتطلبات واحتياجات الكفاءات العراقية المغتربة بهدف الوصول الى الاسباب الحقيقية للهجرة وايجاد الحلول المناسبة والتي تحد من ظاهرة اغتراب العقول والكفاءات العلمية.
 - ٣- العمل على تحسين بيئة البحث العلمي وبما يتوافق مع معطيات العصر ومتطلبات التنمية المستدامة من خلال وضع خطط تنموية خاصة بالمؤسسات التي تحتضن الكفاءات العراقية من حملة شهادة الدكتوراه.
 - ٤- اعادة صياغة النظم القانونية والإدارية وبما يكفل توفير بيئة امنة تشجع العقول العراقية المهاجرة للعودة الى العراق وتقديم ما تمتلكه من خبرات وقدرات لخدمة البلد.

٥- يوصي الباحثان بإعطاء الكفاءات والعلمية حرية الوصول إلى مختلف علوم المعرفة والتطورات العلمية وتبادل المعلومات والأفكار والدراسات والبحوث، من خلال استخدام وسائل المعرفة الحديثة.

٦- العمل على التنسيق بين القطاعين العام والخاص بهدف خلق فرص تشغيل للكفاءات العراقية للحد من اغترابهم.

٧- تعزيز أواصر الثقة بين المؤسسات التربوية والاكاديمية داخل العراق والكفاءات المغتربة عن طريق تبادل الأفكار والآراء حول مختلف المشاريع العلمية والبحثية.

٨- العمل على إيجاد الحلول الأمنية الكفيلة بتوفير الامن للكفاءات العراقية حيث ان مجتمع البحث قد خسر العديد من عناصره نتيجة الاغتيالات المتكررة للأساتذة الجامعيين العراقيين مما دفع بهم للهجرة خارج البلد للفترة من ٢٠١٤-٢٠١٦.

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فاعلية النانو ثاني اوكسيد التيتانيوم (TiO_2) في معالجة المخلفات السائلة لمعامل الالبان

The effectiveness of TiO_2 in treating dairy waste products

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Abstract

Untreated samples were used (control), the first treatment, the second treatment, the samples were treated by mechanical treatment, and in the third treatment, samples were treated with TiO₂ nanoparticles. As it reached (90,23) NTU, respectively, compared with the untreated treatment, which amounted to 407NTU. Also, it can be noted from the results that the electrical conductivity values were at (1000,1600,1738) microsmins / liter for the untreated samples, the mechanical treated samples and the chemically treated samples respectively. . It is also noted from the results that the values of the biological oxygen requirement and the chemical oxygen requirement have decreased significantly when treated with nanoparticles, reaching (119.35) mg / liter⁻¹, respectively, compared with the untreated treatment and the mechanical treatment treatment, which was (323.109) mg / liter. Liter⁻¹, (223,60) mg / liter⁻¹, respectively, as for the heavy metal elements (copper, iron, manganese), the chemical treatment reduced the concentration of these elements, as it recorded (0.05,1.2,1.1) mg / liter. 1, respectively, compared with its concentration in the untreated treatment, reaching (0.7,6.2,4.14) and in the mechanical treatment treatment (0.08,2.5,2.6) mg / L⁻¹, respectively.

Key words: : Titanium dioxide (TiO₂), industrial effluents, dairy plants, biological oxygen requirement.

الخلاصة

تم استخدام عينات غير معالجة (السيطرة) المعاملة الاولى، اما المعاملة الثانية فتم معالجة العينات معالجة ميكانيكية، وفي المعاملة الثالثة تم معالجة العينات باستخدام جسيمات ثنائي اوكسيد التيتانيوم النانوية TiO_2 ، بينت الفحوصات الفيزيائية ان المعالجة الميكانيكية والمعالجة النانوية (TiO_2NPs) ادت الى خفض قيم الكدرة اذ بلغت (٩٠،٢٣) NTU على التوالي مقارنة مع المعاملة غير المعالجة والتي بلغت ٤٠٧ NTU. كذلك يلاحظ من النتائج ان قيم التوصيلية الكهربائية كانت عند (١٠٠٠،١٦٠٠،١٧٣٨) مايكروسمينز/لتر للعينات غير المعالجة والعينات المعالجة ميكانيكية والعينات المعالجة كيميائية على التوالي. كذلك يلاحظ من النتائج ان قيم المتطلب البيولوجي للأوكسجين والمتطلب الكيميائي للأوكسجين قد انخفض انخفاضٍ معنوي عند المعالجة باستخدام الجسيمات النانوية اذ بلغت (١١٩،٣٥) ملغم /لتر^{-١} على التوالي مقارنة مع المعاملة غير المعالجة والمعاملة المعالجة ميكانيكية والتي كانت (٣٢٣،١٠٩) ملغم /لتر^{-١}، (٢٢٣،٦٠) ملغم /لتر^{-١} على التوالي، اما العناصر المعدنية الثقيلة (النحاس، الحديد، المنغنيز) فقد ادت المعالجة الكيميائية الى خفض تركيز هذه العناصر اذ سجلت (٠،٠٥،١،٢،١،١) ملغم /لتر^{-١} على التوالي مقارنة مع تركيزها في المعاملة غير المعالجة اذ بلغت (٠،٧،٦،٢،٤،١٤) وفي المعاملة المعالجة ميكانيكية (٠،٠٨،٢،٥،٢،٦) ملغم /لتر^{-١} على التوالي.

الكلمات المفتاحية: ثنائي اوكسيد التيتانيوم (TiO_2)، المخلفات السائلة الصناعية، معامل الالابان، المتطلب البيولوجي للأوكسجين.

المقدمة

مشكلة شحة المياه في العالم تفاقمت وازداد أثرها السلبي مما جعل الباحثين يفكرون في ايجاد حلول لتلك المشكلة، فكان من بين الحلول المطروحة استعمال مياه الفضلات المعالجة لأغراض الري الزراعي، وعلى سبيل المثال فان المملكة العربية السعودية اعتمدت على استعمال ٦٥ % من مياه الفضلات لأغراض السقي في عام ٢٠١٦ وفقا لما جاءت به منظمة *Environmental Protection Agency (EPA)* [1]. لذا الحل الانسب لتقليل فقد المياه هي معالجة المخلفات السائلة بكل أشكالها والتخلص منها أصبح ضروري نتيجة لنمو السكان المترافق مع ازدياد الاحتياجات البشرية من حيث الموارد المائية النظيفة بالإضافة إلى نمو الاحتياج البشري لمنتجات الالبان [2]. ومن تقنيات المعالجة الكيماوية المستخدمة حديثا في معظم القطاعات الطبية والصناعية والزراعية وغيرها هي تقنية النانو والتي أثبتت فعاليتها العالية من حيث الكفاءة والكلفة، فقد ساهمت هذه التقنية في معالجة مياه الفضلات كأحد المعالجات المقترحة لإعادة التدوير وازالة الملوثات وبكفاءة عالية باعتبارها طريقة مستحدثة عن الطرق التقليدية [3]. كما اشارت الدراسات إلى أن استخدام مركب ثاني اوكسيد التيتانيوم TiO_2 ذو فاعلية عالية في معالجة مياه المخلفات السائلة الصناعية ولاسيما في ترسيب وامتزاز الملوثات الصلبة والذائبة كما بينت دراسة السامرائي [4] ان مياه الفضلات التي احتوت على المركبات العضوية تتحلل الملوثات فيها بشكل انتقائي باستخدام أنشطة تحفيزية بإضافة مواد نانوية.

مواد وطرائق العمل

تحضير العينات: اجريت الدراسة على بعض معامل الالبان في محافظة كركوك للفترة من ٢٠٢٠/١١/٨ ولغاية ٢٠٢١/١/٢٢، إذ تم جمع عينات المخلفات الصناعية السائلة من المعامل المذكورة اعلاه قبل المعالجة واعتبرت عينة المقارنة، وكذلك تم جمع عينات

المخلفات السائلة بعد المعالجة الميكانيكية والنانوية ووضعت في قناني بلاستيكية (بولي اثيلين) نظيفة ومعقمة سعة (١٠٠٠ مل) وحفظت في الثلاجة لحين اجراء الفحوصات عليها.

المعالجة الميكانيكية للمخلفات السائلة: تترسب المواد الصلبة في احواض الترسيب الاولية وعادة ما تكون هذه الاحواض عريضة بشكل يسمح للمواد الصلبة الخفيفة، والدهون والزيوت بان تطفو عل سطح الماء، بحيث يسهل قشطها وازالتها ويتم ذلك بواسطة الحجز بالمصافي، وفصل المواد الزيتية والشحوم والمواد العالقة القابلة للترسيب^[5].

المعالجة الكيميائية للمخلفات السائلة: استعمل في الدراسة الحالية مسحوق ثاني اوكسيد التيتانيوم (TiO_2) النانوي امريكي المنشأ ذو الحجم الجزيئي ٢٥ نانومتر وبتركيز ٢٥ ملغم/ لتر^{-١} والمصنع وفقا للمواصفات الصناعية المطابقة لتكنولوجيا النانو، وقد استخدم تركيز ٢٥ ملغم/لتر^{-١} لان هذا التركيز قد حقق اعلى نسبة الازالة للعناصر الثقيلة في معالجة مياه الفضلات الصرف الصحي والصناعي الخام^[6].

الفحوصات الفيزيائية: تم قياس الكدرة بواسطة جهاز Turbidity meter وحسب الطريقة المتبعة من قبل^[7]. بينما قدرت التوصيلية الكهربائية باستخدام جهاز Multi parameter analyzer وحسب الطريقة المعتمدة من قبل^[8]. اما الاملاح الذائبة الكلية قيست بنفس الخطوات السابقة بجهاز التوصيلية الكهربائية وحسب الطريقة المذكورة من قبل^[9].

الفحوصات الكيميائية: تم قياس درجة الاس الهيدروجيني باستخدام جهاز pH meter وتم اخذ القراءات لكل عينة^[10]. بينما تم قياس قيم المتطلب البيولوجي للأوكسيجين (BOD) حسب الطريقة المتبعة من قبل^[11]. وتم تحديد قيم المتطلب الكيميائي للأوكسيجين (COD) باستخدام جهاز Spectrophotometer وحسب الطريقة المعتمدة من قبل^[12].

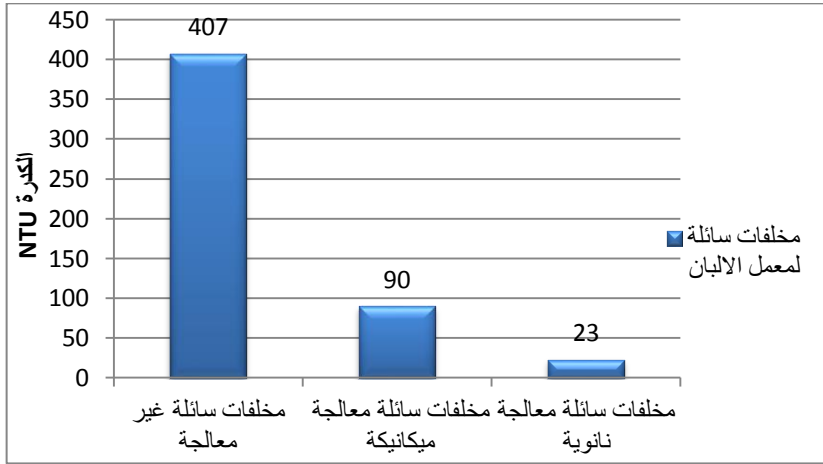
قياس نسبة العناصر الثقيلة: قيس نسب التراكيز للعناصر الثقيلة (Mn ، Cu ، Fe) في الماء بواسطة استخدام جهاز امتصاص الذري Atomic Absorption Spectrophotometer وحسب الطريقة المعتمدة من قبل [13].

التحليل الإحصائي : حلت نتائج التجارب باستخدام النموذج الخطي العام (Linear Model General) ضمن البرنامج الإحصائي الجاهز^[14]. لدراسة تأثير العوامل على وفق التصميم العشوائي الكامل CRD كما أجري إختبار دنكن^[15] لتحديد معنوية الفروق ما بين متوسطات العوامل المؤثرة على الصفات المدروسة عند مستوى (0.05).

النتائج والمناقشة

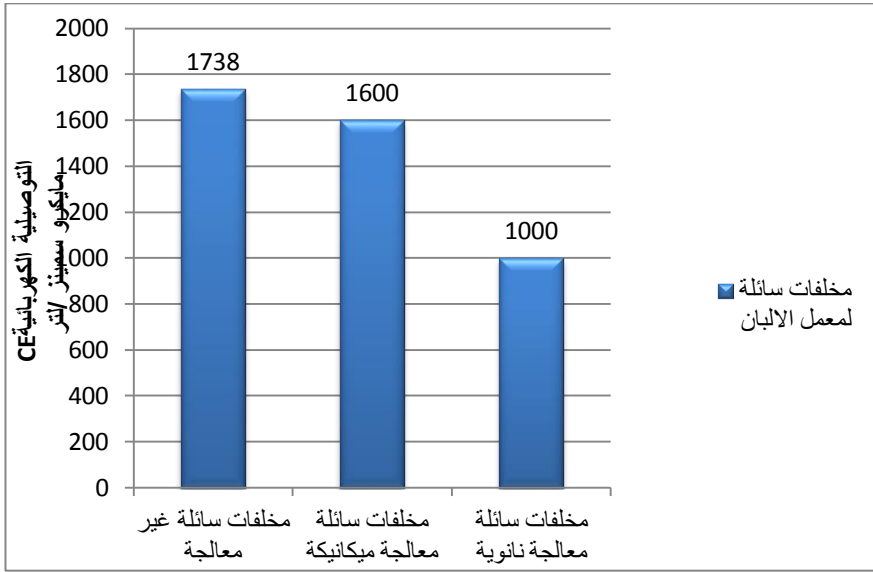
تأثير المعالجة الكيميائية على الخواص الفيزيائية للمخلفات السائلة

الكدرة: يلاحظ من الشكل (٤-١) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم الكدرة اذ بلغت (٩٠) NTU ، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٤٠٧) NTU لمعامل الالبان ، اما المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO₂) قد ادت الى انخفاض معنوي في قيم الكدرة اذ سجلت (٢٣) NTU لمعمل الالبان مقارنة مع المعاملة غير المعالجة، ان انخفاض قيم الكدرة للمعاملة المعالجة بالجسيمات النانوية قد تعزي الى حدوث عملية ترسيب لدقائق الطين والغرين وكذلك ترسيب المواد العالقة والمواد الذائبة الصلبة خاص بعد معالجة المياه فيزيائيا. وهذه الدراسة تتسجم مع ما توصل اليه السامرائي^[16] الذي وجد ان معاملة المخلفات السائلة الصناعية ادى الى انخفاض قيم الكدرة مقارنة مع قيمتها قبل المعالجة



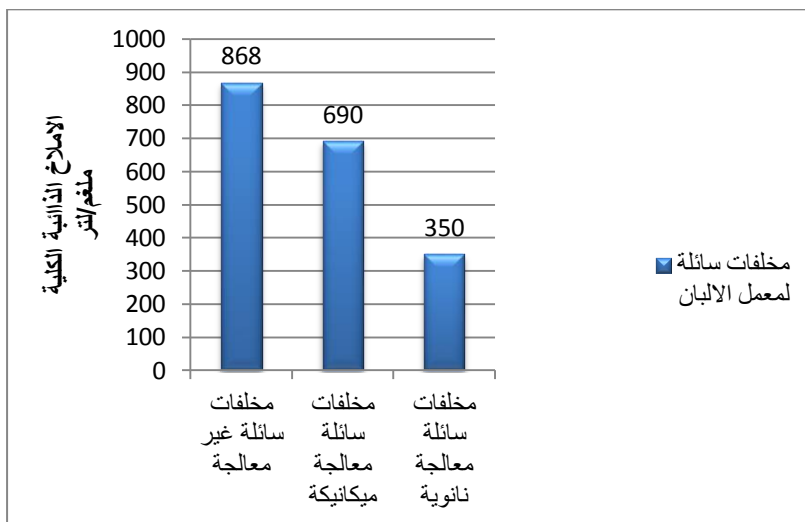
الشكل (٤-١) تأثير المعالجة النانوية (TiO_2) على الكدرة

التوصيلية الكهربائية: يلاحظ من الشكل (٤-٢) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم التوصيلية الكهربائية اذ بلغت (١٦٠٠) مايكرو سيمنز/لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (١٧٣٨) مايكرو سيمنز/لتر، اما المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم التوصيلية الكهربائية اذ سجلت (١٠٠٠) مايكرو سيمنز/لتر مقارنة مع المعاملة غير المعالجة. ان الارتفاع النسبي لقيم التوصيل الكهربائي في المياه الصناعية لمعامل الاغذية بصورة عامة المدروسة يعزى لكون مياهها مشابه للمخلفات السائلة المنزلية وعادتا ما تكون محملة بكميات كبيرة من الاملاح مؤدية الى زيادة التوصيلية الكهربائية، وهذه الدراسة تتقارب مع ما جاء به العلاوي^[17] الذي أشار الى دور الجسيمات النانوية في خفض قيم التوصيلية الكهربائية من المخلفات السائلة الصناعية في معامل الاغذية .



الشكل (٤-٢) تأثير معالجة المياه الصناعية بمادة الـ TiO_2 على التوصيلية الكهربائية

الاملاح الذائبة الكلية: يلاحظ من الشكل (٤-٣) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم الاملاح الذائبة اذ بلغت (٦٩٠) ملغم /لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٨٦٨) ملغم /لتر، اما المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم الاملاح الذائبة الكلية اذ سجلت (٣٥٠) ملغم/لتر مقارنة مع المعاملة غير المعالجة . ان الزيادة في مستوى الـ TDS لمياه الصرف الصناعية غير المعالج تعزى الى ان مياه المنطقة تكون ملوثة نتيجة التأثير المباشر بفضلات المعامل الصناعية ومعامل التصنيع الغذائي بصورة خاصة ومن محطات غسل السيارات^[18] . وهذا يتفق ما توصل اليه Saravanan وSasikumar^[19] . حيث بين ان المعالجة النانوية ادت الى خفض قيم الاملاح الذائبة الكلية في المخلفات السائلة الصناعية .

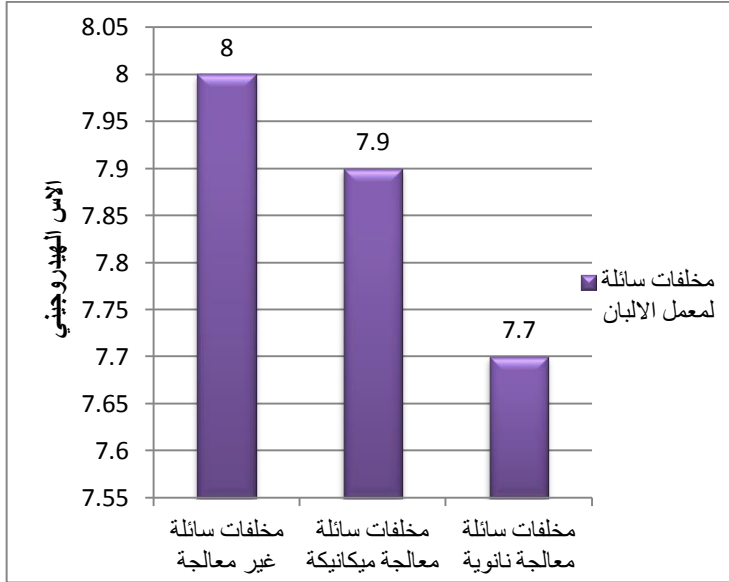


الشكل (٣-٤) تأثير المعالجة النانوية بمادة TiO_2 في الاملاح الذائبة الكلية

تأثير المعالجة الكيميائية على الخواص الكيميائية للمخلفات السائلة

الاس الهيدروجيني **Ph**: يلاحظ من الشكل (٤-٤) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي في قيم الاس الهيدروجيني اذ بلغت (٧,٩)، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٧,٨) ملغم /لتر، وكذلك يلاحظ ان المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض في قيم الاس الهيدروجيني اذ سجلت (٧,٧) ملغم/لتر مقارنة مع المعاملة غير المعالجة . تميل قيم الـ pH الى القاعدية في المواقع المدروسة لوحداث جمع المخلفات السائلة في معامل الالبان (المعالجة الميكانيكية الاولى) والتي يكون متغير قيم الاس الهيدروجيني فيها طفيفا ، ان الكميات العالية من المواد العضوية تؤدي الى تقليل او ارتفاع قيمة الـ pH كما ان تحللها يؤدي الى طرح ثاني اوكسيد الكربون والذي يتناسب عكسيا مع قيمة الـ pH ، وهذه

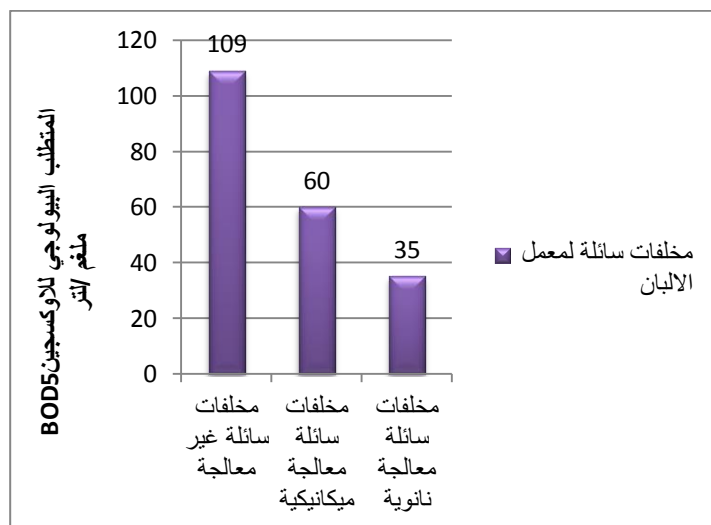
الدراسة تتفق مع ماتوصل اليه الشيخ^[20] الذي استنتج انخفاض قيمة الاس الهيدروجيني عند معاملة مياه المخلفات بالمادة النانوية .



الشكل (٤-٤) تأثير المعالجة بالمادة النانوية (TiO_2) على الاس الهيدروجيني

المتطلب البيولوجي للأوكسجين **BOD** : يلاحظ من الشكل(٤-٥) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم اختبار المتطلب البيولوجي للأوكسجين BOD_5 اذ بلغت (٦٠) ملغم /لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (١٠٩) ملغم /لتر لمعامل الالبان، اما المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم اختبار المتطلب البيولوجي للأوكسجين BOD_5 اذ سجلت (٣٥) ملغم/لتر مقارنة مع المعاملة غير المعالجة . تعزى الزيادة الحاصلة من المواد العضوية الموجودة في مياه الصرف الصناعي للمعامل الاغذية والتي يتم استهلاكها

من قبل البكتيريا الموجودة في الماء تسمح بالنمو السريع لها وتسبب ارتفاعا في قيم المتطلب الحيوي للأوكسجين وانخفاض في قيم الأوكسجين المذاب في المخلفات السائلة^[21]. وهذا ينسجم مع ما جاء به القيسي وآخرون^[22] الذين وجدو عند استعمال الجسيمات النانوية في المعالجة الكيميائية تؤدي الى انخفاض قيم المتطلب البيولوجي في المخلفات السائلة الصناعية .

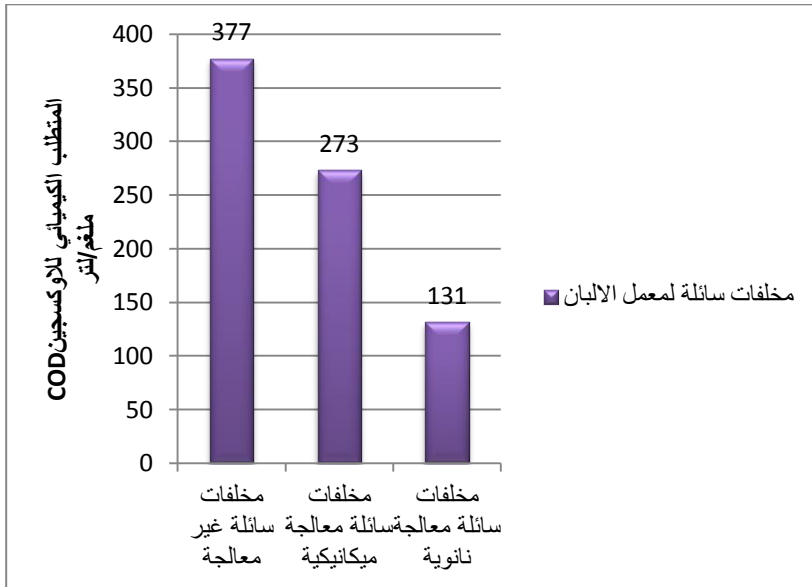


الشكل (٤-٥) تأثير المعالجة النانوية بمادة TiO_2 في اختبار المتطلب البيولوجي

للأوكسجين

المتطلب الكيميائي للأوكسجين: يلاحظ من الشكل (٤-٦) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية (٠,٠٥ $P \leq$) في قيم اختبار المتطلب الكيميائي للأوكسجين COD اذ بلغت (٢٧٣) ملغم /لتر على التوالي ، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٣٧٧) ملغم /لتر لمعامل الالبان، وكذلك يلاحظ ان المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية

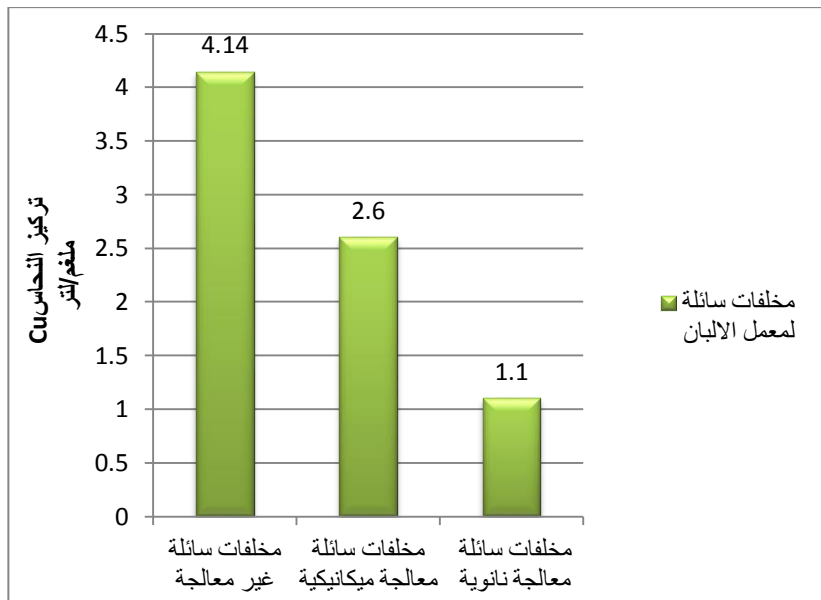
(TiO₂) قد ادت الى انخفاض معنوي في قيم اختبار المتطلب الكيميائي للأوكسجين COD اذ سجلت (١٣١) ملغم/لتر مقارنة مع المعاملة غير المعالجة . تعزى الزيادة الحاصلة في قيم المتطلب الكيميائي للأوكسجين الى التراكيز العالية من المواد العضوية والمركبات اللاعضوية المختزلة المصروفة مع مطروحات المعمل التي تستهلك الاوكسجين الذائب، وايضا الى احتواء مياه الصرف الصناعي والصرف الصحي على كميات عالية من المواد العضوية واللكتين Lignin والسلفونات والأصبغ والتي من صفتها تكون صعبة التحليل وتسود عادة في مياه الصرف الصناعي والصحي والقادمة من الفضلات المنزلية والأسمدة العضوية ومخلفات عدد من المصانع الصغيرة الموجودة في المدينة^[23] وهذه الدراسة تتفق مع ما جاء به أكبر وآخرون^[24] الذين اشاروا الى ان استخدام الجسيمات النانوية في معالجة المحلفات السائلة الصناعية لمعامل المنتجات الغذائية تؤدي الى انخفاض قيم المتطلب الكيميائي للأوكسجين.



الشكل (٤-٦) تأثير المعالجة بمادة نانوية TiO₂ في اختبار المتطلب الكيميائي للأوكسجين

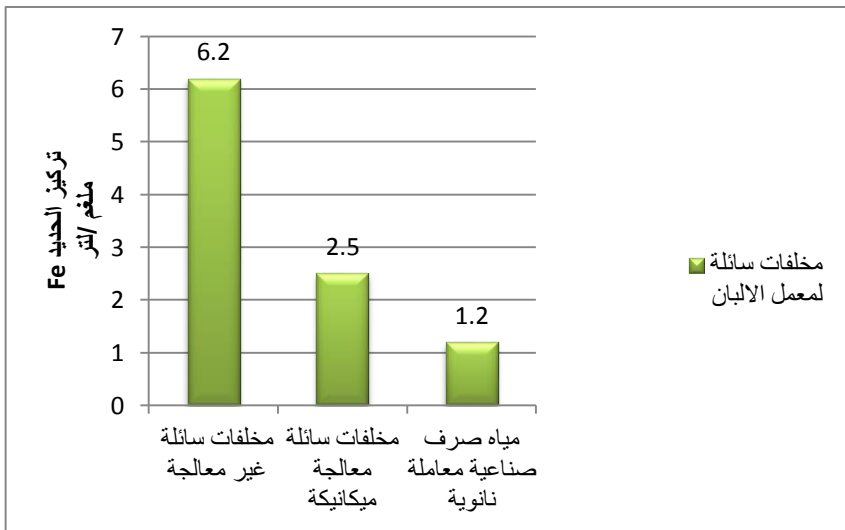
تأثير المعالجة الكيميائية على محتوى المخلفات السائلة من العناصر الثقيلة

عنصر النحاس Cu: يلاحظ من الشكل (٤-٧) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم تركيز النحاس اذ بلغت (٢,٦) ملغم /لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٤,١٤) ملغم /لتر لمعامل الالبان، وكذلك يلاحظ ان المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم تركيز النحاس اذ سجلت (١,١) ملغم/لتر لمعمل الالبان مقارنة مع المعاملة غير المعالجة . وقد يعزى هذا الانخفاض الى فاعلية الجسيمات النانوية TiO_2 في المعالجة بسبب الفعالية العالية لترسيب وامتزاز الملوثات الصلبة والمركبات العضوية المعقدة^[25] . و تتسجم هذه القيم مع ما جاء به Nizamuddin وآخرون^[26] الذين اشاروا الى دور الجسيمات النانوية في خفض تركيز عنصر النحاس في المخلفات السائلة مقارنة مع المخلفات غير المعالجة .



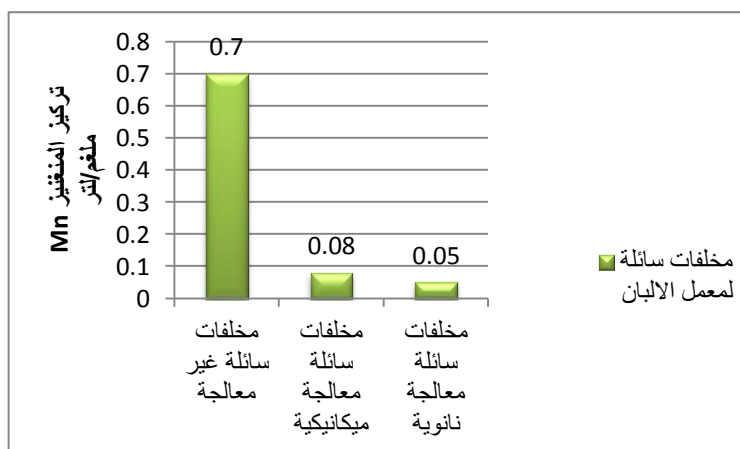
الشكل (٤-٧) تأثير المعالجة النانوية TiO_2 في تركيز عنصر النحاس

عنصر الحديد Fe: يلاحظ من الشكل (٤-٨) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم تركيز الحديد اذ بلغت (٢,٥) ملغم /لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٦,٢) ملغم /لتر، وكذلك يلاحظ ان المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم تركيز الحديد اذ سجلت (١,٢) ملغم/لتر مقارنة مع المعاملة غير المعالجة . وقد يعزى ارتفاع العناصر الثقيلة في المخلفات السائلة الصناعية بسبب كثرة استخدام محطات السيارات والمطاعم والنشاطات الصناعية والدوائية في المدينة وهذه النتائج تتقارب مع ما توصل اليه Madhura وآخرون^[27] الذين اشارو الى فعالية الجسيمات النانوية عند استعماله في معالجة المخلفات السائلة للمعمل الالبان.



الشكل (٤-٨) تأثير المعالجة النانوية TiO_2 في عنصر الحديد

عصر المنغنيز Mn: يلاحظ من الشكل (٤-٩) ان المعالجة الميكانيكية للمخلفات السائلة لمعامل الالبان قد ادت الى انخفاض معنوي عند مستوى احتمالية ($P \leq 0,05$) في قيم تركيز المنغنيز اذ بلغت (٠,٠٨) ملغم /لتر، مقارنة مع المخلفات السائلة غير المعالجة والتي سجلت (٠,٤) ملغم /لتر لمعامل الالبان، اما المعالجة الكيميائية باستخدام ثاني اوكسيد التيتانيوم النانوية (TiO_2) قد ادت الى انخفاض معنوي في قيم تركيز المنغنيز اذ سجلت (٠,٠٥) ملغم/لتر لمعمل الالبان مقارنة مع المعاملة غير المعالجة . وقد يعزي هذ الانخفاض في العناصر الملوثة باستخدام جزيئات النانو والتي قد تكون ناتجة عن الامتزاز لإضافتها الى مياه المخلفات السائلة ، اذ تتكثف الملوثات بفعل الترسيب الى كتل صغيرة الحجم ومن ثم إلى جزيئات أكبر قد تترسب معها العناصر حيث يتم استخدام المادة النانوية TiO_2 كمادة ملبدة رئيسية^[28]. و تتسجم هذه الدراسة مع ما جاء به حسين^[29] الذي وضع فعالية الجسيمات النانوية في معالجة المخلفات السائلة مقارنة مع المخلفات السائلة الصناعية غير المعالجة .



الشكل (٤ - ٩) تأثير المعالجة النانوية TiO_2 في عنصر المنغنيز

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فاعلية بناء التنمية المستدامة في العراق من وجهة نظر محاسبية

THE EFFECTIVENESS OF BUILDING SUSTAINABLE
DEVELOPMENT IN IRAQ FROM AN ACCOUNTING POINT OF
VIEW

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هدفت هذه الدراسة الى تسليط الضوء نحو التنمية المستدامة واهدافها ودور المحاسبة في تعزيز وبناء تلك الاهداف داخل البلد .

تتبع اهمية هذه الدراسة من دور علم المحاسبة في توصيل معلومات للمجتمع المحيط بالمؤسسات الاقتصادية لمعرفة دور تلك المؤسسات في دعم اهداف التنمية المستدامة .

وافترضت الدراسة ان الدول التي ترغب بتطبيق التنمية المستدامة وتتخذ خطوات جادة نحو تعزيز اهدافها يجب ان تكون المؤسسات الاقتصادية فيها كافة ملتزمة بالتطبيق والذي سيؤكد ذلك وجهة النظر المحاسبية .

واعتمدت الدراسة المنهج الوصفي في متن البحث، وكانت حدودها نظرية بحتة، وتوصلت الى جملة من الاستنتاجات من ابرزها ان الدور المحاسبي مهم في توصيل معلومات تخدم بناء التنمية المستدامة في العراق .

اما ابرز التوصيات التي توصلت لها الدراسة منها الضغط على الهيئات المحاسبية الوطنية ومجلس المعايير المحاسبية والرقابية والنقابات والجمعيات المحاسبية لإصدار قاعدة محاسبية عراقية توحد نماذج لقوائم وتقارير مالية توضح اهداف التنمية المستدامة .

الكلمات المفتاحية : التنمية المستدامة ، الاهداف العالمية السبعة عشر ، الدور المحاسبي ، تقارير وقوائم مالية خاصة .

This study aimed to shed light on sustainable development and its goals and the role of accountability in promoting and building those goals within the country

The importance of this study stems from the role of accounting science in communicating information to the community surrounding economic institutions to know the role of these institutions in supporting the goals of sustainable development

The study assumed that countries that wish to implement sustainable development and take serious steps towards promoting their goals, all economic institutions in which must be committed to the application, which will confirm this from the accounting point of view

The study adopted the descriptive approach in the body of the research, and its limits were purely theoretical, and it reached a number of conclusions, most notably the important accounting role in communicating information that serves to build sustainable development in Iraq

As for the most prominent recommendations that the study reached, including putting pressure on the national accounting bodies, the Accounting and Oversight Standards Board, unions and accounting societies to issue an Iraqi accounting rule that unifies models for financial lists and reports that clarify the goals of .sustainable development

Key words: sustainable development, seventeen global goals, accounting role, .special financial reports and statements

المقدمة:

كثير من الدول وضعت رؤى مستقبلية لبلدانها لتبني خطة التنمية المستدامة وبدأت بخطوات جدية لبلوغ تلك الرؤى، بصورة مبسطة فان التنمية المستدامة تقوم على ركزتين الاولى الحفاظ على البيئة من التلوث والثانية ضمان حقوق الاجيال القادمة من الموارد الطبيعية .

خطة التنمية المستدامة التي تضعها الدول نصب عينها قائمة على سبعة عشر هدفاً سميت بالأهداف العالمية منها على سبيل الذكر لا الحصر (القضاء على الفقر ، القضاء على البطالة ، الخدمات الصحية للجميع ، التعليم الجيد للجميع ، خدمات الطاقة الحديثة للجميع ، تعزيز البنى التحتية ، التوسع في المساحات الخضراء ، العدالة الاجتماعية والحد من الفساد) .

هذه الاهداف اعلاه عندما تقرر اي دولة تطبيقها يجب ان تُخضع لها جميع المؤسسات العاملة لديها وعلى مختلف مشاربها وان تُصدر تلك المؤسسات تقارير توضح مدى الشوط المقطوع من قبلها للذهاب الى التنمية المستدامة من خلال قربها وبعدها عن الاهداف العالمية السبعة عشر .

الدور المحاسبي هو من يصدر تلك التقارير ، فالمحاسبة تعزز من فاعلية بناء التنمية المستدامة من خلال معلومات ذات طبيعة خاصة تنتجها ضمن تقارير وقوائم مالية ذات طبيعة خاصة كذلك توضح كل هدف واين المؤسسة من ذلك الهدف .

منهجية الدراسة

اهمية الدراسة: تتبع اهمية الدراسة من الموضوع المبحوث فهو شغلنا الشاغل نحن الاكاديميين داخل البلد وخارجه والكل يبحث من وجهة نظره وهو كيف نستطيع ان نتبنى التنمية المستدامة او ماهي الخطوات التي تحقق هذا الموضوع من وجه نظر اهل المحاسبة مثلاً .

أهداف الدراسة: تهدف الدراسة الى تسليط الضوء على الاتي :

- ١- ماهية التنمية المستدامة واهدافها .
- ٢- ما هو الدور المحاسبي في تعزيز تلك الاهداف داخل المؤسسات .
- ٣- نوع التقارير والقوائم الصادرة من المحاسبة لمتخذ القرار .

مشكلة الدراسة: ان مشكلة الدراسة تكمن في الاتي:

لتحقيق التنمية المستدامة يجب ان يكون هناك مخرجات لنظم المعلومات المحاسبية تضم معلومات ذات طبيعة خاصة تبين مدى التزام المؤسسات الاقتصادية بتبني اهداف التنمية المستدامة السبعة عشر .

فرضية الدراسة : تبنت الدراسة فرضية مفادها :

الدول التي ترغب بتطبيق التنمية المستدامة وتتخذ خطوات جادة نحو تعزيز اهدافها يجب ان تكون المؤسسات الاقتصادية فيها كافة ملتزمة بالتطبيق والذي سيؤكد ذلك وجهة النظر المحاسبية .

منهج الدراسة: تعتمد الدراسة في مناقشة فرضيته ومفرداته المنهج الوصفي من خلال القراءة المستفيضة للمصادر العربية والأجنبية المتاحة ومقالات الانترنت والتقارير الحكومية الداعمة .

خطة الدراسة: لكي لا تكون الدراسة مملة ومشابهة لمثيلاتها ارتى الباحث ان يتناول الموضوع بشيء من الاقتضاب الذي لا يخل بالمعنى ويدخل بالمراد مباشرةً وتم تقسيم الخطة الى اجزاء بسيطة يدخل فيها الباحث مباشراً الى هدف البحث .

اولا : ماهية التنمية المستدامة واهدافها :

ان التنمية المستدامة هي نتاج عشرات الاعوام من الانتهاك البيئي والاستخدام الاناني وغير العقلاني للموارد الطبيعية والتفكير الانى وعدم التفكير في الاجيال القادمة بل العكس هو العمل على نضوب تلك الموارد واستغلالها بشكل جشع .

تعرف التنمية المستدامة بصورة عامة بانها " التنمية التي من شأنها ان تلبى الاحتياجات الحالية للأجيال دون ان تمس حقوق وامكانيات الاجيال القادمة في توفير احتياجاتها ومتطلباتها " (حسين ، ٢٠٢١ ص ٢١٠) اما بقدر تعلق الامر بالمؤسسات فان التنمية المستدامة تمثل " الجهود المبذولة للمحافظة على الموارد الطبيعية بطرائق مختلفة بما يضمن تحقيق الرفاهية للأجيال الحالية والمحافظة على حقوق الاجيال القادمة " (وهاب وسليمان ، ٢٠٢١ ص ٣٠٦).

ولضمان تحقيق التنمية المستدامة فان هناك مجموعة من الاهداف يجب ان تتحقق او ان تسعى الدول في تحقيقها وهذه الاهداف متعددة وتناولها العديد من الباحثين بصور مختلفة وبوجهات نظر متعددة منها اقتصادية ومنها اجتماعية ومنها سياسية وهكذا ولكن سأركز على الاهداف العالمية والموضوعة من قبل الامم المتحدة والتي التزمتها كثير من الدول والزمت مؤسساتها العاملة ضمن رقعتها وهذه الاهداف هي سبعة عشر هدفاً تمثل خطة لأي دولة تسمى خطة التنمية المستدامة والاهداف هي كالآتي : (حمودي ، ٢٠٢١ ص ١٠-١٢)

- ١- القضاء على الفقر بجميع اشكاله في كل مكان.
- ٢- القضاء التام على الجوع وتوفير الامن الغذائي والتغذية المحسنة وتعزيز الزراعة المستدامة .
- ٣- ضمان تمتع الجميع بأنماط عيش صحية وبالرفاهية في جميع الاعمار .
- ٤- ضمان التعليم الجيد المنصف والشامل للجميع وتعزيز فرص التعلم مدى الحياة للجميع
- ٥- المساواة بين الجنسين .
- ٦- ضمان توفير المياه وخدمات الصرف الصحي .
- ٧- ضمان حصول الجميع على خدمات الطاقة الحديثة الموثوقة والمستدامة وبتكلفة ميسورة.
- ٨- تعزيز النمو الاقتصادي المستدام والشامل للجميع وتوفير العمل اللائق للجميع .

٩- اقامة بنى تحتية قادرة على الصمود وتحفيز التصنيع الشامل للجميع وتشجيع الابتكار.

١٠- الحد من انعدام المساواة داخل البلدان وفيما بينها .

١١- جعل المدن والمستوطنات البشرية شاملة للجميع وامنة وقادرة على الصمود.

١٢- ضمان وجود انماط استهلاك ونتاج مستدام.

١٣- اتخاذ اجراءات عاجلة لمكافحة تغيير المناخ واثاره من خلال تنظيم الانبعاثات وتعزيز التطورات في مجال الطاقة المتجددة .

١٤- حفظ المحيطات والبحار والموارد البحرية واستخدامها على نحو مستدام :

١٥- حماية النظم الايكولوجية البرية وتعزيز استخدامها على نحو مستدام

ومكافحة التصحر

١٦- تشجيع اقامة مجتمعات سلمية وشاملة للجميع من اجل تحقيق التنمية المستدامة وتوفير امكانية الوصول الى العدالة للجميع.

١٧- احياء الشراكة العالمية من اجل التنمية المستدامة .

وداخل كل هدف من الاهداف اعلاه مقاصد عديدة تصل الى (١٦٩) مقصدً ومن ثم

هناك مؤشرات اغلبها اقتصادية تصل الى (٣٠٤) مؤشر لقياس التقدم المحرز نحو بلوغ الأهداف .

ثانياً : التنمية المستدامة في العراق^١ :

قبل الولوج الى تفاصيل التنمية المستدامة وهل قطعت شوطاً في العراق ام لا يجب ان نؤسس لمسألة في غاية الاهمية وهي ان الجميع معني بالتنمية المستدامة والجميع سيقطف ثمارها ولكن قد يتباين مدى تبنيها من جهة لأخرى وبحسب مدى اعتقاد تلك الجهة بأهميتها ولكن وهذا الاهم ان يتم متابعة المؤسسات كافة والاقتصادية بصورة خاصة منها لان من المسلمات ان كل تطور اقتصادي يصاحبه تدهور بيئي وقد نكون الان لسنا بصدد مراقبة الانتهاك البيئي من قبل المؤسسات على افتراض انها تجاوزت هذه المرحلة وانما مراقبة تلك المؤسسات عن مدى تبنيها للأهداف العالمية السبعة عشر جميعها او ما يخصها من اهداف بصورة مباشرة على اقل احتمال .

والسؤال الذي يطرح نفسه هنا (ما بعد او قرب العراق من الاهداف العالمية للتنمية المستدامة ؟ او هل البلد يغرد خارج السرب ؟ ام انه يغرد مع سرب التنمية المستدامة ؟) .

في عام (٢٠١٥) اعتمدت الجمعية العامة للأمم المتحدة خطة عمل تحت عنوان (تحويل عالمنا) اذ تم تبني اهداف التنمية المستدامة (الاهداف العالمية) من قبل جميع الدول الاعضاء في الامم المتحدة بما فيهم العراق، مما يعني ان التنمية المستدامة يجب ان تنطبق على جميع البلدان المتقدمة والنامية على حد سواء وتمثل دعوة عالمية للعمل من أجل القضاء على الفقر وحماية الكوكب وضمان تمتع جميع الناس بالسلام والازدهار بحلول عام (٢٠٣٠).

إن تحقيق اهداف التنمية السبعة عشر في العراق أمر بالغ الأهمية لضمان ازدهار البلاد وتحقيق التنمية على المستوى البعيد، لكن تحقيق ذلك يتطلب تضافر جميع الجهود على المستويين الوطني والمحلي، ليس في العاصمة والمحافظات الكبرى فحسب، بل في جميع انحاء البلاد. ولتحقيق الاهداف يجب ان يكون هناك ما يسمى بالتوطين او التكيف.

إن توطين أهداف التنمية المستدامة عملية شديدة الأهمية لما لها من دور في الإسراع بتنفيذ أهداف التنمية المستدامة في العراق " لتشمل الجميع بلا استثناء ". وهو ما يعني أن يكون لكل أصحاب المصلحة والمؤسسات والحكومة على المستويات دون الوطنية والجهات الفاعلة غير الحكومية كالمجتمع المدني والأوساط الأكاديمية دوراً أساسياً في صياغة وتنفيذ ومراقبة أهداف التنمية المستدامة على مستوى كل منها.

ومن ثم تم ادماج اهداف التنمية المستدامة ضمن الخطط الوطنية والاستراتيجيات القائمة ابرزها في الخطة القائمة ٢٠١٨-٢٠٢٢ مع تشكيل اللجنة الوطنية للتنمية المستدامة لتحقيق (رؤية العراق للتنمية المستدامة ٢٠٣٠) والرؤية كانت هي

(العراقي مُمكن في بلد امن ومجتمع موحد واقتصاد متنوع وبيئة مستدامة ينعم

بالعدالة والحكم الرشيد)

في عام (٢٠١٩) تم إصدار التقرير الاول بعنوان (التقرير الطوعي الاول حول اهداف التنمية المستدامة) وحددت وزارة التخطيط بانها المسؤولة عن الاطر الاستراتيجية في الاقتصاد العراقي وتهيئة المقدمات الكفيلة بتطوير الاقتصاد ووضع السياسات والخطط المستقبلية ثم افرد ذلك التقرير بعض التحديات التي تواجه هذه الاهداف ومنها (الاقتصاد

الريعي وعدم الاستقرار السياسي والفساد والارتباك المؤسسي وضعف الاداء المؤسسي ومقومات الحكم الرشيد) والذي يخدم هدف البحث هو العمل المؤسسي وان التقرير ركز على ابراز التحديات التي تواجه تطبيق الاهداف خصوصاً فيما يتعلق بالمؤسسات .

يشير التقرير كذلك الى التقدم المحرز لأهداف التنمية المستدامة في العراق دولياً وان العراق حقق مركز متدني بخصوص تلك الاهداف ، ويرى الباحث ان الوضع العام يحدد مدى بعدنا او قربنا من الاهداف ولا نحتاج الى تقارير خصوصاً بعد تفشي الوباء فان البطالة ازدادت ونسبة الفقر كذلك ارتفعت وارتفاع سعر صرف الدولار ادى الى دخول عوائل جديدة تحت مستوى الفقر تسمى بالعوائل الهشة ، ثم يختتم التقرير اعلاه بان تكييف الاهداف يتطلب ان يكون هناك شراكة قوية بين الدولة والقطاع الخاص والمجتمع المدني بالإضافة الى وجود قاعدة بيانات دقيقة .

وخلاصة ذلك ان اهداف التنمية المستدامة لا يمكن توطينها او تكييفها بمعزل عن المؤسسات الاقتصادية بل قد تكون هي شرارة التكييف وان ما يؤكد ان تلك المؤسسات قد بدأت تلتزم تلك الاهداف من عدمها مجموعة التقارير والقوائم التي تصدره نظم المعلومات المحاسبية داخل تلك المؤسسات .

ثالثاً : علم المحاسبة في خدمة التنمية المستدامة :

المحاسبة نشاط خدمي وتسمى بلغة الارقام وهي تحاول ترجمة وتحويل تلك الارقام الى معلومات تخدم متخذ القرار، فالمحاسبة هي اشبه بالزجاج الذي يفصل بين المؤسسة

وبين المستفيدين من المؤسسة على مختلف مشاربهم فالزجاج كل ما كان نقيا كلما عكس بدقة ما يدور خلفه من اعمال وكلما قلت النقاوة كلمت تشوهت الصورة وظل متخذ القرار .

المحاسبة ضرورية لتكثيف اهداف التنمية المستدامة اذ يمكن من خلالها ترجمة الارقام الى معلومات ومن ثم ربطها مع الاهداف العالمية فمن المفترض انه تغير الدور المحاسبي من اعطاء رسائل للمجتمع عن مدى امتثال المؤسسات للقرارات البيئية الى دور اوسع وهو تزويد المجتمع بمدى تبني المؤسسات لأهداف التنمية المستدامة .

والمحاسبة تطورت مع حاجة المجتمع لمعلومات اكثر دقة عن وضع المؤسسات مع البيئة والتزمت الهيئات المحاسبية والنقابات بإصدار المعايير والارشادات حول عمل المحاسبين داخل المؤسسات " فبداية كان علم المحاسبة يخدم ادارة المؤسسات من خلال حصر الانشطة البيئية واحتساب كلفها لأخذها بنظر الاعتبار عند تسعير المنتج او الخدمة ، ثم تطور هذا العلم لردم الفجوة المتحققة بين المؤسسات والمجتمع ولحاجة المجتمع لمعلومات دقيقة عن تلك المؤسسات ومقدار قربها او بعدها بدايةً عن انتهاكات البيئة والان عن خطط التنمية المستدامة " (حمودي ، ٢٠٢١ ص ١٤) .

ويرى الباحث ان الدور المحاسبي داخل المؤسسات الاقتصادية اصبح مهماً في ظل تبني الدول لأهداف التنمية المستدامة لان تلك المؤسسات هي المستهلك الاساس للموارد الطبيعية وهدفها على الاغلب هو تعظيم الربح وقد يتأتى هذا الهدف على حساب اهداف التنمية المستدامة ما لم يكن هناك رقابة حكومية مستندة على معلومات تصدرها المحاسبة توضح ان تلك المؤسسات الى جانب هدفها الربحي فإنها ماضية الى الاستدامة .

رابعاً : جوانب الدور المحاسبي في بناء التنمية المستدامة في العراق :

عندما نقول الدور المحاسبي فإنه يشمل كافة انواع المحاسبة الرئيسية والفرعية داخل هذا الدور بالإضافة الى الوسائل والادوات المستخدمة من تسجيل وقياس وافصاح وتوصيل ، فالنظرة شمولية لهذا الدور، فالأهداف كبيرة وعظيمة ومتعددة ويجب ان يساهم كل فرع من فروع علم المحاسبة في بناء تلك الاهداف وان يتم تبني مفهوم المحاسبة من اجل بناء اهداف التنمية المستدامة القائم على تحويل البيانات من خلال مجموعة من العمليات التشغيلية الى معلومات مفيدة لمتخذ القرار الذي هو على الاغلب خارجي كما في العراق يمثل وزارة التخطيط بصفتها المعنية عن تطبيق تلك الاهداف .

الدور المحاسبي هنا يجب ان ينتج مجموعة تقارير وقوائم مالية خاصة تضم كذلك معلومات محاسبية ذات طبيعة خاصة اذ ان متخذ القرار يجب ان يعول على مخرجات المحاسبة وكيف ان المحاسبة ستخدم ذلك المتخذ .

والسؤال هو كيف يخدم الدور المحاسبي اهداف التنمية المستدامة ؟ ولماذا المحاسبة دون غيرها من العلوم مهمة في تعزيز اهداف التنمية المستدامة ؟

مجتمع اليوم بحاجة الى معلومة تقدم له في الوقت المناسب و يجب ان تتميز تلك المعلومة بانها تزيد من معرفة ذلك المجتمع لكي ترشده في اتخاذ قراره ، وخير من يقدم تلك المعلومة هي النظم المحاسبية ، اذ يجب ان يزود الدور المحاسبي متخذ القرار اي من هم خارج اسوار المؤسسة بمدى قرب او بعد تلك المؤسسة عن اهداف التنمية المستدامة ، اي يجب ان يدعم غالب اهداف التنمية المستدامة من خلال المعلومات التي تضم على سبيل

المثال حصر اعداد العاملين ومستوى الاجور ومدى مساهمة المؤسسة في تخفيض البطالة ونوع التعليم داخل المؤسسة والتدريب المُعطى للعاملين والوضع الصحي لهم ومدى انفاق المؤسسة حول الرعاية الصحية مدى تبني التقنيات الحديثة وهل المؤسسة ماضية في تبني الاساليب الخضراء وغيرها .

لقد قام المجمع البريطاني للمحاسبين القانونيين بتوجيه المحاسبين داخل المؤسسات الأوروبية بشكل طواعي بدايةً ثم اصبح الزامياً بإصدار تقارير تخدم اهداف التنمية المستدامة منها (تقرير الاستدامة وتقرير المسؤولية الاجتماعية وتقرير مسؤولية الشركة) وداخل كل تقرير هناك معلومات تفصيلية حول الاداء الاقتصادي والبيئي والاجتماعي ومدى التزام جميع الموظفين (جميع المستويات) بالتنمية المستدامة وغيرها من الامور الداعمة لتحقيق اهداف التنمية المستدامة وكذلك تم توجيه المحاسبين بأعداد قوائم تكميلية للقوائم المالية يتم من خلالها الافصاح عن التنمية المستدامة داخل تلك المؤسسات وبالأشكال التالية على سبيل الذكر لا الحصر : (بيرة بتصرف، ٢٠١٩ ص ٤٢٩-٤٣١)

١- قائمة الربح المعدل بأعباء الوفاء بالمسؤولية عن التنمية المستدامة : وهذه القائمة توضح ما تتحمله المؤسسة من اعباء لتحقيق التنمية المستدامة وتضم في داخلها كثير من المؤشرات والرسائل الى متخذ القرار بموقف المؤسسة من بعض اهداف التنمية المستدامة فهي تبدأ بصافي الربح المحاسبي ثم يضاف له او يطرح منه اي اعباء ايجابية او سلبية للوصول الى قائمة الربح المعدل، فعلى سبيل المثال تضم كلف بعض مؤشرات العمالة (هل هناك توظيف زائد عن نطاق العمل لامتناس البطالة وهل هناك توظيف للمعاقين للتخفيف عنهم

وهل هناك اسكان للعاملين كذلك وهل هناك تدريب وتعليم للموظفين وغيرها من الامور المتعلقة بالموارد البشرية).

٢- قائمة المركز المالي للوفاء بالمسؤولية عن التنمية المستدامة : وهذه القائمة توضح الاصول والخصوم ولكن بعد تناول الاصول الثابتة والمتداولة والاخرى بالمؤسسة يجب توضيح ان كان هناك مباني للرعاية الصحية او مباني لترفيه العاملين او سكنهم او ما هي الاصول الخاصة بمجال المساهمات البيئية من مباني واجهزة مراقبة التلوث او تنقية المخلفات مع تناول كذلك اي خصوم وهي بمثابة التزامات من المؤسسة تجاه الغير نتيجة تبني اهداف التنمية المستدامة .

وهكذا فان المحاسب امامه فضاء واسع لتوجيه تقارير او قوائم ملحقه ومكملة يراها تخدم كل هدف من اهداف التنمية المستدامة السبعة عشر تحت شعار (اين المؤسسة من اهداف التنمية المستدامة) وحسب علاقة المؤسسة ببعض الاهداف المباشرة بعملها وليس جميعها احيانا ، مع التأكيد على ملاحظة مهمة ان المؤسسات هدفها الاساسي تعظيم الربح وهذا لا يمنع ان تساهم في بناء التنمية المستدامة ومع تحملها للكلف فان هناك تيارات إيرادية تتحقق لها بالإضافة الى نشاطها الاساس وهذا جوهر التنمية المستدامة وهو تنوع الدخل او ان لا يكون الدخل ريعي ، وكما اسلفت فان المحاسب امام فضاء واسع فليس من المعقول ان المحاسب سيقضي على الفقر كما في الهدف الاول ولكنه سيوجه عناية متخذ القرار من خلال تقرير مالي او نموذج لقائمة مالية يمكن تسميته ب(نموذج قائمة تخفيض نسب الفقر داخل المؤسسة) يجمع خلالها الكلف التي تحملتها المؤسسة بشأن

الهدف الاول ويرصد ضمن هذا النموذج اعداد العاملين وهل ساهمت المؤسسة بتخفيض حجم البطالة بالقدر الممكن والذي هو تحصيل حاصل لتقليص نسبة الفقر وكما هو الحد الأدنى من الاجور المعطاة للعاملين وهل هذا الاجر فوق خط الفقر وهل تتبنى المؤسسة ابناء العاملين وتحمل كلف زجهم في المدارس والجامعات وما هي اعداد النساء العاملات وهل هناك عاملين معاقين وهل هناك كلف تتحملها المؤسسة لفتح أنشطة لهؤلاء المعاقين والعاطلين تعود بالنفع كذلك للمؤسسة من خلال إيرادات متنوعة ، وهكذا الحال بالنسبة للهدف الثاني كذلك يمكن تأسيس نموذج يمكن تسميته ب(نموذج قائمة نظام التغذية داخل المؤسسة والمساحات الخضراء) يجمع خلالها الكلف التي تحملتها المؤسسة بشأن الهدف الثاني ويرصد ضمن هذا النموذج اذا كانت المؤسسة تقدم نظام تغذية للعاملين لديها او المقابل النقدي الممنوح للعاملين او قد تساهم المؤسسة في برامج تغذية عامة وما هي الكلف التي تتحملها المؤسسة في تحويل المساحات المتاحة لديها الى مساحات خضراء او استغلالها بالإنتاج الزراعي المستدام وايجاد الاسواق لهم الذي قد يكون تيار مالي اضافي للمؤسسة يساهم في تنوع الإيراد لديها، وهكذا الحال بالنسبة للهدف الثالث كذلك يمكن تأسيس نموذج يمكن تسميته ب(نموذج قائمة النظام الصحي) يجمع خلالها الكلف التي تحملتها المؤسسة بشأن الهدف الثالث ويرصد ضمن هذا النموذج اذا كان للمؤسسة مبنى منفصل يمثل رعاية صحية تقدم مجاناً للعاملين ومقابل مادي للمجتمع المحيط بالمؤسسة كما في كثير من البلدان العالمية وبهذا فان المؤسسة ستتحمل كلف المبنى والكادر الصحي والرعاية الصحية للعاملين لديها

وبالمقابل فان لديها تيارات مالية اضافية نتيجة الايرادات المتحققة من جراء تقديمها للرعاية الصحية العامة ، وهكذا الحال بالنسبة للهدف الرابع كذلك يمكن تأسيس نموذج يمكن تسميته ب(نموذج قائمة التعليم والتدريب) يجمع خلالها الكلف التي تحملتها المؤسسة بشأن الهدف الرابع ويرصد ضمن هذا النموذج اذا كانت المؤسسة تقدم منح تعليمية للعاملين لديها او تقوم بتدريبهم وما هي فرص التعلم والتعليم الجيد وما هي خطط المؤسسة في تعليم واستمرار تعليم الكادر لديها وابناءهم كمساهمة فعالة من قبل تلك المؤسسة وهل للمؤسسة قسم للبحوث العلمية تنشط في البحث والتطوير وتقيد المجتمع وتستفاد هي كذلك من ايرادات ذلك القسم ، وهكذا لبقية الاهداف من خلال تأسيس نماذج حول مدى تبني المؤسسة للطاقة النظيفة والتكنولوجيا الحديثة مثلا وهكذا فان المحاسب هو الوحيد القادر على تزويد متخذ القرار بالمعلومات التي تعزز من بناء اهداف التنمية المستدامة وكما اشرت سابقاً ان كل مؤسسة قد تكون معنية بعدد من الاهداف دون غيرها فالمؤسسات الصناعية ليست كالمؤسسات الخدمية مثلا وهكذا .

الاستنتاجات والتوصيات

الاستنتاجات :

- ١- اليوم جميع الجهات معنية ببناء التنمية المستدامة في العراق ومن اهم تلك الجهات المؤسسات الاقتصادية .
- ٢- المؤسسات الاقتصادية اكثر الجهات اتهاماً بانها منتهكة للبيئة وبعيدة عن تبني اهداف التنمية المستدامة .
- ٣- ضمن الاهداف السبعة عشر اهداف مشتركة التطبيق في جميع انواع المؤسسات الاقتصادية على مختلف مشاربها ومنها القضاء على الفقر والرعاية الصحية والتعليم الجيد .
- ٤- المؤسسات الاقتصادية حسب نوع المؤسسة تكون اكثر ارتباطاً ببعض الاهداف دون غيرها وهي تمثل حلقة متكاملة التطبيق لأهداف التنمية المستدامة مع بقية المؤسسات .
- ٥- الدور المحاسبي مهم في توصيل معلومات تخدم بناء التنمية المستدامة في العراق .

التوصيات :

١. لتحقيق رؤية العراق للتنمية المستدامة ٢٠٣٠ يجب تفعيل الدور المحاسبي داخل المؤسسات ويجب على وزارة التخطيط الزام المؤسسات الاقتصادية

بتزويدها بأنواع التقارير والقوائم التي تلائم نشاط المؤسسة مع اهداف التنمية المستدامة .

٢. بالإضافة الى مخرجات المحاسبة التقليدية يجب ان تكون هناك مخرجات ذات طبيعة خاصة تلبي احتياجات وزارة التخطيط العراقية لمعرفة اين المؤسسة من التنمية المستدامة.

٣. الضغط على الهيئات المحاسبية الوطنية ومجلس المعايير المحاسبية والرقابية والنقابات والجمعيات المحاسبية لإصدار قاعدة محاسبية توحد نماذج لقوائم وتقارير مالية توضح اهداف التنمية المستدامة .

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قطاع التأمين في العراق واستراتيجيات المساهمة في التنمية الاقتصادية

دراسة للمدة ٢٠١٠ - ٢٠١٨

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المستخلص

يمثل التأمين مظهراً من مظاهر التضامن والتكافل الاجتماعي ، فعن طريق التأمين تتوزع الخسارة التي تصيب الفرد على مجموعة من الأفراد الذين يتعرضون لخطر الخسارة نفسه ، وعلى هذا الحال تتجسد الوظيفة الاجتماعية والاقتصادية للتأمين بأن تقوم بدفع الخسارة عن كاهل الفرد وتوزيعها على مجموعة من الأفراد ، مما يساهم في تخفيض كلفة الخطر على مستوى الاقتصاد الوطني بأكمله .

ومع ازدهار التبادل التجاري في الحضارات القديمة عن طريق البحر، ظهرت مخاطر غرق السفن والقرصنة البحرية والتي حالت دون ازدهار هذا التبادل ، ولاستمرار ازدهار التجارة ظهر ما يسمى بالقرض البحري، والفكرة التي يقوم عليها هي بأن صاحب الشحنة البحرية أو السفينة يقوم باقتراض مبلغ من المال بضمان الشحنة أو السفينة ، وهذا الاجراء مهد الى ظهور التأمين البحري على ايدي البرتغاليون والاسبان في القرن الخامس عشر ومع تطور هذا التأمين برزت الانواع الاخرى من التأمين كالتأمين الصناعي والتجاري وتأمين الممتلكات والاشخاص ..الخ ، من هنا انطلقت فكرة البحث للخوض في أهم مرتكزات التأمين في العراق وآليات تفعيل نشاط شركات التأمين العاملة في السوق العراقية وتفعيل مشاركتها في التنمية الاقتصادية .

الكلمات المفتاحية : شركات التأمين ، السوق التأمينية ، التنمية الاقتصادية ، الاقتصاد

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Abstract

Insurance represents a manifestation of solidarity and social solidarity. Through insurance, the loss that afflicts the individual is distributed to a group of individuals who are exposed to the same risk of loss. In this case, the social and economic function of insurance is embodied by paying the loss on behalf of the individual and distributing it to a group of individuals, which contributes In reducing the cost of risk at the level of the entire national economy.

With the flourishing of trade exchange in the ancient civilizations by sea, the dangers of shipwreck and sea piracy appeared, which prevented this exchange from flourishing, and for the continuation of trade flourishing, the so-called marine loan appeared, and the idea on which it is based is that the owner of the sea shipment or ship borrows a sum of money with a guarantee The shipment or the ship, and this procedure paved the way for the emergence of marine insurance at the hands of the Portuguese and the Spaniards in the fifteenth century. With the development of this insurance, other types of insurance emerged, such as industrial and commercial insurance, and insurance of property and people..etc. And mechanisms to activate the activity of insurance companies operating in the Iraqi market and activate their participation in economic development.

المقدمة :

يُعد التأمين وسيلة من الوسائل الهامة لمواجهة الاخطار، فهو بمثابة نظام يعمل على تهيئة وتوفير الغطاء التأميني للأفراد ضد أي خطر قد يصيبهم ، وقد نشأ نظام التأمين في العراق على شكل هيئات وشركات تأمين أجنبية ، وهي فروع لشركات بريطانية وفرنسية وأمريكية وسويسرية وإيطالية وهندية، وعدد قليل من الشركات العربية، وقد بدأ الاهتمام بالتأمين في العراق بعد الحرب العالمية الأولى ، عندما قام عدد من التجار باستيراد البضائع المختلفة من خارج العراق فوجدوا بأن هناك حاجة كبيرة للتأمين عليها من الأخطار التي قد تصيبها ، وقد أستمروا عمل شركات التأمين في العراق بدون أن يصدر قانون ينظم عمل هذه الشركات لغاية عام ١٩٣٦ ، إذ صدر القانون رقم (٧٤) لسنة ١٩٣٦ وهو أول قانون بهذا الخصوص ، وبعد ذلك تم تأسيس أول شركة تأمين عراقية سنة ١٩٥٠ وفي ضوء التوجيهات الجديدة للسياسة الاقتصادية في العراق بعد عام ٢٠٠٣ ، كان التوجه لتنظيم أعمال التأمين في العراق ومواكبتها للتطورات العالمية إذ صدر القانون رقم (١٠) في عام ٢٠٠٥ بهدف تطوير إجراءات التأمين في العراق وتنظيم أعمال شركات التأمين بما يتناسب والاعمال الحديثة للتأمين في العالم .

أهمية البحث:

تطلق أهمية البحث من معرفة أسس التأمين وآليات عمل المؤسسات العاملة في هذا القطاع ، فضلا عن التعرف على واقع التأمين في الاقتصاد العراقي وسبل مساهمته في الناتج المحلي الاجمالي .

مشكلة البحث:

بالرغم من ظهور التأمين في الاقتصاد العراقي منذ بدايات القرن المنصرم من خلال شركات التأمين الاجنبية والتي كانت تعمل على وفق المعايير الدولية آنذاك ، الا انه شهد تذبذبا في مستويات اداءه بسبب تأمين شركات التأمين وانحسار العمل التأميني في القطاع الحكومي والذي افتقد الى المنافسة والرغبة في التطوير ، اما بعد ٢٠٠٣ فقد برزت شركات تأمين غير مؤهلة للتنافس مع الشركات الاجنبية التي تمتلك خبرات تأمينية متراكمة ، ولم تكن لديها القدرة على نشر الوعي التأميني لتجلب اكبر عدد من الزبائن المشتركين في فعاليتها .

هدف البحث:

يهدف البحث الى التعرف على مفاهيم التأمين وآليات عمل المؤسسات التأمينية ، وصولا الى دراسة واقع قطاع التأمين في العراق ومدى مساهمته في التنمية الاقتصادية ، ثم محاولة رسم سيناريوهات لتفعيل قطاع التأمين في العراق وتعزيز قدرته على التنافس مع شركات التأمين الاجنبية .

فرضية البحث:

ينطق البحث من فرضية مفادها :

ان تطوير اداء قطاع التأمين من شأنه ان يخلق بيئة آمنة للعمل وتطوير اداء المؤسسات الاقتصادية لتعزيز مساهمتها في التنمية الاقتصادية .

الحدود المكانية والزمانية:

تشمل الحدود المكانية العراق أما الحدود الزمانية تتضمن السنوات (٢٠١٠-٢٠١٨)

المبحث الأول

قطاع التأمين في العراق والحاجة الى ثقافة تأمينية فاعلة

أولاً: الإطار المؤسسي للتأمين في العراق:

من أجل تنظيم أعمال التأمين في العراق، فقد تأسست مجموعتين من المؤسسات التي تمارس هذه الأدوار وهي:

١- **ديوان التأمين العراقي:** تأسس هذا الديوان وفقاً لقانون تنظيم أعمال التأمين في العراق رقم (١٠) لسنة ٢٠٠٥ ويهدف إلى تنظيم قطاع التأمين في العراق وكذلك الاشراف عليه بما يكفل تطوره وتأمين سوق شفاف ومفتوح وآمن مالياً ويعمل على تعزيز دور صناعة التأمين وضمان الممتلكات والأشخاص ضد المخاطر من أجل حماية الاقتصاد الوطني وكذلك تجميع المدخرات الوطنية وتنميتها واستثمارها لدعم التنمية الاقتصادية^(١)، وبموجب القانون فإن الديوان يعد المنظم الرئيس لأعمال التأمين الخاصة والعامة في العراق، فقد أجازت المادة (١٣) من القانون رقم (١٠) لسنة ٢٠٠٥ للشركات الخاصة ممارستها لأعمال التأمين بعد الحصول على الإجازة من رئيس ديوان التأمين^(١).

٢- **جمعية التأمين العراقية:** تأسست هذه الجمعية وفق المادة (٨٤) من قانون تنظيم أعمال التأمين الصادر بالأمر رقم (١٠) لسنة ٢٠٠٥ وتكون المسؤولية فيها تضامنية وأن جميع المؤمنين ومعيدي التأمين (جمعية المؤمنين ومعيدي التأمين العراقية) المجازون في العراق أعضاء فيها حتى نفاذ هذا القانون، وتهدف هذه

الجمعية إلى رعاية مصالح أعضائها والعمل على تطبيق قانون وأخلاقيات التأمين^(١).

ثانياً: تخطيط تطوير الخدمات التأمينية وادماجها في الفعاليات الاقتصادية :

بعد التحولات الاقتصادية والاجتماعية التي جرت في الكثير من بلدان العالم الثالث تزايدت الحاجة إلى التخطيط والتطوير الاقتصادي الوطني وعلى أسس علمية، تستجيب لمتطلبات التنمية الاقتصادية وتستخدم جميع الإمكانيات المتاحة. إن التأمين يرتبط بجميع القطاعات الاقتصادية الأخرى لذا فإن التخطيط لتطوير الخدمات التأمينية يعتمد على الخطة الاقتصادية الوطنية وكذلك خطة تطوير كل قطاع من القطاعات الاقتصادية وإن الدقة في وضع الخطة الوطنية والخطط التفصيلية لمختلف القطاعات تنعكس على جودة ونجاح خطة التأمين، إذ إن الخطة التأمينية تهدف إلى رسم آفاق تطور العمليات التأمينية وتنوعها، وأيضاً تخفيض النفقات الفنية والإدارية وهذا يؤدي إلى تخفيض أقساط التأمين، لتوفير حماية تأمينية رخيصة وجيدة، وبما إن قطاع التأمين يتميز بكونه قطاع خدمات مبنية على أساس التكاليف وليس على أساس برنامج إنتاجي كمشروعات ومؤسسات الإنتاج المادي فإن الذي يمكن رسمه في الخطة التأمينية هو أشكال وأنواع التأمينات المستجيبة لمتطلبات التطوير الاقتصادي وحاجات المجتمع

وتحديد الخطوات والإجراءات اللازمة لتطوير هذه الأشكال والأنواع على نحو أفضل.

لذا تُعد مؤشرات الخطة التأمينية مرآة لبلاد الاقتصاد للبلد وتعكس الإجراءات التي يجب اتخاذها من أجل تحقيق جزء من المهام المالية للخطة العامة، وإن الإحصاءات من الأدوات المهمة في وضع الخطط والإشراف عليها، وتستخدم لذلك البيانات المتجمعة لدى هيئات التأمين من (أقساط التأمين ومبالغ التأمين والتعويضات والنفقات الإدارية ... الخ) .

ويمكن الإشارة إلى جودة الخدمة التأمينية في الشركات التأمينية إذ إن تشابه الخدمات التأمينية جعل المنافسة بين هذه الشركات لا تتركز فقط على أنواع الخدمات المقدمة، ولكن على جودتها أيضاً^(١)، وتواجه شركات التأمين العديد من العقبات الناشئة عن المنافسة الشديدة في السوق التأميني، وإن حرص ومحاولة كل شركة على الحصول على أكبر حصة ممكنة في السوق أدى إلى حرص كل شركة على تطوير خدماتها التأمينية المقدمة إلى الزبائن والسوق، وعندما تكون حاجات الزبائن ورغباتهم تصاغ وتتشكل في ضوء واقعهم الاجتماعي والاقتصادي والحضاري؛ فإن العلاقة تصبح وثيقة بين قدرة الشركة على البقاء والاستمرار، وبين قدرتها على تقديم الخدمات التأمينية التي تتلائم مع الاحتياجات المتطورة لهؤلاء الزبائن، لذا فإن الشركات التأمينية تقوم بدراسات شاملة وكثيفة ودورية لزبائنهم والمتعاملين معها للوقوف على رغباتهم واحتياجاتهم من الخدمة التأمينية^(١).

ثالثاً: أهمية الثقافة التأمينية في السوق العراقية:

تعد الثقافة التأمينية من الأهداف الاجتماعية لصناعة التأمين فهي تسعى بكل جوانبها لتتقيد المجتمع منظمات وأفراداً كيفية الانتباه للمخاطر التي قد يتعرضون لها في حياتهم اليومية والعملية ، وكذلك كيفية إدارة المخاطر بشكل فعال وكفوء عن طريق اللجوء إلى شركات التأمين التي تعد الجهة الفعالة في إدارة المخاطر وذلك لإمكانياتها المالية والفنية، فمن الناحية الاقتصادية يساهم التأمين في الاستقرار الاقتصادي بما يوفره من وعي بحماية النشاطات الاقتصادية المختلفة فيحفز أصحاب الأموال باستثمار أموالهم بالأوجه الاستثمارية كافة ، أما من الناحية الاجتماعية فالتأمين يبعث الأمان في نفوس المؤمن لهم ، فيجعلهم يعملون في جو من الأمان والراحة ويزيل منهم حالة القلق من تعرضهم لخسارة ما فيؤدي هذا إلى زيادة إنتاجيته واطمئنانه على ممتلكاتهم.

إن صناعة التأمين في كل أنحاء عالمنا العربي وبالرغم من توفر الإمكانيات البشرية والمالية والفنية قد فشلت في نشر الوعي التأميني ولاسيما بين طبقات المجتمع البسيطة من ذوي الدخل المحدود، ودليل على ذلك الانخفاض في حصيلة الاقساط التأمينية السنوية مقارنة بإجمالي الناتج القومي وارتفاع أقساط إعادة التأمين^(١).

المبحث الثاني

مؤشرات أداء شركات التأمين العامة للمدة (٢٠١٠-٢٠١٨) ^(١)

أولاً: صافي الاستثمار:

تقوم شركات التأمين باستثمار الفوائض النقدية المستحقة عن طريق الأقساط بأوجه الاستثمار المتاحة وعلى وفق سياسة محددة من أجل ضمان عوائد مستمرة ومناسبة، وإن النشاط الاستثماري يمثل في إدارة النشاط المالي والعقاري للشركات والمتمثل في استثمار الفوائض النقدية وإعداد خطط الاستثمار على ضوء الرؤية الاقتصادية لهذه الشركات.

أن أبرز الاستثمارات التي تقوم بها شركات التأمين العراقية هي استثمارات ذات عائد ثابت تحصل عليه هذه الشركات بشكل دوري منظم ومجدد مثل القروض والسندات بأنواعها ، واستثمارات ذات العائد غير ثابت كالعقارات والأراضي واسهم الشركات المالية والتجارية والصناعية، أن المادة رقم (٤) قانون رقم (٣٨) لعام ١٩٦٠ تنص بإن للشركة التأمينية الحق باستثمار موجوداتها وبطرق الاستثمار جميعها ووفق ما يقرر مجلس الإدارة ووفق المادة (٣٨) لنفس القانون تقوم الشركة التأمين الوطنية باستثمار أموالها من أجل تعزيز مكانتها في السوق التأمين وكذلك تحقيق الأرباح لتقوية مركزها المالي ، ووفق المادة (١٥) لنفس القانون تكون صلاحية بيع وشراء العقارات والأموال المنقولة من مسؤولية مجلس الإدارة بإن يكون ذلك ضروري لأغراض استثمار احتياطي راس المال ويحق له تحديد أوجه الاستثمار ، وأن الاستثمار في فوائض شركات التأمين يقصد به قيام الشركة

باستثمار أموالها بشكل لا يؤثر على المستفيدين من الخدمة التأمينية ، ويعد الاستثمار من أهم أقسام شركات التأمين ويكون ارتباطه بشكل مباشر مع المدير فهو مهم لنجاح واستمرار شركات التأمين^(١)، ويمكن ملاحظة تطور الاستثمار لشركة التأمين الوطنية وشركة التأمين العراقية وكما موضح في الجدول التالي :

جدول (١): تطور حجم الاستثمار ومقارنته بالعوائد لدى شركتي التأمين العراقية وشركة التأمين

الوطنية للمدة (2010-2018)

شركة التأمين الوطنية			شركة التأمين العراقية العامة			النشاط السنوات
نسبة العائد إلى حجم الاستثمار %	عائد الاستثمار	حجم الاستثمار	نسبة العائد إلى حجم الاستثمار %	عائد الاستثمار	حجم الاستثمار	
7%	4877931	73471215	9%	1364174	14527465	2010
6%	5627297	100161010	10%	1652786	16686611	2011
6%	6934928	114002589	8%	1714150	21653353	2012
5%	6679153	129485495	9%	2394596	27131171	2013
8%	8065273	100692816	7%	2522864	35586638	2014
5%	7215030	157570780	8%	2994705	34426935	2015
4.9	8402492	171263956	7%	2796636	36513979	2016
6%	8512328	148396879	7%	2923242	39408445	2017
5%	8120435	153710636	6%	2993785	54330705	2018
	76427259	1266615698		26134547	311524539	المجموع

المصدر: من اعداد الباحثين بالاعتماد على تقارير (شركة التأمين العراقية العامة، شركة التأمين الوطنية)

لسنوات مختلفة

يلاحظ من خلال الجدول (١) بأن شركة التأمين الوطنية لديها ارتفاع تدريجي بحجم الاستثمارات فقد تطورت من (73) مليار دينار عام 2010 إلى أن وصل أقصاه عام ٢٠١٦ بلغ (171,2) مليار دينار ، وكان عائد الاستثمار للشركة متفاوت فبلغ أقصاه سنة 2018 إلى (8) مليار دينار أما شركة التأمين العراقية فقد شهدت ارتفاع في حجم الاستثمار وبصورة تدريجية من عام 2010 التي تبلغ (14) مليار حتى (54) مليار عام ٢٠١٨ وكانت مبالغ تفوق الشركات الباقية ، وذلك لأن هذه الشركة تساهم وبشكل كبير في استثماراتها في هيئة الأوراق المالية وكذلك في الودائع المصرفية وشراء العقارات ، وبالنسبة لعائد الاستثمار لشركة التأمين العراقية فهو بتزايد مستمر فقد تجاوز (١٣) مليار في عام ٢٠١٠ واستمر ارتفاع العائد حتى وصل عام ٢٠١٨ حوالي (29) مليار لتلك الشركة .

ويلاحظ من هذا الجدول بأن البيانات تعطي مؤشراً إيجابياً بتحسن الوضع الاقتصادي في العراق، إذ أن للنشاط الاستثماري أثر إيجابي في حماية الشركات التأمينية من التقلبات غير المرغوب فيها وبالتالي المحافظة على قدرة الشركات بالإيفاء بهذه الالتزامات قصيرة وطويلة الاجل وكذلك الحفاظ على استمرارية وضمان السيولة النقدية لهذه الشركات.

ثالثاً: مجموع مساهمات الشركات المحلية والأجنبية:

ان شركات التأمين لم يكن بمقدورها أن تقوم بدور حيوي لها بواسطة العمليات التأمينية بين المؤمن له والمؤمن إلا من خلال المزج بينها وبين المساهمات الأجنبية، والجدول (٢) يوضح عدد الشركات المحلية والأجنبية العاملة بقطاع التأمين:

جدول (٢) : مجموع الشركات المحلية والأجنبية المساهمة مع شركتي التأمين الوطنية وشركة التأمين العراقية العامة للمدة (2010-2018)

شركة التأمين العراقية العامة		شركة التأمين الوطنية		النشاط السنوات
الأجنبية	المحلية	الأجنبية	المحلية	
2	26	3	43	2010
2	26	3	43	2011
2	26	3	43	2012
2	26	3	43	2013
2	26	3	38	2014
2	26	3	42	2015
2	26	3	42	2016
2	26	4	42	2017
2	26	4	42	2018

المصدر: من اعداد الباحثين بالاعتماد على تقارير (شركة التأمين الوطنية، شركة التأمين العراقية) اعداد مختلفة

توضح بيانات جدول (٢) بأن شركتي التأمين العراقية والوطنية كانتا بحالة منافسة باستقطاب المساهمات المحلية والأجنبية ، إذ بلغت أجمالي الشركات المساهمة مع شركة التأمين الوطنية (378) شركة ومجموع الشركات الأجنبية هي (29) شركة ، اما شركة التأمين العراقية فكان مجموع الشركات المساهمة معها (234) شركة محلية و (18) شركة أجنبية وهذا يعطي مؤشراً إيجابياً تجاه تحقق حالة المنافسة المتكافئة بين الشركتين من جانب ومن جانب آخر ما زالت المساهمات الأجنبية محدودة فهي لا تزيد عن (6.7%) في شركة التأمين العراقية و(5.7%) في شركة التأمين الوطنية .

ثالثاً: أجمالي الأقساط المتحققة :

أن الأقساط المتحققة تعني مقابل مالي يحصل عليه المؤمن (شركات التأمين) من الافراد (المؤمن له) نتيجة ما يحصل عليه المؤمن له من أمان ، وأن القسط ينقسم إلى قسمين هما التجاري والقسط الصافي فيقصد بالقسط الصافي هو المبلغ الذي يغطي الخطر بدون نقصان أو زيادة ، إما القسط التجاري هو القسط الصافي ويضاف اليه ما يتحمل المؤمن من تكاليف مثل نفقات تحصيل القسط وعمولة الوساطة ومصروفات الإدارة العامة والرسوم والضرائب المفروضة من قبل الحكومة وأرباح المساهمين ، وأن حجم القسط يختلف وفقاً للشركة التأمينية ولنوع التأمين^(١) ، ويمثل الجدول (٣) البيانات الخاصة لشركة التأمين الوطنية والعراقية المتعلقة بأجمالي الأقساط المتحققة خلال المدة 2018-2010

جدول (٣) : أجمالي أقساط التأمين في شركتي التأمين الوطنية العامة و التأمين العراقية

العامة للمدة 2018-2010

السنوات	شركة التأمين الوطنية		شركة التأمين العراقية	
	الاقساط الاجمالية المتحققة	نسبة النمو %	الاقساط الاجمالية المتحققة	نسبة النمو %
2010	60,561,538	-	19068592	-
2011	83,306,169	0.38	24529277	0.28
2012	92,583,820	0.11	73708323	-0.70
2013	126,087,773	0.36	51275288	-0.30
2014	120,714,386	0.06	60370630	-0.88
2015	92,923,005	0.23	63468048	0.05
2016	97,778,386	0.05	53178322	-0.16

-0.06	49459329	-0.05	92416207	2017
0.64	81146644	-0.13	80235097	2018

المصدر : من اعداد الباحثين بالاعتماد شركة التأمين العراقية وشركة التأمين الوطنية العامة لسنوات مختلفة.

ومن خلال الجدول (٣) يلاحظ أن أجمالي أقساط شركة التأمين الوطنية لسنة ٢٠١٠ قد بلغت حوالي (60561538) الف دينار (ستون مليار وخمسمائة وواحد وستون مليون وخمسمائة وثمانية وثلاثون الف دينار) بينما بلغت قيمة أجمالي أقساط الشركة لسنة ٢٠١١ حوالي (83306169) الف دينار (ثلاثة وثمانون مليار وثلاثمائة وستة مليون ومائة وتسعة وستون الف دينار) إذ يلاحظ الزيادة الكبيرة في أجمالي أقساط هذه الشركة ويتوالي السنوات ماعدا سنة ٢٠١٧-٢٠١٨ فكان هناك انخفاض ملحوظ في أجمالي أقساط هذه الشركة إذ كانت نسبة الانخفاض لسنة ٢٠١٨ قدرها (13%) وكذلك انخفاض قدره (5%) لسنة ٢٠١٧ ويرجع ذلك للأوضاع الأمنية في البلد ، وكذلك يلاحظ من الجدول (٣) بأن قيمة أجمالي أقساط شركة التأمين العراقية لسنة ٢٠١٠ قد بلغت حوالي (19068592) الف دينار (تسعة عشر مليار وثمان وستون مليون وخمسمائة وأثنان وتسعون الف دينار) وحققت سنة ٢٠١١ زيادة ملحوظة في قيمة أجمالي أقساط هذه الشركة إذ بلغت حوالي (24529277) الف دينار (أربعة وعشرون مليار وخمسمائة وتسعة وعشرون مليون ومائتان وسبع وسبعون الف دينار) إي أنه هناك ارتفاع مستمر في قيمة أجمالي أقساط هذه الشركة ويتوالي السنوات ، إذ بلغت أقصاها سنة ٢٠١٨ إلى (81146644) الف دينار (واحد وثمانون مليار ومائة وستة واربعون مليون

وستمائة واربع واربعون الف دينار) وبنسبة زيادة قدرها (64%) عن السنة السابقة . ٢٠١٧ .

رابعاً: التعويضات المدفوعة:

أن التعويضات المدفوعة من شركة التأمين هي حق من حقوق حاملي وثائق التأمين التي تدفع في حالة التعرض إلى الخطر، إذ تقوم الشركة بخصمها قبل الوصول إلى الربح القابل للتوزيع ، إي أنها تقوم بتخصيص مبلغ من الإيرادات من أجل تسوية الخسائر ومطالبات المؤمن لهم في حال تحقق الخطر المؤمن منه ويطلق عليه في الحسابات (مخصص التعويضات) ، وأن هذا البند يظهر في ميزانيات الشركات التأمينية كافة^(١) ، إي انه المقابل الذي يحصل عليه المؤمن له في حال تحقق الخطر وفق الاتفاق المبرم مسبقاً بين المؤمن له وشركة التأمين ، وأن التعويضات تختلف وفقاً للمادة المؤمن عليها ووفقاً لنوع المحفظة التأمينية (التأمين على الحياة او التأمين على السيارات أو التأمين على الحريق .. الخ)، بينما تشكل التعويضات المدفوعة في شركة التأمين العراقية جزءاً كبيراً من مصروفات العمالية التأمينية^(١)، ويمكن ملاحظة تطور التعويضات المدفوعة لشركتي التأمين الوطنية وشركة التأمين العراقية ومن خلال الجدول التالي:

جدول (٤) : اجمالي التعويضات لشركتي التأمين العراقية العامة وشركة التأمين الوطنية

ألف دينار

للمدة 2018-2010

شركة التأمين الوطنية العامة		شركة التأمين العراقية العامة		النشاط السنوات
معدل التغير السنوي %	أجمالي التعويضات	معدل التغير السنوي %	أجمالي التعويضات	
12.43	10395542	105.46	9272733	2010

71.20	17798161	-10.80	8270605	2011
61.84	28805473	103.7	16795295	2012
19.71	34485453	155.36	24890101	2013
16.28	40101546	27.31	31689941	2014
3.74	41604703	9.89	34824761	2015
-19.20	33615230	-11.88	30684224	2016
-26.18	24811759	-13.54	26526525	2017
2.93	25540705	29.08	34242735	2018
	278879888		227974506	المجموع

المصدر: من اعداد الباحثين بالاعتماد على تقارير شركة التأمين العراقية العامة وشركة التأمين الوطنية العامة لسنوات مختلفة

يلاحظ من الجدول (4) بلغ إجمالي التعويضات لشركة التأمين الوطنية في تزايد مستمر في سنة 2010 والتي بلغت (10395542) الف دينار (خمسة مليار واربعمائة وثلاثة وخمسون مليون وثمانمائة وسبعة وخمسون الف دينار عراقي) إلى أن وصلت سنة 2014 نحو (40101546) الف دينار (عشرة مليار وثلاثمائة وخمسة وتسعون مليون وخمسمائة وأثنان واربعون الف دينار عراقي) وقد بلغت إجمالي تعويضات هذه الشركة أقصاها سنة ٢٠١٥ حيث بلغت (41604703) الف دينار (واحد واربعون مليار وستمائة واربع مليون وسبعمائة وثلاثة الف دينار عراقي) بزيادة نحو (12%) عن السنة السابقة (٢٠١٤) ، وبلغت قيمة إجمالي التعويضات لهذه الشركة سنة ٢٠١٨ نحو (25540705) الف دينار (خمسة وعشرون مليار وخمسمائة واربعون مليون وسبعمائة وخمسة الف دينار عراقي)، بينما كان معدل التغيير السنوي لشركة التأمين الوطنية بدرجات متفاوتة موجبة

وبدرجات سالبة فلغ أقصاه سنة ٢٠١١ نحو (71%) وظهر بدرجات سالبة سنة ٢٠١٦-٢٠١٧ نحو (-19,-26) أي أنه ظهر بدرجات متفاوتة لمختلف السنوات ، وكذلك يلاحظ من الجدول بأن شركة التأمين العراقية العامة قد بلغ أجمالي تعويضها نحو (2972733) الف دينار (ثلاثة مليار ومائة وسبعة عشر مليون وستمائة وتسعة واربعون الف دينار عراقي) لسنة 2010 وكان هناك ارتفاع ملحوظ في اجمالي تعويضاتها وبتوالي السنوات حتى بلغ سنة ٢٠١٨ نحو (34242735) الف دينار (اربعة وثلاثون مليار ومائتان واثنان واربعون مليون وسبعمائة وخمسة وثلاثون الف دينار عراقي) وبمعدل تغير سنوي نحو(29%) في سنة ٢٠١٨ وكان معدل التغير السنوي لهذه الشركة بدرجات متفاوتة فبلغ درجات سالبة في سنة ٢٠١٦-٢٠١٧ و٢٠١١ وكما هو مبين في الجدول .

رابعاً: أجمالي الأرباح:

جدول (٥) : إجمالي أرباح التأمين العراقية (شركة التأمين العراقية ، شركة التأمين الوطنية)

الف دينار

للمدة (٢٠١٠-٢٠١٨)

شركة التأمين الوطنية العامة				شركة التأمين العراقية العامة				السنوات
معدل التغيير السنوي %	إجمالي الأرباح	الأرباح الاستثمارية من الأعمال غير التأمينية	الأرباح التأمينية	معدل التغيير السنوي %	إجمالي الأرباح	الأرباح الاستثمارية من الأعمال غير التأمينية	الأرباح التأمينية	السنوات
34.9	60160049	9994053	50165996	67.3	12589732	2793873	9795859	2010
26.1	75873518	10365510	65508008	0.5	19314841	3056169	16258672	2011
0.9	76546014	12767668	63778346	214.3	60708447	3795419	56913028	2012
39.0	106447929	14845609	91602320	-48.5	31237489	4852302	26385187	2013
-9.9	95816931	15204091	80612840	14.5	35753206	7072517	28680689	2014
-29.8	67279273	15960971	51318302	-18.9	28982655	339368	28643287	2015
22.7	82534223	18371067	64163156	3.5	29993487	7499389	22494098	2016
-15.9	69399059	1794611	67604448	-4.0	28764019	5831215	22932804	2017
39.8	69994640	15300248	54694392	93.8	55755478	8851569	46903909	2018
	808142137	129185789	678956348		323145952	46486340	276659612	المجموع

المصدر: من اعداد الباحثين بالاعتماد على تقارير شركة التأمين العراقية العامة وشركة التأمين الوطنية العامة لسنوات مختلفة

يلاحظ من الجدول (٥) بأن شركة التأمين الوطنية قد بلغ إجمالي ربحها (60160049) الف دينار (ستون مليار ومائة وستون مليون وتسعة واربعون الف دينار) في سنة ٢٠١٠ وهناك ارتفاع مستمر بأجمالي أرباح الشركة وبتوالي السنوات وبصورة ملحوظة والتي بلغت قيمة اجمالي أرباح الشركة أقصاها إلى (82534223) الف دينار (اثنان وثمانون مليار وخمسمائة واربع وثلاثون مليون ومائتان وثلاثة وعشرون الف دينار) لعام ٢٠١٦ ، أما بالنسبة لمعدل التغيير السنوي فيكون بدرجات متفاوتة وبتوالي السنوات فيظهر بدرجات موجبة وسالبة فكانت نسبة التغيير السنوي- سنة ٢٠١٧ إلى (-15.9%) وظهر بدرجات سالبة أيضا بسنة ٢٠١٤-٢٠١٥ وبدرجات موجبة في باقي السنوات ، وكانت الأرباح

التأمينية لشركة التأمين الوطنية بزيادة ملحوظة في أرباحها التأمينية وكانت أعلى حصيلة لها في سنة ٢٠١٣ قد بلغت حوالي (91) مليار دينار عراقي ، وأما بالنسبة لشركة التأمين العراقية فيلاحظ من الجدول (٥) أن أجمالي أرباح الشركة في سنة ٢٠١٠ قد بلغت (١٢٥٨٩٧٣٢) الف دينار (اثنتا عشر مليار وخمسائة وتسعة وثمانون مليون وسبعمائة وأثنان وثلاثون الف دينار عراقي) وكذلك نلاحظ الارتفاع المستمر في أجمالي أرباحها ويتوالي السنوات فكانت سنة ٢٠١٢ قد حققت اقصى درجة لشركة التأمين العراقية فبلغت أجمالي أرباحها حوالي (60708447) الف دينار (ستون مليار وسبعمائة وثمانية مليون واربعمائة وسبعة وأربعون الف دينار عراقي) بزيادة كبيرة عن السنوات السابقة ، بينما ظهرت الأرباح التأمينية لشركة التأمين العراقية بارتفاع تدريجي في أرباحها التأمينية التي نحصل عليها من الفرق بين أجمالي الأقساط وأجمالي التعويضات للشركة التأمينية المدروسة ، وفي سنة ٢٠١٢ قد حققت هذه الشركة أعلى أرباح تأمينية لها فبلغت حوالي (56) مليار دينار عراقي ، بينما ظهر معدل التغيير السنوي لها بدرجات متفاوتة (سالبة وموجبة) ولقد تم الحصول على صافي أرباح الشركتين من حاصل جمع الأرباح التأمينية مع الأرباح الاستثمارية من الاعمال غي التأمينية للشركتين.

المبحث الثالث

تحديات العمل التأميني في العراق وآليات اصلاح

أولا : أهم التحديات التي يواجهها قطاع التأمين في العراق

يواجه قطاع التأمين العراقي مجموعة من التحديات التي تقف أمام تطوره،
واهم هذه التحديات هي:

١- **الأمن غير المستتب:** يعد عدم توفير الامن في البلاد من التحديات التي يواجهها قطاع التأمين فيؤدي إلى عزوف رؤوس الأموال الأجنبية عن الاستثمار في العراق وقد يؤدي إلى ذهاب رؤوس الأموال العراقية إلى الدول الأخرى، وبهذا يكون قطاع التأمين العراقي يخسر توفير الأغطية التأمينية على هذه الاستثمارات وما يرافقه من الأقساط التأمينية، وكذلك من التحديات التي يواجهها التأمين هي الفساد الإداري والمالي.

٢- **ضعف إداء قطاع البنى التحتية:** أن ضعف البنى التحتية نتيجة للوضع الأمني للبلد والعمليات الإرهابية والفساد الاداري والاقتصادي التي تحصل في العراق قد أثرت بشكل كبير وسلبى على قطاع التأمين لأن تهيئة وتوفير البنى التحتية تعود إلى خلق بيئة استثمارية محرّكة للقطاع الخاص .

٣- **القوانين والتشريعات :** بعد رفع العقوبات الاقتصادية على العراق في أعقاب سنة ٢٠٠٣ كان هناك أمل كبير بعودة سوق التأمين العراقي واسترداد مكانته المرموقة ، لكن حصل العكس^(١) فقد تم صدور قانون التأمين رقم (١٠) لسنة ٢٠٠٥ الذي نص على عدم اشتراط وجوب التأمين على الأموال الموجودة داخل العراق أو البضائع التي ترد اليه ، و تسبب هذا القانون في تقليص العمل الإنتاجي لدى الشركات التأمينية العراقية وبشكل كبير وملحوظ وكذلك خروج أقساط التأمين خارج العراق^(١).

٤- تراجع الطلب على التأمين: أن الطلب على التأمين قد تراجع من قبل الشركات التابعة للدولة وذلك للتراجع والتراخي بصياغة أحكام التأمين والتعويض لعقود الدولة ففي بعض هذه العقود هناك غياب بالمواد المتعلقة بالتأمين، وكذلك ترك الحرية للمستثمر الأجنبي للتأمين مع شركة تأمين عراقية أو شركة تأمين أجنبية ووفق القانونين (المادة ١١ قانون الاستثمار رقم (١٣) لسنة ٢٠٠٦ والمادة ١١ من قانون الاستثمار في إقليم كردستان-العراق رقم (٤) لسنة ٢٠٠٦) فأن التأمين للعديد من المشاريع الاستثمارية تتسرب لخارج العراق.

٥- غياب الاهتمام الحكومي: أن هناك عدم الاهتمام بقطاع التأمين العراقي من قبل المسؤولين والحكومة العراقية بتنمية وتطوير هذا القطاع في العراق إذ ليس هناك تطور حقيقي في حجم أقساط التأمين بالرغم من وجود ثلاث شركات تأمين حكومية وثلاثين شركة تأمين خاصة، إذ أن قانون تنظيم التأمين رقم (١٠) لسنة ٢٠٠٥ الذي سمح بتسريب أقساط التأمين إلى خارج العراق من غير المرور بشركات تأمين مسجلة في العراق ولديها رخصة بمزاولة العملية التأمينية من قبل ديوان التأمين العراقي.

٦- شحة كوادر التأمين المؤهلة للعملية التأمينية: أن قطاع التأمين قد خسر أغلبية كوادره بسبب التقاعد والوفاة والهجرة، فأن قطاع التأمين العراقي في الوقت الحاضر يفتقر إلى الكوادر التأمينية المتعمقة والمتمرسنة في ثقافتها التأمينية وهذا على مستويين الأول على مستوى المؤمن لهم من الشركات الصناعية والتجارية والدوائر الرسمية وغيرها من المؤسسات، التي ليس لديها الكادر الفني والمؤهل القادر على

ممارسة وظيفة إدارة الخطر والتأمين كما في قطاع النفط ، والثاني على مستوى شركات التأمين التي لم تتمكن من بناء وتأهيل كوادر جديدة ، إذ أن شركات التأمين العراقية والكوادر الموجودة لديها لم تتطور بل أن دورها قد تراجع منذ الاحتلال الأمريكي للعراق عام ٢٠٠٣^(١) ، وكذلك فأن وجود الشركات التأمينية الخاصة التي تفتقر إلى الكوادر الفنية المدربة والمتانة المالية إذ لا يشكل وجودها إلا ضغطاً والمنافسة السعرية بين الشركات ولا يصاحب ذلك تطور في الخدمات التي تقدم إلى المؤمن لهم^(١).

٧- غياب الوعي التأميني والثقافة التأمينية وركود سوق التأمين:

أن شركات التأمين العراقية لم تسعى في استهداف المواطنين سواء من حيث توفير الخدمات التي يحتاجونها أو من حيث زيادة الوعي التأميني لديهم، ولا توجد إي محاولات في الاستفادة من هذا المجال بالصورة التي تحقق للعملاء الخدمات التأمينية مع احتياجاتهم الأخرى التي تلبى رغبات المواطنين^(١)، ومن المهم القيام بتحسين صورة القطاع التأميني لدى المواطنين وخلق ثقافة تأمينية لديهم وبناء جسور الثقة المتبادلة بين المواطنين وبين شركات التأمين وهذا عن طريق تعميق وترسيخ الفكر لدى الأفراد بأن الشركات التأمينية العراقية لديها مهمة أساسية التي تتمثل بتعويض المواطنين بما قد يتعرض له من خطر وليس جمع الأقساط منه فقط^(١).

أن ضعف الوعي التأميني قد يرجع إلى أسباب اجتماعية واقتصادية وتاريخية وكذلك فأن المواطنين العراقيين الذين يعيشون تحت خط الفقر يكون خارج الطلب

الفعال على الحماية التأمينية لأنهم ما يكفيهم من دخل لتمويل احتياجاتهم الأساسية إذ ليس لديهم إمكانية دفع الأقساط التأمينية لذلك فأن عامل الفقر من العوامل الأساسية في غياب الوعي التأميني وتراجع الطلب على الحماية التأمينية.

إذ يعد نشر الوعي التأميني من العوامل المهمة في طلب الخدمة التأمينية وبالأخص في العراق الذي يوصف بانخفاض أو غياب الوعي التأميني بين أفراد المجتمع وأن أهم الأسباب التي تؤدي إلى تراجع ثقافة التأمين لدى الأفراد هي عدم دخول القطاع التأميني في المناهج التعليمية التي تساهم في نشر الثقافة التأمينية وتوفير المعلومات التي تساعد في نوعية المواطنين^(١)، وأيضاً عدم الاهتمام الكافي من قبل الشركات التأمينية بنشر ثقافة الوعي التأميني يؤدي إلى آثار سلبية وردود غير مرضية ومشجعة لدى المواطنين باتجاه قطاع التأمين ، وتفتقر بعض الشركات التأمينية إلى استخدام الوسائل التكنولوجية الحديثة لغرض تخطيط وأعداد الموازنات ونقل المعلومات وأن هذه الشركات التأمينية تستثمر المبالغ النقدية الكافية في تدريب الموارد البشرية وبناء ملاكات مدربة ومؤهلة من إداريين وفنيين من أجل النهوض وتطوير القطاع التأميني في العراق، وقد يعود ركود سوق التأمين لأفتقار المواطنين للوعي والثقافة التأمينية وكذلك مما لا شك فيه أن العادات والتقاليد خلفية مهمة بصياغة الوعي التأميني فقد تؤثر في عملية اتخاذ القرار بطلب أو شراء الخدمة التأمينية^(١) ، ولكن قد يكون من الأسباب في حالة ركود سوق التأمين العراقي هو الدخل الفردي المتوفر للإنفاق على الحماية التأمينية إذا أن نمو الدخل الفردي يؤثر بشكل فعال في نمو حجم الطلب على التأمين فأن ارتفاع الدخل يؤدي إلى زيادة أقبال الأفراد على التأمين العام

وبالعكس في حالة انخفاض الدخل الفردي يؤدي إلى تراجع الطلب على التأمين وما يرافقه من تدني المستوى الثقافي والمعاشي^(١).

التشكيك بالتعويض:

أن الأفراد يدركون الأخطار التي تحيطهم والخسائر التي تسببها لهم إذا تحققت هذه الأخطار ويشعرون بالحاجة للتأمين واهميتهم الكبيرة لكنهم يلجؤون إلى وسائل أخرى متعددة لتفادي هذه الأخطار التي قد تصيبهم ومن هذه الوسائل والطرق لمعالجة الأخطار هي التأمين الذاتي والادخار لدى المصارف وذلك بسبب تشكيكهم واعتقادهم بعد التزام الشركات التأمينية بالتعويض لهم عند وقوع الخطر المؤمن منه وهذا لعدة أسباب وهي:

أ- الخلافات التي قد تحصل بين المؤمن له عند تحقق الخطر المؤمن منه (طالب التعويض) وبين الشركات التأمين حول استحقاقه للتعويض والمبلغ المستحق للتعويض، وهذا يؤدي للشعور بعدم مصداقية الشركات التأمينية والتشكيك بالإيفاء بالالتزامات اتجاههم (المؤمن لهم).

ب- الطابع المستقبلي والاحتمالي التي تتصف بها العملية التأمينية باعتبار أن الخطر المؤمن منه قد يحصل أو لا يحصل إي أن الأفراد (المؤمن لهم) قد يحصلون على التعويض من الشركات التأمينية فقط في حالة تحقق الخطر المؤمن منه^(١).

ثانيا : الآليات المقترحة لإصلاح قطاع التأمين في العراق

من خلال دراسة واقع قطاع التأمين في العراق والزيارات الميدانية والتقارير السنوية لبعض الشركات تم تحديد اهم المشاكل التي يعاني منها هذا القطاع لذلك تم

الاقتراح على بعض الآليات لتطوير هذا القطاع عن طريق الاستفادة من تجارب دول العالم المتطورة في هذا المجال وأهم الأسباب التي أدت إلى النجاح.

١- الآليات الواجب اتخاذها على مستوى شركات التأمين:

أ- تعزيز رؤوس أموال الشركات عن طريق دمج الشركات لتعزيز قوتها المالية وكذلك التقليل من المنافسة التي تضر بعمل الشركات وتقود إلى استنزاف احتياطياتها وهذا الدمج يزيد القدرة المالية للشركات وبالتالي يزيد حجم الاستثمار التأميني للاستجابة لتطورات سوق التأمين والانفتاح على الأسواق العالمية وهذا يؤدي إلى زيادة الثقة بقطاع التأمين وبالتالي زيادة الطلب على التأمين.

ب- تطوير المنتج التأميني من خلال دراسة واقع السوق وما يحتاجه من أنواع التأمين وذلك بدراسة الخدمات التأمينية المعروضة والمطلوبة ودراسة عدد السكان ومتوسط دخلهم والحالية الاقتصادية وعن طريق هذه الأبحاث يتم تطوير وتنويع أنواع التأمين وفق حاجة السوق بصورة تلبي طموحات العملاء والفائدة على الشركات.

ج- التسعير المناسب للخدمات لأنه أساس نجاح العمليات التأمينية إذ يعد أحد الأسباب الرئيسية التي تتعلق بقرار الافراد والمؤسسات بشراء الخدمات التأمينية ، ولتشجيع الاقبال على الخدمات التأمينية فينبغي على شركات التأمين توحيد سعر خدمات المحافظ التأمينية وتخفيض الأسعار التأمينية.

د- تطوير الكفاءات البشرية وتنظيم الدورات والبرامج التدريبية والاستفادة من خبرات الدول المتقدمة بهذا المجال كالولايات المتحدة والنرويج ولندن وكذلك الامارات والسعودية والمغرب من الدول العربية والعمل على تأسيس معهد تدريب متطور ومخصص في التدريب على وظائف التأمين كافة.

هـ- تعديل الهيكل التنظيمي لقطاع التأمين عن طريق خبراء مختصين والاستفادة من الدول المتقدمة بالتأمين ذلك يعزز مكانة التأمين في الاقتصاد العراقي والتركيز على أهمية ودور هيئات الاشراف والرقابة.

و- ادخال التكنولوجيا في مكاتب وأقسام شركات التأمين جميعها لتحديث القطاع التأميني وجعله مواكب للتطورات العالمية.

ز- العمل بما يسمى صيرفة التأمين بمعنى ربط المصارف بالنشاط التأميني من خلال بيع منتجات التأمين عن طريق المصارف وبالتالي تسهيل المعاملات وتقليل الوقت لأن المصارف تملك شبكة معلومات عن العملاء وكذلك يقلل تكاليف الخدمة التأمينية ويتم ذلك عن طريق الزام عملاء المصارف بالتأمين عند طلبهم قروض السيارات أو قروض عقارية أو عند فتح حساب.

ح- تطوير استثمارات شركات التأمين من خلال تشجيع المواطنين على الاقبال على التأمين وكذلك الاستفادة من هذه الأقساط في الاستثمارات طويلة الاجل كبناء الجامعات والمستشفيات والمدارس والطرق.

٢- الآليات الواجب اتخاذها على المستوى الحكومي:

أ- تطوير سوق التأمين بتوفير نظام مالي متطور كالاستقرار في أسعار الفائدة وأسعار الصرف وأن تطور قطاع التأمين يعني تطور باقي القطاعات الاقتصادية فينبغي أن يكون هناك تكامل بين القطاعات الاقتصادية كافة.

ب- إيقاف التناقضات وتعديل القوانين ولاسيما قانون رقم ١٠ لسنة ٢٠٠٥ وضرورة وجود نص قانوني يلزم العقود والمشاريع كافة بالتأمين الحصري لدى شركات التأمين المحلية وإيقاف خروج الأقساط للخارج.

ج- الاتفاق مع دوار الدولة بالتأمين على موجوداتها وأموالها لدى شركات التأمين محلية.

د- عدم إعطاء التراخيص للشركات النفطية العاملة في العراق سواء كانت محلية او اجنبية مالم تؤمن على ممتلكاتهم مسؤولياتهم وكذلك الأصول المرتبطة بالصناعة النفطية وبما فيها مخاطر انخفاض أسعار النفط لدى الشركات المحلية ولاسيما الحكومية.

هـ- ضرورة تشريع قوانين تنص على التأمين الاجباري كالتأمين على السيارات وتأمين المهندسين والأطباء .

و- التأمين على الصادرات لدى الشركات المحلية بدلا من التأمين عليها في البلد المستورد، وعدم السماح بالاستيراد مالم يتم الاتفاق مع المستوردين على ضرورة التأمين لدى شركات محلية بدلا من التأمين عن البضائع المستوردة في الخارج^(١).

ز- العمل على توفير بيئة استثمارية آمنة وبنى تحتية ملائمة للاستثمار وقوانين استثمار مرنة وكذلك الزام الاستثمارات داخل البلد بالتأمين لدى شركات تأمين

محلية، وتحديث قوانين هيئات الاشراف والرقابة بشكل يتلائم مع تطور أسواق التأمين العالمية.

٣- الآليات الواجب اتخاذها على مستوى الافراد:

ينبغي تعزيز الوعي لدى الافراد عن طريق تقديم الخدمة التأمينية بحيث تتلائم مع متوسط الدخل الفردي والنمو الاقتصادي لجذب العملاء وكذلك تسهيل تسويق الخدمات التأمينية ومعاملات التأمين ويتم ذلك بعدة طرق ترويجية منها ارسال عبر الفاكس او عبر الهاتف النقال او ارسال رسائل نصية عبر البريد الالكتروني وان هذه الطريقة تعد ناجحة حققت عن طريقها العديد من الشركات في البلدان المتقدمة أقساط كبيرة ، كذلك يمكن الترويج للتأمين من خلال الإعلانات عبر مواقع التواصل الاجتماعي والاعلانات التلفزيونية المكثفة أو عن طرق شاشات الكبيرة الموجودة في الشوارع بحيث تكون هذه الإعلانات على شكل أفلام قصيرة تحفز الافراد على التأمين ونشر الثقافة التأمينية لدى الافراد من خلال القيام بالجولات الميدانية من قبل مندوبي شركات التأمين للمؤسسات الاهلية وتعرف بها عن فوائد شراء الخدمة التأمينية ومزايا التأمين .

الاستنتاجات:

١- أن أغلبية معوقات ومشاكل شركات التأمين تعود إلى أسباب أمنية تخرج عن سيطرة الإدارة في الشركة مثلا سيطرة الإرهاب على غالبية محافظات العراق وما خلفه هذا من انخفاض في عدد الوثائق المستلمة في المدة الأخيرة.

- ٢- انخفاض الوعي التأميني في العراق والذي ادى الى تخفيض مساهمات الافراد والمشروعات الاقتصادية في الاشتراك في الفعاليات التأمينية ما خلق فجوة بين السوق التأمينية وقدرتها على التأثير على النشاط الاقتصادي .
- ٣- لا يوجد تحديث وتطوير في الاغطية التأمينية في شركات التأمين وكذلك الاعتماد على الاغطية التقليدية وعدم الاهتمام بتطوير قدرات ومهارات الافراد.
- ٤- ان للعامل الاقتصادي الدور المهم في القطاع التأميني حيث أن اغلب أفراد المجتمع يعاني من مشكلة انخفاض متوسط نصيب الفرد ولا يعطون أهمية لهذا القطاع، أدى إلى استخدام الأموال لشراء السلع الضرورية بدلاً من شراء خدمات التأمين.
- ٥- من خلال دراسة القوانين نجد أن البيئة التشريعية المحيطة بالقطاع التأميني مظلمة لعدم شمول دوائر الدولة بالتأمين وبالإضافة لذلك لا توجد معايير وضوابط تتلائم مع المعايير الدولية بالتأمين بسبب ضعف النشاط التأميني في العراق .

التوصيات :

- ١- توطين صناعة التأمين عن طريق تحريم إجراء التأمين خارج العراق بمعنى خارج القاعدة الرقابية التي يقوم بها ويديرها ديوان التأمين العراقي.
- ٢- العمل على أقامه سوق تأميني وطني اتحادي يخضع لنظام رقابي واحد وكذلك تسهيل تأسيس فروع لشركات التأمين العراقية وتأسيس شركات تأمينية جديدة.

- ٣- العمل على نشر الوعي التأميني ونشر الثقافة التأمينية في المجتمع العراقي من خلال مقالات مبسطة، وأن ديوان التأمين يكون ملزم بقوة القانون في زيادة الوعي التأميني إذ يهدف إلى تنظيم قطاع التأمين والاشراف
- ٤- العمل على تعديل صياغة وثائق التأمين من أجل ضمان حقوق المؤمن لهم وكذلك لتلافي الاختلاف بين المؤمن لهم والمؤمن وخاصة في حال حصول حادث، وأيضا مزاولة أنواع مهمة من التأمين كتأمين خسارة الأرباح والتأمين من المسؤولية وذلك بالعمل على تأهيل كادر يملك الخبرة والمعرفة المتخصصة بهذه الأنواع من التأمين وبالإستناد على جهاز تسويقي متمكن لتسويقها.

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نمذجة السلوك البشري باستخدام نموذج هولاند

Modeling human behavior using the Holland model

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المخلص

يهدف البحث الحالي إلى التعرف على نمذجة سلوك العاملين على وفق أنموذج "Holland" الذي يفسر مدى مطابقة مؤهلات الأشخاص العاملين لمتطلبات الوظيفة في المنظمات، واستنادا إلى هذا الأنموذج، يمكن أن يتطابق المظهر المهني للشخص مع صورة بيئة عمل محددة، ويرتبط مستوى عال من التطابق بين شخصية الفرد المهنية وبيئة العمل والوظيفة (person-job fit) مع العديد من النتائج المواتية مثل فترة أطول للاحتفاظ في العمل، وارتفاع الرضا الوظيفي، وأفضل أداء وتحقيق نتائج تنظيمية ايجابية وكذلك المهنية العالية، ويصف الأنموذج ستة أشكال مهنية أساسية للوظائف وبيئتها في مواقع العمل، وكذلك المقدرات المرتبطة بالشخص وسماته الفردية، والأمثلة الوظيفية المناسبة لكل من الشخصيات المهنية، إذ يؤدي مدى ملائمة مواصفات ومؤهلات الشخص إلى متطلبات الوظيفية دوراً ايجابياً في الأداء الفردي والتنظيمي، وفي حال اختيار الشخص المناسب في الوظيفة المناسبة سوف يكون هنالك تطابق بين قيمه وقيم المنظمة، وبالتالي تحقيق أهداف التنظيمية.

الكلمات المفتاحية: نمذجة السلوك البشري، ملائمة الفرد-الوظيفة، ملائمة الفرد-البيئة.

المبحث الأول

منهجية البحث

أولاً: مشكلة البحث

تعد عملية الاختيار المهني من أهم المراحل التي يمر بها الإنسان في حياته، إذ تتوقف عليه العديد من النتائج اللاحقة التي تؤثر في مستقبله الاجتماعي، فعلى الشخص أن يحدد ما لذي يريد أن يتخصص فيه ليقوم بممارسته مستقبلاً بطريقة أكثر احترافية، لذا تعد عملية التخصص المهني مشكلة للعديد من الأشخاص، لنقصهم الوعي والموائمة بين استعداداتهم وقدراتهم وميولهم ومطامحهم وظروفهم الاجتماعية وجنسهم والإعداد والتأهيل لها والدخول في العمل والتقدم والترقي فيه وتحقيق أفضل مستوى ممكن من التوافق المهني. وتكمن مشكلة البحث في التساؤل الرئيس الآتي "ما مدى فاعلية أنموذج "Holland" لنمذجة السلوك البشري في تحقيق اختيار المصالح المهنية بما يتطابق بين شخصية الفرد المهنية وبيئة العمل والوظيفة؟"

ثانياً: أهمية البحث

تكمن أهمية البحث في الآتي:

- ١) تحسين مستوى النضج المهني لدى العاملين في المنظمات بما يساعدهم في اتخاذ القرارات المهنية في المستقبل .
- ٢) ندرة الدراسات المتعلقة بتطبيق نموذج هولاند في قياس فاعليته في مدى مطابقة شخصية العاملين مع وظائفهم من خلال النمذجة السلوكية .

٣) التعرف على اهتمامات والميول الشخصية والتعليمية للعاملين ومدى توافقهم مع البيئة المهنية التي تناسبهم .

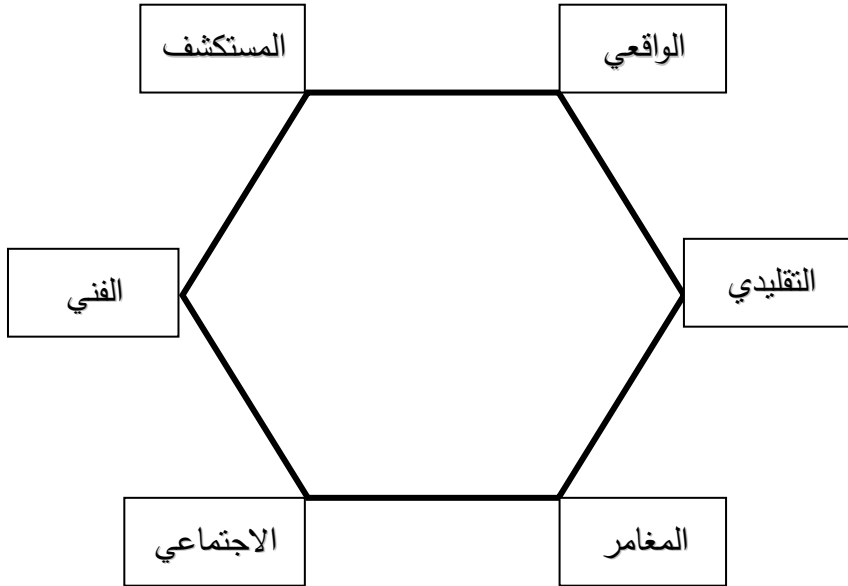
ثالثاً: أهداف البحث

يهدف البحث إلى:

- ١) إعداد برنامج إرشادي فاعل لنمذجة سلوك العاملين في المنظمات يساعدهم في تحسين اتخاذ القرار المهني .
- ٢) التعرف على مدى فاعلية نموذج "Holland" ومكوناته الستة الرئيسة.
- ٣) تحسين ميول واتجاهات العاملين في المنظمات لتكون متطابقة مع الشخصية والبيئة المهنية.

رابعاً: نموذج البحث

ووفقاً لنظرية (Holland, 1997) يمكن اعتبار المصالح المهنية عموماً مصدراً شخصياً هاماً للالتزام الوظيفي المحتمل والتنمية المهنية ويعتقد أن المصالح المهنية تعكس السمات الشخصية المنفصلة ويمكن تفسيرها على أنها أنواع شخصية مهنية، ويتضمن (نموذج Holland) (RIASEC) ستة أنواع أساسية من الشخصيات المهنية وبيئات العمل المناظرة (Swanson, 2012)، والتي يتم تنظيمها في هيكل محيطي، ويمكن وصف كل من الأفراد والبيئات من تشابهها مع كل من الأبعاد الستة (العابدي، ٢٠٢١:)، والشكل (١) يوضح هذا النموذج، وكما يأتي:



الشكل (١)

أنموذج البحث وفق أفكار (Holland)

المبحث الثاني

الجانب النظري للبحث

أولاً: نمذجة السلوك البشري

السلوك البشري هو مجموعة الأعمال والأنشطة التي يبديها البشر إما بشكل فردي أو في مجموعات من مختلف الأحجام والتركيبات. أو هو حقل متعدد التخصصات يهدف إلى تطوير النماذج التي تعكس أو تماثل الواقع، في ظل مجموعة من الشروط الأولية المناسبة. ويكتسب الحقل زخماً سريعاً ولديه نطاق واسع ومتنوع من التطبيقات في المجالات المدنية والعسكرية، بسبب الاستخدام الواسع النطاق لنماذج السلوك البشري، فمن المهم الفهم الجيد

للأسس النظرية له وما يمكن أن توفره هذه النماذج؛ أنه من المهم أيضا التعرف على القيود المرتبطة به. تميل النماذج القائمة إلى افتراض أن نماذج السلوك البشري تمتلك قدرات مماثلة في التنبؤ بالسلوك، وهو أمر نادر الحدوث، وبالتالي فمن المهم أن ندرك طبيعة وتعقيد السلوك البشري ومحاولة معالجته عند تطوير النماذج التحليلية (John & Catherine, 2010 :271).

فقد عرّف كل من (Kim & Giunchiglia) نمذجة السلوك البشري هي تفسير شخصي لتسلسل الأحداث المحفوظ في جداول حياة الفرد الذي يستخدم تصورا عاما لبعض السلوك البشري مع قيود تقتصر على قضية محددة من هذا النوع هو نوع من المعلومات التي ترشح أو تحلل خطوة لتطبيقها على كائن البيانات السابق. وبما أننا نتابع المعالجة الآلية للحياة الشخصية المؤرشفة منذ زمن طويل، فإن إحدى القضايا هي الدعم المنهجي لأتمتة هذه العملية من أجل توفير الراحة والكفاءة لأرشفة المعلومات وإدارتها (Kim & Giunchiglia, 2017: 2875) ومن جانب آخر، فإن ما يحدد من صعوبة تحليل ونمذجة السلوك الإنساني هو الاختلافات الهائلة بين الأفراد فلا يمكن ان تجد شخصين يتمتعون بنفس السمات الشخصية والرغبات والحب او الكره لأمر محددة بل ستجدهم يختلفون بطرق التعامل والانفعالات ودرجة الكره والحب لبعض الأمور ويبرز الاختلاف كذلك بدرجة ومستوى الاستجابة للمؤثرات فقد تجد شخصا يفرح بدرجة كبيرة لحصوله على مكافأة، في حين أن زميله لن يفرح بنفس المستوى والثالث لن يفرح حتى ولهذا كيف سيتم نمذجة هذا السلوك المتغير والمتذبذب بين الأفراد وكيف سيتم معالجة وتحليل هذا الكم الهائل من المؤثرات على السلوك ومعرفة مدى أثرها على سلوك الإنسان (Doki et al., 2011:)

ويرى (Obo et al., 2015: 1) أن نظام نمذجة السلوك البشري يعتمد على تعابير الوجه الإنسان ليساعده على الاتصال إذا يمكن لنموذج التكيف الزمني بين الأنماط السلوكية والعاطفية من تكوين الاتصالات و استخدام شبكة العصبية لنمذجة العلاقات السياقية.

في حين وصف (Murray, 2016) نمذجة السلوك البشري هي مجموعة من الميزات التي تسمح بتوفير نهج موحد لوصف وتصميم وتصور نماذج السلوك البشري. اذ يتم تعريف نموذج السلوك البشري هنا كنموذج رياضي صريح يصف كيف يتحول السياق إلى نتيجة سلوكية من خلال الحالة الداخلية للنظام البشري. وباختصار، ينبغي أن يكون نموذج السلوك البشري عبارة عن (Murray, 2016:54): -

- أ- مجموعة من المتغيرات السياق، الحالة، والسلوك.
- ب- مجموعة من الحسابات التي تحدد متغيرات السلوك كدالة للحالة التي هي في حد ذاتها وظيفة من السياق.
- ج- التجريد المنطقي الذي يسمح للباحثين لاستيعاب سلوك النموذج بحيث تكون أكثر قدرة على تقدير السيطرة على النظام البشري بشكل عام.
- د- المبادئ التوجيهية بشأن المعمول بها بشأن الأفراد والمقياس الزمني لنموذج السلوك البشري .

كما تعد نمذجة السلوك البشري لغة العصر التي استخدمتها المنظمات في العديد من النطاقات لذلك تطرق إليها العديد من العلماء والباحثين حيث تظهر الأساليب والقدرات التي تساعد على تطوير الخبرات المعرفية والسلوكية القادرة على تحسين الخبرات والمناهج والآليات التي ترتقي بمستويات المنظمة التي تكمن وراء الأداء البشري (Ruppel, 2016: 3). والجدول (١) يوضح مفاهيم نمذجة السلوك البشري، وكما يأتي:

الجدول (١)

تعريف نمذجة السلوك البشري

أنها احد الأطر المهمة التي تستخدم من اجل تنمية ونمذجة الأنظمة التنظيمية من خلال تأطيرها واعتمادها على أسس معرفية وقواسم مشتركة وتخصيص المهام الخاصة لأصحاب المصلحة.	(BALCI, 1997)
أنها الحجر الأساس التي ترتكز عليه المنظمات من اجل خلق نظام سلوكي يحتم على الأفراد العاملين فيها على التعامل بالشكل الصحيح مع المدراء التنفيذيين .	(Valmari, 2000)
أداة لوضع الخطط وخلق أنظمة محاكاة .	(Ogren, 2003)
أنها الركيزة التي تساعد تقاسم العلاقات مع الأفراد العاملين في المنظمات.	(Krogstie, 2003)
أنها نطاق واسع التخصصات يمثل السلوك البشري من خلال استخدامها كوسيلة لتطوير الأداء وتحليل آثار الفشل باعتبارها كمقياس للتفاعل بين الأفراد العاملين في المنظمات .	(Penaloza, 2012)
انه " نقطة الانطلاق التي تبدأ بها المنظمات من اجل معرفة الأطر والأساليب، الديناميكيات الجديدة والتي تحسن المراحل الفردية لمناهج إدارة الموارد البشرية من خلال استخدام الأطر والنماذج السلوكية الذكية.	(Core C, 2015)
أنها المبادئ التوجيهية التي تستخدم من اجل معرفة طرق تحليل الموارد البشرية و التأثيرات والعوامل البيئية التي تحدد وتقيم الموثوقية البشرية، ويجب ان تكون قابلة للتطبيق في المنظمات لكي تتمكن من استخدامها .	(Ruppel, S, 2016)

المصدر: بالاعتماد على الأدبيات أعلاه

ثانياً: أهمية نمذجة السلوك البشري

تتجسد أهمية نمذجة السلوك البشري بالآتي:

- ١) نمذجة السلوك البشري هو مجال هام من مجالات العلوم الحاسوبية والعلوم الاجتماعية وعلم الأوبئة وغيرها من المجالات وهي مهمة لإيجاد إطار المحاكاة التي من شأنها أن تسمح بالتنفيذ الفعال لمثل هذه المفاهيم لمختلف جوانب السلوك البشري الحقيقي إلى التشغيل البيئي (Schröder et al., 2017: 396)
- ٢) تمكن نمذجة السلوك البشري في الاستشعار العديد من التطبيقات في مختلف المجالات، المدن الذكية يمكن أن تدعم السلطات والمواطنين في إدارة بيئة أكثر أمناً؛ المنازل الذكية أكثر أمناً تسمح العيش المستقل للمسنين وتوفير راحة إضافية لحياتنا اليومية (Alemdar, 2017: 3804).

فضلاً عن ما تقدم، أنها تعد الحجر الأساس الذي تستند عليه المنظمات من أجل زيادة الموارد ووضع الخطط التي تساعد على خلق الميزة التنافسية بالاعتماد على رأس المال البشري أي الأفراد العاملين في المنظمة، وتدريب وتنمية المهارات الفردية و تنمية الخبرة، ووضع الأحكام، وتوطيد العلاقات عن طريق الاعتماد على الخصائص التنظيمية التي تضيف قيمة اقتصادية للمنظمة وخلق منظمة ناجحة لتحقيق الميزة التنافسية ولا يتم ذلك إلا من خلال اختيار موظفين ذو كفاءة عالية يتمتعون بصفات محددة عن طريق تدريبهم ووضع الأنظمة تساعد على ترسيخ طرق وموارد إدارة الموارد البشرية التي تتمثل بالجودة والربحية، ورضا العملاء (Raymond & Johan, 2016: 6).

ثالثاً: فوائد نمذجة السلوك البشري

هناك الكثير لا الحصر من الفوائد التي تضيفها نمذجة السلوك البشري للمنظمات تتمثل بما يأتي (7: Raymond & Johan, 2016):

- ١) تساعد نمذجة السلوك البشري المنظمات على خلق القيمة المعرفية وتوظيف الأفراد العاملين ورفع مستوى المهارات الفردية والجماعية.
- ٢) تساعد على خلق الميزة التنافسية وإعداد الأنظمة التي ترتقي بمستويات المنظمة إلى الأمام.
- ٣) تساعد على تنمية الدوافع الفردية وتطوير القدرات والمعرفة وتحليل الموارد التي تدخل إلى المنظمة.
- ٤) تساعد على تحسين النماذج الاقتصادية باعتبارها أداة فعالة لتلبية ذروة طلب الأفراد العاملين
- ٥) تساعد نمذجة السلوك البشري على تنمية المهارات السلوكية في المنظمات من خلال اعتمادها على الأنظمة التي تساهم في حل المشاكل التي يتعرض إليها الأفراد العاملين فيها.
- ٦) تساعد على زيادة العائدات ووضع النماذج التي تعمل على حل الصراعات التنظيمية وتنمية المجالات التقنية في المنظمات من خلال اعتمادها على عنصري الدقة والمهارات الفردية.
- ٧) تساهم نمذجة السلوك البشري على توطيد المبادئ التي تساعد في تقوية العلاقات بين الأفراد في المنظمات.

رابعاً: خطوات النمذجة السلوكية

هنالك عدد من الخطوات لكي تحدث النمذجة السلوكية بنجاح، ومن هذه الخطوات:

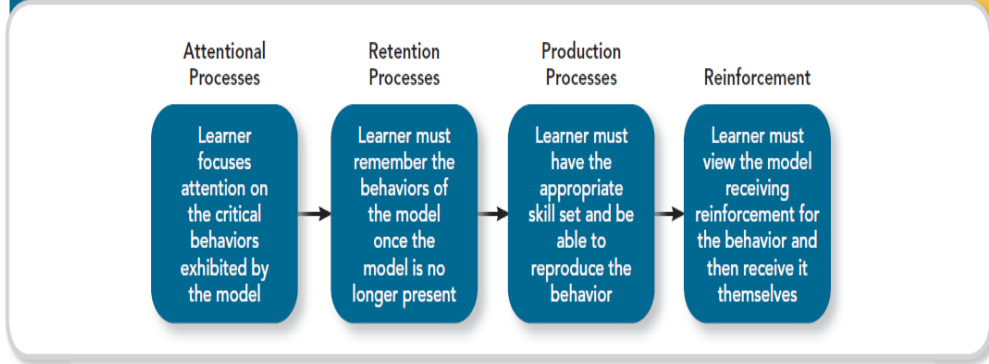
١: يجب على المتعلم تركيز الاهتمام على نموذج مناسب ودقة تصور السلوك الحاسم للنموذج المعروض. قد يكون هذا النموذج هو لمشرف بالعمل، أو زميل أو حتى تابع. بعض المنظمات تخرج من طريقها إلى عرض نماذج يحتذي به للقادمين الجدد أو للعمال الذين لا يملكون الخبرة من أجل المشاهدة والتعلم منها. كذلك المكافآت فإنها تشجع العمال المسنين على سلوك النموذج وتبادل معارفهم. وبهذه الطريقة، ليس فقط المعرفة الصريحة يحصل لها المشاركة ولكن أيضا المعرفة الضمنية.

٢، يحتاج المتعلم إلى أن يتذكر بالضبط ما كان سلوك النموذج وكيف تم تنفيذه. هذه الخطوة صعبة جدا عند مشاهدة الخبراء لأداء وظيفتهم، لأن الكثير من ما يفعلونه لا يزال غير معنن ويمكن أن يحدث بوتيرة سريعة.

٣، يجب على المتعلم القيام وفهم العمليات المنتجة، أو في الواقع ان يكون قادر على إعادة إنتاج ما فعله النموذج . ليس فقط يجب أن يمتلك المتعلم المعرفة المطلوبة والمهارات البدنية ليكون قادرا على أداء المهمة؛ الآن هو أو هي يجب أن يترجم ما لوحظ الى افعال. هل تذكر في المرة الأولى التي قاد بها سيارة ؟ وهناك احتمالات جيدة كنت قد شاهدت السائقين الآخرين لسنوات عديدة، والتقاط صوره لكيفية القيام بذلك من خلال المراقبة. ومع ذلك، أصبحت الأمور مختلفة عندما كنت خلف عجلة القيادة لأول مرة. فجأة، كان هناك الكثير من المعلومات تحتاج للمعالجة، وكان يتعين تنفيذ سنوات من المراقبة.

FIGURE 8-3

The Modeling Process



٤، الخطوة الأخيرة للنمذجة السلوكية هي التعزيز "Reinforcement". هذا التعزيز يمكن أن يأتي من الملاحظة، والخبرة المباشرة، أو كليهما. يمكن للمتعلم مراقبة عواقب ذلك النموذج الذي عرض السلوك (التعزيز الإيجابي أو العقاب)، الذي في حد ذاته سوف يساعد في غرس الرغبة في أداء السلوك. وبالإضافة إلى ذلك، فإنه من المهم للمتعلم لتلقي التعزيز بعد تكرار السلوك. إذا كانت السلوكيات المكتسبة حديثاً إيجابية وعززت، فاحتمالات استمرار السلوك تزداد (Jason et al , 2015 : 249-250). والشكل (٢) يوضح ذلك، كما يأتي:

الشكل (٢)

عمليات النمذجة السلوكية

Source: Adapted from H.M. Weiss, "Learning Theory and Industrial and Organizational Psychology," in Handbook of Industrial and Organizational Psychology, ed. M.D. Dunnette and L.M. Hough (Consulting Psychologists Press: Palo Alto, CA, 1990), pp. 75-169.

خامساً: أنموذج Holland's في الاختيار المهني

وهي واحدة من النظريات الأكثر إثباتا في الاستخدام على الصعيد الدولي، والجهود الهادفة إلى التوافق بين المتطلبات الوظيفية والخصائص الشخصية للفرد العامل. ويتضمن وجود استبيان للأسباب المهنية لـ(١٦٠) عنوانا مهني. ويشير المستجيبون فيه إلى ماذا يحبون أو يكرهون، وتشكل إجاباتهم ملفات شخصية. وقدم هولاند ستة أنواع من الشخصية (**Holland Hexagon**)، واقترح أن الارتياح والميل إلى ترك موقف يعتمد على مدى ملائمة شخصية الأفراد مع الوظيفة. وهناك آثار ثقافية على الوظيفة الشخصية التي تتناسب مع توقعات العمال بأن الوظائف سوف تكون مصممة. في البلدان الفردية حيث يتوقع العمال أن يتم سماعها واحترامها من قبل الإدارة، وزيادة نسبة ملائمة الفرد للوظيفة يزيد من الرضا الوظيفي للفرد. ومع ذلك، في البلدان الجماعية، يعد ملائمة الفرد للوظيفة هو مؤشر ضعيف للرضا الوظيفي لأن الأفراد لا يتوقعون أن يكون لهم وظيفة مصممة خصيصا لهم، لذلك فانهم يقيمون جهود ملائمة الفرد للوظيفة بمستوى اقل . ولذلك، يجب على المديرين في الثقافات الجماعية عدم انتهاك المعايير الثقافية من خلال تصميم الوظائف للأفراد؛ بل ينبغي السعي للأفراد الذين من المرجح أن يزدهروا في الوظائف التي تم تنظيمها بالفعل (Robbins & Judge, 2017: 192)

وفيما يلي وصف لأشكال المهنية الأساسية الستة، وكذلك المقدرات المرتبطة بالشخص وسماته الفردية، والأمثلة الوظيفية المناسبة لكل من الشخصيات المهنية وكما يأتي (العابدي، ٢٠٢١):-

١) النوع الواقعي **realistic (R)**: يفضل الأفراد ذوو المصالح الواقعية العالية الأنشطة التي تنطوي على التلاعب الصريح أو النظامي أو المنهجي بالأشياء أو الأدوات أو الآلات. ولديهم كتشبيه ما يعرف بالكتيبات اليدوية، الميكانيكية، أو التقنية (يعملون بطريقة منظمة وحسب التعليمات). وتوصف أنواع واقعية بأنها

طبيعية وقوية، ومطابقة. والوظائف النموذجية لهذا النوع من الأعمال المهنية هي (كهربائي، ميكانيكي أو مهندس).

٢) نوع المستكشف **(I) investigative**: يفضل الأفراد أنواع التحقيق والأنشطة التي تنطوي على التحقيق والرصد للظواهر الفيزيائية أو البيولوجية أو الثقافية. وهذه التفضيلات والاتجاهات السلوكية تؤدي إلى اكتساب المقدرات العلمية والرياضية. وهذا النوع هو عرضة من التحقيقات تكون مستقلة، تحليلية، فكرية، حرجة، وعقلانية. والوظائف النموذجية لهذا النوع من الشخصيات هي (عالم أو عالم الرياضيات).

٣) النوع الفني **(A) artistic**: يظهر الأشخاص الفنيون اهتمامات وتفضيلات عالية لأنشطة غامضة وحررة وغير منتظمة. وإنهم يحبون إنشاء أشكال فنية أو منتجات وإظهار الكفاءات في اللغة أو الفن أو الموسيقى أو الدراما أو الكتابة. وسمات الحرف النموذجية هي العاطفية، والتعبير، والإبداع، والحساسية التي يمكن تطبيقها في وظائف مثل (الكاتب، والممثل، أو الفنان).

٤) النوع الاجتماعي **(S) social**: يفضل الأفراد الأنشطة التي تنطوي على التعامل مع الآخرين (التعامل بحرفية) كالإعلام والتدريب والتعليم أو التطوير. ويظهر الأفراد ذوو المصالح الاجتماعية أساسا مقدرات عالية في العلاقات الإنسانية (مثل العلاقات الشخصية والتعليمية). ومن سماتهم التعاطف مع المريض ويتسمون بالحنان والمسؤولية أيضا، والوظائف النموذجية لهذه الشخصيات المهنية هي (المعلم أو مستشار).

٥) النوع المغامر **(E) enterprising**: الأفراد الذين لديهم مظاهر عالية على نطاق مغامر لديهم تفضيلات للأنشطة التي تنطوي على القيادة أو إقناع الأشخاص والجماعات. فإنها تظهر القيادة بين الأفراد والوسائل المقنعة وغالبا ما توصف بأنها

خارج المألوف، وحيوية، والاستبداد، والتحمس، وكذلك الثقة بالنفس. أمثلة العمل هي (منظم أو مدير).

٦) النوع التقليدي (C) conventional: يظهر الأفراد الذين يهتمون أساسا بالأنشطة التقليدية تفضيلات عالية في التعامل الصريح والمنتظم والمنهجي للبيانات (على سبيل المثال، مواد الإيداع ومعالجة البيانات والتوثيق والأنشطة الإدارية). ولديهم كفاءات إدارية عالية ويرتبطون بسمات شخصية مثل الحذر، والمطابقة، والمثابرة، والنظام، والكفاءة، وإنهم يفضلون وظائف مثل (كاتب الحسابات أو مصرفي).

الخلاصة

تؤكد المنظمات على ملائمة الشخص للوظيفة، أي وضع الشخص المناسب في المكان المناسب في مجال التوظيف، وهذا هو مفتاح النجاح الذي تطابق مؤهلات الشخص في عملية التحليل الوظيفي وسماته مع مهام ومتطلبات العمل والسعي نحو تحقيق أفضل مطابقة لمعرفة المهارات والقدرات ومتطلبات العمل المحددة.

في ظل التطور السريع للمنظمات وفي أعقاب العولمة واقتصاد المعرفة والتركيز على المنافسة بين الشركات، إذ أصبح المورد البشري أبرز عناصر المنافسة في مجال العلم والتكنولوجيا. لذلك، فإن كيفية توظيف والمحافظة على المواهب البشرية التي تناسب خطط المنظمات لأنها مركز التنمية المستدامة والقدرة التنافسية.

فضلاً عن الدور التي تؤديه نتائج ملائمة الشخص للوظيفة سواء أكان على مستوى الفرد أو الجماعة أو المنظمة في من خلال استخدام نموذج "Holland" للوظائف بصورة فاعلة والذي له دور رئيسي في مطابقة السمات والمؤهلات الشخصية للعاملين مع وظائفهم وبيئاتهم.

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A novel approach to Arabic Chabot, utilizing Google Colab and the Internet of Things: a case study at a computer center

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Abstract

A Chabot is a software program for humans to interact with natural-language computers. It has numerous applications in business, service, education, and healthcare, among others. Arabic Chabot's, on the other hand, fight to generate and display Arabic characters correctly because of linguistic problems. In this paper, we propose a new method for the development of effective Arabic Chabot's, which is improved by the use of the Internet of things (IOT). An experiment was performed utilizing Google Colab and the Python Chatterbot library to build and deploy an Arabic Chabot for a computer center based on IOT.

Keywords: Google Colaboratory, Chatterbot, machine learning, artificial intelligence, Arabic Chabot's, Google Colab, IoT, Twillio.

1. Introduction

Chabot's are artificial intelligence-powered conversational systems (AI). By using natural language, Chabot is capable of interacting with humans and learning their language. It is responsible for three functions: receiving, evaluating, and responding to user requests. There is a significant connection between Chabot and human language. The efficacy and severity of Chabot are language-dependent. According to studies, Chabot's has been proven to be successful in the vast majority of languages presently spoken worldwide. Apart from that, Chabot is equipped with the necessary levels of Arabic, Arabic grammar, and Arabic vocabulary. Chabot's has recently made an attempt to address the many grammatical issues raised by the Arabic language[1].

Chabot's may be written in a variety of different computer languages, including PHP, Python, XML, AIML, C++, and JAVA.

Chabot's may be created in a number of ways, one of which is via the usage of chatterbots, which can either create a Chabot or another bot performing a similar job. In the Chabot's knowledge database, there is still a pre-programmed question bot, as well as rules on how it should reply to each unique question, phrase, or word. Due to its reliance on automatically generated information, the method begins with a blank database and develops from there.

When any of the aforementioned methods are used, a chat log is generated throughout the session and is used by the botmaster to enhance the Chabot's answers.[3,5].

Cloud notebooks like Google Colab, completely free to use, are used for machine learning and Python programming. With Colab's assistance, it is possible to collaborate with other individuals online [2]. The Google Corporation discovered the Jupyter Notebooks, the first to do so. This was created by the Google corporation. Using interpreted programming languages, tools, and libraries, all of which are available through a web browser to allow users to construct visualization processes for use in their applications, users may construct visualization processes for use in their applications. After your notebook work is completed, it is immediately saved to the cloud. It includes cells that incorporate a scripting language as well as any other material needed to operate correctly to produce the page output. The Google Collaborator's primary goal is to enhance machine learning via scientific research and development. That's one of the primary goals of cooperation. Because all Colab notebooks are structured around a narrative explanation augmented by interactive visuals produced by coding, they are intended to support learning [13,14,15,16,17].

Internet of things (IOT) is a technological model that acts as a worldwide network of machines and gadgets capable of interacting with one other. It is developing rapidly in wireless telecommunications, aimed at achieving the goal of interaction and collaboration as a united entity [21,22].

A novel approach to dealing with Arabic Chabot's problems has been suggested in this paper, which makes use of the Google Colaboratory (colab) and chatterbot libraries. It is improved by utilizing the IOT application as a tool to notify about any case that is implemented in the chatrooms.

The following is the structure of the paper: (1) a short history of Chabot and the Arabic Chabot's, as well as their features, (2) a depiction of the suggested approach, (3) the results and limitations, and (4) a discussion of the implications of the findings. (4) The discussion, conclusion, and recommendations for future work to further improve the suggested technique are included.

2. Background

a. Background of Chabot

"Computing Machinery and Intelligence" was the title of a paper written by Turing in 1950 that received widespread attention. He was intrigued by the idea that the computer might chat with numerous people at the same time without him being aware of who was talking to whom and when [19].

On this day in 1966, the development of the world's first computer-controlled robot (ELIZA) was completed. Elizabeth's manner was modelled after that of a psychologist, and she offered good advice. ELIZA defines user input and repeats previously recorded input through the use of a pattern matching methodology, which is implemented in the program.

Chabot's, on the other hand, laid the groundwork for future generations of robots. It was coined in 1995 [20] to refer to a

computer entity that can communicate with other computer entities through the use of artificial language.

ELIZA established A.L.I.C.E., also known as "ELIZA's first online Chabot," which stands for "ELIZA's first online Chabot." It was a bot that used natural language processing to communicate with the user (NLP). She interacted with people by applying heuristic patterns and matching rules to the information they provided her in response to her questions and statements.

Siri, a voice-activated personal assistant, was introduced to the public for the first time in the year 2010. Siri's primary function is to aid you in talking with all of your iOS-enabled devices, including your iPhone. Siri, Apple's virtual assistant, may be accessed with voice commands. In addition, it merges them with other files like music, photos, and movies. User inquiries are answered and ideas are created through the use of the internet. It responds correctly to the diverse word choices made by different people. Siri, while extremely intelligent, has a number of problems that must be addressed. There is a strong desire to gain access to the internet. Currently, only a few languages (4 and 9) are supported by the application. The public's interest in Chabot's illness has risen considerably in recent years, with the most recent spike coming in 2017.

b. **Arabic Chabot literature review**

According to Abu Shawar and Atwell (2004), Chabot was used to query the Arabic Web QA corpus using logical inference and natural language processing. The Chabot was designed to produce AIML files from the Qur'an using Java in 2003. This Chabot sought to visualize the Qur'an's data content. To retrain ALICE, a machine learning methodology was employed to transform a corpus into an AIML format. To do that, we just need a huge yet basic pattern-template rule set. The existing Arabic Web QA chatbot's response was reused. Rethinking issues from Arabic into

other languages may provide no results since the language has various unique characteristics.

Khan and Al Hagbani (2016) built BOTTA, an Arabic-speaking chatbot. This app mimics talking using the Cairene dialect of Egyptian Arabic. Anyone may join and communicate in-game using the game's public database files [7].

Nabiha, a Saudi Arabic Chabot, was built in (2020) by D. Al-Ghadhban and N. Al-Twairesh, with funding from the University of King Saud. It is the first chatbot in Saudi Arabic. You may get it on several platforms (including on Twitter, on the web, and on Android phones). Anyone is invited to download the app from Twitter or go to the website to connect with Nabiha. IT students tested the application, and the results were positive. Their Chabot was constructed in five stages: gathering information from students, like opinions and complaints, creating a corpus in the Saudi dialect from text files, running a program that converts characters to readable AIML text, publishing the Chabot on the Pandorabots platform, and integrating it with Twitter and Android [8].

Yassin, Zubair Khan, (2021), created an Arabic-language Chabot that was designed to provide users with useful information about the prophet's biography. SeerahBot is the first Chabot related to the biography of the Prophet. The system was built using two techniques: the first is an NLP language processing retrieval Chabot, and the second is a Chabot design framework. Chabot has now been made available on Telegram [9].

Abu Laban, Alnaima, and Sweidan in (2021) show an Android chatbot app (SIAAA-C). An electronic guidebook created by students. It's got many alert types and a campus map. This is a well-researched and well-documented book. Additionally, students at the University of Jordan selected by several academic departments spearheaded SIAAA-C implementation, and the results were positive [11].

3. Methodology Proposal

A number of Arabic Chabot's are currently accessible because of the intricacies of the Arabic language and dialect. Using the Google Colaboratory (colab) and the chatterbot library, we offer a novel method for building Arabic Chabot's that is simple, easy, and efficient. This method is made accessible to the public in this article. Our case study of Chabot, a service named A on a university computer known as "CCsci bot," which is meant to function as an automated system, is presented in this paper. The user may choose to continue the conversation if he or she writes an erroneous term using a method known as proximity processing, which involves selecting random words from a pool of suggestions and selecting one of those words from the pool of suggestions. Our main aim is to make it simple to build an Arabic Chabot that performs correctly and responds in a timely and appropriate manner.

A representation of the structure of the suggested approach is shown in the

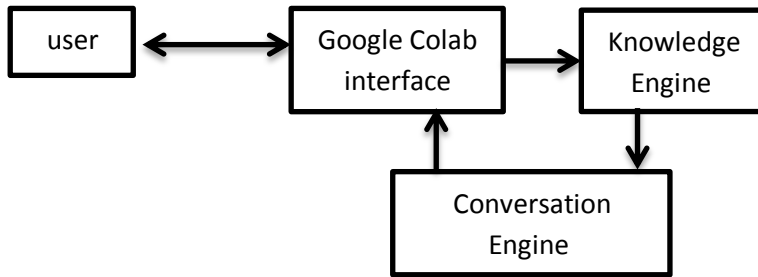


figure1.

Fig1. depicts the structure of an Arabic Chabot created with Google colab .

The process of answering the questions is displayed in figure 2 .

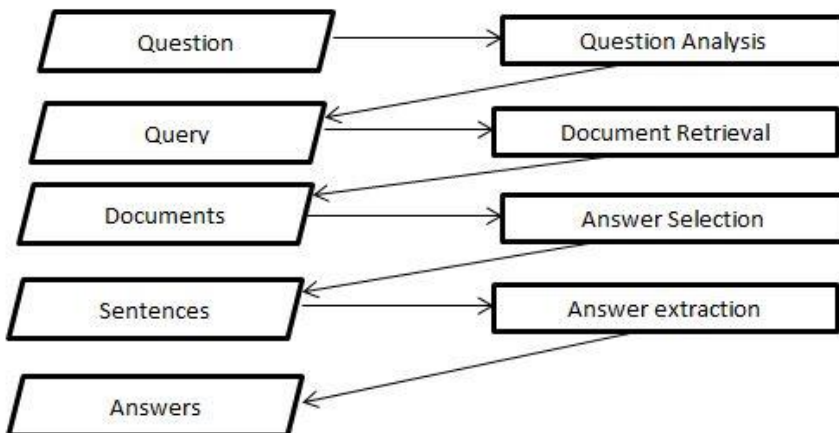


Fig.2. answering questions process .

Dataset of questions and answers :30 randomly-selected questions and answers were sent to the "CCsci" bot .

question-processing: The codes start preparation by the following steps.

- 1.create a Google Colaboratory, or "Colab" notebook.
2. install package chatterbot.
- 3.install chatterbot_corpus.
- 4.Importing all the required libraries (Importing chatterbot).
- 5.Create object of Chabot class.
6. Create a Chabot object with a Storage Adapter.
7. Create a class ChatBot with a Logic Adapter.
- 8.Import ListTrainer.
9. response to the input text.
10. Creating a greeting for user input and providing a randomly-generated greeting answer.
- 11.Generating the response.

In this phase, machine learning takes the role of Chabot as:

- 1.a user's reaction (query).
- 2.The extra answer is inserted to the sentence list.
- 3.Term frequency , and inverse document frequency , The term's frequency in the document is counted in Word. a rare word . It turns tokenized text .
- 4.The index of the most comparable sentence is returned.
- 5.It publishes the most comparable phrase.
- 6.When there is no matching sentence for the user answer, it apologizes.

7. Additionally, the dialogue between Chatbot and the user must be looped.

Execution of Chabot model using platform

As part of their Google Research effort, Google created the Chabot model. Anyone on the web may now use Python code to analyze and handle data. It is ideal for machine education, data analysis, and training. Colab provides services free of charge. Resources are limited and the availability may thus be modified. Colab provides resources free of charge, provided that they are compensated. In an experiment with university users online and students (students or academic staff), the Chabot prototype was evaluated to support an on-line system. After the finished prototype, the Chabot prototype was tested. Figure 3 shows an example of a missing user password which a bot may automatically reply to and resolve.

The Chabot was created with IOT technology and uses the Twillio application to deliver telecommunications notifications. In the case of the example above, the password may be transmitted to the mobile user. Figure 4 illustrates the user including a password will get the SMS message.

```
List Trainer: [#####] 100%
Bot Response: The current time is 11:58 AM
Welcome to the Bot Service! Let me know how can I help you/ أهلا بك في خدمة ال botالخاصه بشجة الحاسبة كيف يمكنني مساعدتك
Bot: لطفاً. أدخل أيميلك الرسمي
Bot: لطفاً. أدخل ادخل رقم الهاتف المرتبط بكلمة السر
Bot: تم إرسال رساله لهاتفك المحمول بكلمة السر
```

fig.3. Example of bot answer.

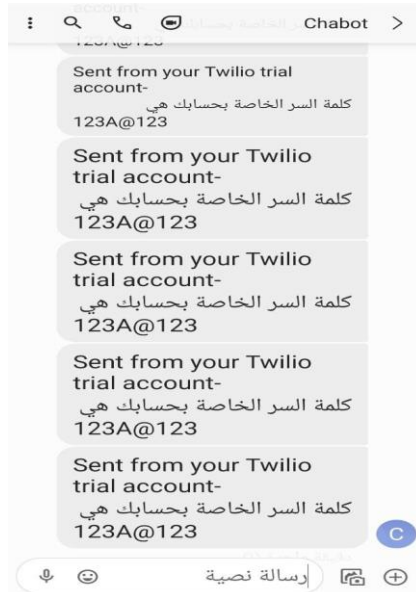


fig.4. Example IOT SMS message.

4. Results , and limitations:

The output of our Chabot is "CCsci". It has four unique roles. These characteristics include:

1. Hello and respond.
2. A mistake should be apologized for.
3. send an answer to the user that closes up the dialogue, like: (thank you or bye).
4. assist the user in answering

In the case of limitations, Additional drawbacks to examine include: The app may not run on a Colab notebook. To run the code, you must first install all the needed libraries .

5. Discussion And Conclusion

Our method for developing the Arabic intelligent Chabot is to use Google Colab to create an intelligent Arabic Chabot to avoid the

complexity of the language with a quick and easy design, and any software installed and used is cloud - based, with all the library files on the cloud. It also responds quickly and accurately to the user's questions, and the proposed method can be modified to work with telegrams or any other software. Furthermore, an IOT technology is used in this Chabot implementation which is used to notify the user of any secret answer to the bot.

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review of risks management techniques on A construction projects

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Abstract

known the construction industries are famous to be very expensive and take a lot of time and effort to complete, during this long period that construction buildings take to complete and be handed over to the stakeholders, will be exposed to many risks like (Financial, environmental, constructional and others). This paper tries to shed light on risks management techniques to which the construction projects are exposed and ways to prevent and reduce them from previous studies.

Keywords: risks management, construction projects, risks management techniques

Introduction

Risk exists in all our daily life and is hard to avoid, it becomes an indispensable part of everyday life. Risk is present everywhere, in every aspect of our life. One such aspect is the construction industry, where risk is an inherent element¹. Effective risk management does not mean the removal of risk, which would seemingly be the cheapest option. From an economic point of view, this option is pointless because what is potentially profitable is by definition risky and activity that does not pose a risk is not economically interesting, and thus, does not bring tangible benefits, the risk management is finding the best way to manage the risk to which the project is exposed in two respects, the first is to determine the risk, its cause, type, and to make the decision, the second is to determine the future benefits of the project from the decision taken².

What do you mean of risk?

Risks are uncertain events or conditions that, if happen, have an impact on at least one projects' objectives. Objectives may be scope,

schedule, cost, and quality. Risks may cause from one or more event and, if it occurs, it may have one or more effective. A cause may be a requirement, assumption, constraint, or conditions that create the possibility of a negative or positive outcome³.

Risk can be defined as an opportunity for loss or an unfavorable outcome associated with a business due to the uncertainty surrounding the process. Uncertainty is the lack of knowledge of what will happen in the future and, it is due to the multiplicity of variables introduced to a single process in addition to their change during the work stages.

For example, the project may require the appointment of new employees, and a permit must be made for them. The potential risk is that making the permit takes more time than they are planned, or the new employees may be unsuitable for work, and the risk may be related to the work environment, such as poor project management practices, or approval to external participants that are difficult to control⁴.

Risk appear in the 1940s when it was possible to make a statistical assessment of the probability of occurrence of a particular event. Risk, therefore, tended to be insurable. Using the logic, the actual risk to be carried was quantified as follows⁵.

$$\text{Risk} = \text{Probability of event} \times \text{Magnitude of loss/gain}$$

Common Estimated Risks

Technical

- sufficiency of site investigation
- Availability of materials and components
- Adequacy of design and design information

Logistical

- Materials, equipment and work

Construction

- Productive efficiency
- Weather
- Suitability of the construction plan of the contractor
- Suitability of the planning of resources

Financial

- Inflation/Scaling
- Payment schedule

Five main groups will be included in a construction project risk division:

Design preliminary, tender, design detailed , construction works, financing the investment⁶.

Previous researches relating to Risk management

1. Movenzadeh and Mason (1976) have regarded risk as an exposure to loss only.
2. Bufaied (1987) describes construction risk as a variable in the building project process, the variations of which lead to uncertainty regarding the final cost, time and quality of the project.
3. According to Fong (1987) It is well known that people in the construction industry constantly face a number of unknown, unanticipated, often unwanted and often unpredictable factors.
4. Williams (1995), Baker (1986), Cooper (1985), and Dey (1994) have all shown that risk management is used effectively as a tool for managing projects effectively throughout its life cycle.

5. Steiner (1969) It has agreed that the projects generally include large, expensive, unique or high risk enterprises which, with some expected levels of performance, are to be completed by specific data for a certain amount of money.

Risk management basic concepts

Project Risk Management includes the risk management planning, identifying, analyzing, answering, and monitoring and control processes in a project, most of which are updated during the entire project. Project risk management is intended to increase the likelihood and impact of positive events and to reduce the likelihood and impact of project-neutral events⁷.

Risk management Planning decide how risk management activities for a project should be approached, planed, and implemented⁷.

Risk Identification means determining which risks might affect the project and documenting their characteristics⁷.

Qualitative Risk Analysis means prioritizing risks for subsequent further analysis or action by assessing and combining their probability of occurrence and impact⁵.

Quantitative Risk Analysis means numerically analyzing the effect on overall project objectives of identified risks⁵.

Risk Response Planning means developing options and actions to enhance opportunities, and to reduce threats to project objectives⁵.

Risk Monitoring and Control means tracking identified risks, monitoring residual risks , identifying new risks , executing risk response plans, and evaluating their effectiveness throughout the project life cycle⁸.

These processes interact with each other's and with the processes in the other knowledge areas as well. Each process can involve effort from one or more persons or groups of persons based on the needs of the project. Each process occurs at least once in every project and occurs in one or more project phases, if the project is divided into phases. Although the processes are discrete elements with well-defined interfaces, in practice they may overlap and interact⁸.

Risk analysis and management can only be as good as the perception and quantification of risk by the project team, and it is at this point that the credibility of risk analysis often falls down⁸.

The process of risk management

In general, unexpected events occur in projects and may lead to a change from the plan, either positively or negatively. Positive results are opportunities and negative results are a loss. Risk concentrates on preventing loss of unexpected events⁹. Several definitions of risk are available in the literature and risk is usually referred to as an exposure to losses in a project¹.

Risk management processes are designed to identify weaknesses in the methods used in product development through a structured approach to prevent risk, transfer risk, lower risk probability or reduce risk impact timely mitigation measures³. Figure 1 shows the process of risk management proposed by the Australian Risk Management Standard. It consists of seven iterative risk context assessment sub processes, risk identification, risk analysis, risk assessment, communication and consultation between stakeholders, as well as risk monitoring and control. The risk management process fuses into the design and development of CE products as changes and iterations in the design phase cost less than changes in the implementation phase. Thus, early discovery of risks leading to downstream losses is much better than treatment of losses when unavoidable¹⁰.

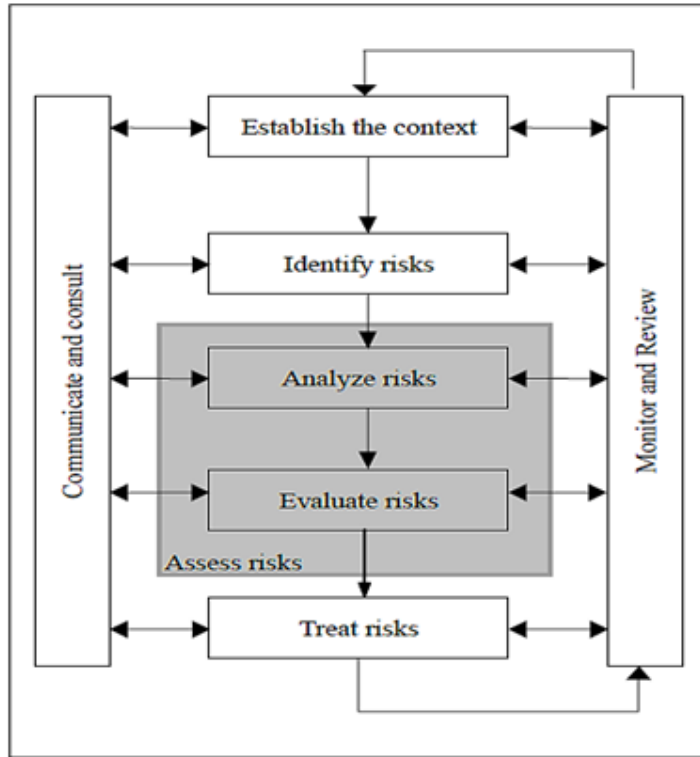


Fig. 1. Representation of the risk management process as per AS/NZS 4360:1999

Techniques for context establishment

Context establishment in the risk management process involves representation of project units (functional, process, data, etc.) and their inter-relationships¹¹. This enables the project status to be represented in different ways such as the use of resources, equipment needs, availability of budgets, involvement of stakeholders, the results of the contracts, strategic objectives and timetables, depending on a

particular project aspect. Tools and techniques for project modeling are generally, project network diagram, precedence diagramming method (PDM), generalized activity networks (GANs), design structure matrices (DSM), IDEF3 process modelling and IDEF0 functional modelling. These are described in detail in the following paragraphs.

Project network diagrams

Project network diagramming is a graphical technique used for representing project tasks and precedence relationships¹². Tasks or activities of a project are shaped by two different methods as arrows or nodes – node activity or arrow activity. A project network diagram provides a simple visual display of a project tasks that make complex relationships difficult to represent. In project network diagrams, alternative and cross-linked activities are also not covered. In order for the project's critical path analysis, the critical task identify and estimate the overall duration of the project, the program evaluation and review technology (PERT) and the critical path method (CPM) are applied. A combined diagramming of the project network, CPM and PERT techniques are designed to manage projects on a simple schedule¹³.

Precedence diagramming method

PDM extends the diagramming technique for the project network in which overlapping content between two dependent activities is represented by the relationship of lead layers. Lead-lag relationships usually show that the time between an activity and the time of start of the activity is overlapping. Relationships between leaders are divided into four types: start-to-start, finish-to-finish, start-to-finish and finish-to-start¹⁴.

Generalized activity networks

A GAN shows the probabilistic ramifications of activities. Uncertainty is presented as alternate paths with an associated probability that illustrate all possible roads or scenarios for a project, including loops. GAN is also very complicated when the number of nodes increases with additional difficulty in quantifying the possibilities of branching as the output of every node¹⁵.

Design structure matrices

A design structure matrix (DSM) represents precedence relationships of project tasks on a square matrix containing equal number of rows and columns representing the number of tasks. A binary code with the

mark x is used in the existence of a precedence relationship between two tasks. Absence of the trademark means that the two tasks have no precedent. DSM shows three different types of relationships of precedence between tasks. A sequential relationship means that before the task begins the preceding task must be completed. A parallel relationship shows that two tasks are performed separately, whereas a combined or circuit relationship shows that both tasks are interdependent and need input from one another¹⁶.

IDEF0 functional modelling

IDEF0 is a graphical representation of a system through a functional perspective. In IDEF0, a box represents an activity or a function while arrows represent inputs, outputs, controls and mechanisms operating on activities and on the project as a whole. An input is a requirement that a functional unit needs to perform, while an output is the outcome of that function or a combination of functions. Controls are constraints that dictate functions such as regulatory environment and budget, while mechanisms are supports that advocate performance of that function such as people, computer systems and machines. IDEF0 provides an overall view of the project at the top level and successively more details deeper into subsequent levels. This provides a model that is relevant to all functional levels in the organization¹⁰.

IDEF3 process modelling

In a system, tasks are defined as units of behavior (UOB); relationships are represented as links and logical branching as junctions. Logical branches or junctions are usually decision points in the system and they could be of – AND, OR, or EXCLUSIVE OR types. An AND junction means that all UOB connecting this junction must be performed, an OR junction means that at least one UOB connecting this junction needs to be performed while, an EXCLUSIVE OR junction indicates that only one UOB connecting this junction can be performed. Fan-in and fan-out junctions indicate multiple paths in the process flow with fan-in junctions indicating convergent paths, while fan-out junctions indicate divergent paths in the process flow. IDEF3 allows greater flexibility in modelling alternatives in design processes and is suited for the CE environment and lends itself as a foundation for further risk analysis. Since, processes can be represented in layers with the top layer providing the overall view, an IDEF3 model could be as simple as it is desired to be or dig down into details in each subsequent lower layers¹⁷.

Techniques for risk identification

Risk identification is studying a situation to realize what could go wrong in the product design and development project at any given point of time during the project. Sources of risk and potential consequences need to be identified, before they can be acted upon to mitigate. Experts in their own domain have intuitive methods of recognizing a risk situation. As such, the identification tools presented in this section are more general in nature and need a collaborative approach so that all aspects of the project are examined for risk situations¹⁸.

Checklists

Checklists are a trivial method of risk identification where pre-determined crucial points are examined for symptoms of potential risk situation¹¹. These are simple to use and usually evolve over time through contributions from various functional experts and collective experiences¹⁹.

Influence diagrams

An influence diagram is graphical representation of the structure of the decision context such that decisions, uncertain events, consequences and their interrelationships are graphically enumerated²⁰. Owing to the visual display, cause-and-effects of risk

situations are described and can be used for identifying risk situations before they eventuate.

Cause-and-effect diagrams

A cause-and-effect diagram or a fish bone diagram is a graphical representation of root causes of quality problems, where major causes of the ultimate problem are grouped and broken down into detailed sources. Though, cause-and-effect diagrams are easy to use, they do not provide a foundation for further analysis such as relative importance of individual causes of a problem. Hence, cause-and-effect diagrams are used for deterministic problems in a very specific domain.

Failure mode and effect analysis

Failure mode and effect analysis (FMEA) provides a structure for determining causes, effects and relationships in a technical system. FMEA is used to determine failures and malfunctions through exploration of failure modes, consequences of a system component failure so that solutions for rectifying these problems can be visualized

3.

Hazard and operability study

Hazard and operability study (HAZOP) is an extension of FMEA where check words are applied to process parameters in order to identify safety and operational problems, usually in new systems¹⁵. Check words create other perspectives to the overall process and focus attention on unforeseen areas in the process. In risk management for projects, HAZOP can be applied by considering project parameters such as strategy, budget and schedule to identify risk situations.

Fault trees

Fault tree analysis is a visual technique for breaking down failure in the system into source events⁶. Fault trees use event and gate symbols to structure cause and effect relationships of a failure. It is a simple technique and helps in reflecting on logical sequences that lead to failure. In project risk analysis, this technique is complicated due to the large number of events and gates; however, it could be used in a smaller domain to analyse a particular failure¹⁶.

Event tree

Event tree analysis is a graphical representation of potential consequences arising from a failure where possible consequences are generated and broken down from an initial event⁵. In project risk analysis its application is similar to fault tree analysis and works only

on small zone of influence of potentially damaging consequence arising from a risk event¹⁶.

Techniques for risk analysis

After risk events are identified, their characteristics need to be assessed so that it is determined whether the risk event is worth further analysis. Once it is decided that a risk event needs analysis then it needs to be determined whether the risk event information can be acquired through quantitative or qualitative means. Measurement metrics for risk also need to be determined so that these metrics can be used for computation of risk magnitude and risk analysis leading to risk mitigation plans³. Risk is measured using two parameters – risk probability and risk consequence. The probability or probability of a risk event indicates a risk event, whilst a risk result, severity or impact is the result of the risk event. Risk magnitude is the result and consequence of risk probability. The probability and consequence of a risk event, which constitutes the risk assessment function, needs to be determined to measure the risk magnitude. In practice, the risk quantities are either quantitative or qualitative in nature. A statistical analysis requires an analysis of historical data for the quantitation of risk parameters. In many cases, quantitative data are difficult to obtain and are reduced to very small areas where historical trends can be

sustained. A historical record of money spent on correcting tool non-compliance usually in the manufacture of the type product currently being developed is an example of quantitative data on the identification of risk consequences. Although the risk may not occur, the costs of the risk are fairly estimated. Quantitative data is not always available, whether required or not, so a qualitative approach is often more appropriate to risk management using subjective assessment techniques. In comparison to ideal situations, subjective approach primarily uses measures relative to human judgments, sentiments and opinions². Although the subjective approach is influenced by individual preconditions, preferences and expertise, it offers a basis for a risk assessment in which it is more important than an exact prediction of a catastrophic event to highlight possible risk events. One example of quality evaluation is the very high impact of the failure of a manufacturing tool to be used in the project, but the chances are very low. Though, the terms very high and very low can be represented on a nominal scale, it is not an exact measure. Organizations employ qualitative assessment techniques to identify risk because an expert opinion is the best source available, rather than an unreliable quantity¹⁵.

The function of risk analysis is to determine influence of risk factors on the system as a whole. Risk events form a cumulative effect on one or more aspects of the project and it is easier to mitigate risk events if they can be bunched in groups and preferably dealt at a higher level in the long run than focusing on one particular risk event, in which case the project is likely to be micro-managed. Several techniques in the literature that are currently applied for project analysis can also be applied for risk analysis. These are summarized in this section¹⁵.

Probability and impact grids

Risk events represented on a grid consisting of probability on one axis and impacts on another are often used to define threshold regions on the grid, which represent high risk events based on past experience or organizational procedures³. Probability and impact grids provide a simple format for showing relative importance of risk events. Figure 2 shows an example of a probability and impact grid¹³.

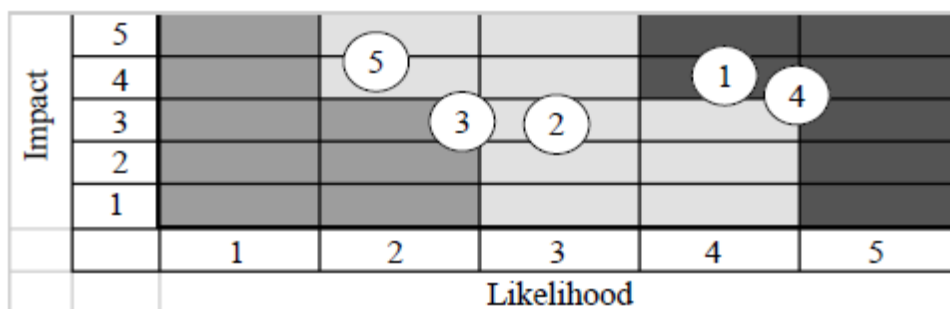


Fig.2 probability and impact grid

Estimation of system reliability

System reliability estimation is technique of determining chance of a system element such that it is functioning without a failure in a specified time period¹⁴. System elements are integrated together as having either a serial or a parallel relationship and traditional reliability calculations are then used to determine the overall reliability of the system, representing its health. Hence, cumulative effects on the critical components of the project are determined as the system reliability.

Fault tree analysis

Fault tree analysis determines the chance or a failure event occurring in the project structure represented in a fault tree¹⁵. Further, the top-level chance or a failure is determined from events in lower levels passing through logical gates. This analysis provides an overview of risk in the overall project through top-level analysis or specific components of the project through analysis at lower levels.

Event tree analysis

Event tree analysis determines how likely a particular event represented on an event tree is likely to happen from an initial event¹⁴. The probability of occurrence of a particular outcome is determined as a product of all probabilities of occurrence in the associated branch. Owing to this examination of all failures that are possible for an outcome, event tree analysis leads to a comprehensive mitigation plan.

Sensitivity analysis and simulation

Sensitivity analysis is a what-if type of analysis to reflect on responses by the system as project conditions change¹⁴. A baseline for the project metrics is generated as a precursor to a what-if analysis and then project conditions are manipulated to determine their effect on the project metrics. This leads to an understanding of the system response to changing project situations. Simulation is used as an extension to the sensitivity analysis²⁰. In simulation, a system model is constructed to reflect actual processes with project parameters and constraints. Then, the values for the risk parameters and constraints are randomly selected in a predefined range²¹. A collation of the effects are tabulated and statistically analyzed to provide an insight into the system behavior under various conditions²⁰. Simulation is a flexible technique for risk analysis, but requires large simulation runs to provide sufficient data for statistical analysis.

Techniques for risk evaluation

Risk evaluation is the function of risk management where risk events need to be prioritized so that risk mitigation plans are determined either based on past experience, lessons learnt, best practices, organizational knowledge, industry benchmarks and standard practices¹⁵. In risk evaluation, different aspects of the project—strategic, budget or schedule may be considered in light of a risk event to determine risk mitigation options and incorporate the most suitable option into a mitigation plan. This section describes several evaluation techniques that can be applied for risk evaluation.

Decision tree analysis

Decision tree analysis is used to structure a decision process and evaluate outcomes from uncertain events¹⁷. In decision trees, decision nodes and chance nodes are represented graphically and expected monetary values (EMV) are attached to the nodes. EMV is then used to calculate expected returns from decisions and select the decisions that generate the maximum returns¹⁷. Figure 3 shows decision tree analysis for an investment. Decision tree analysis incorporates probability of returns associated with decisions and estimation of expected returns, which could be misleading in situations that are out of the normal. As such decision tree analysis should be used with caution for risk analysis.

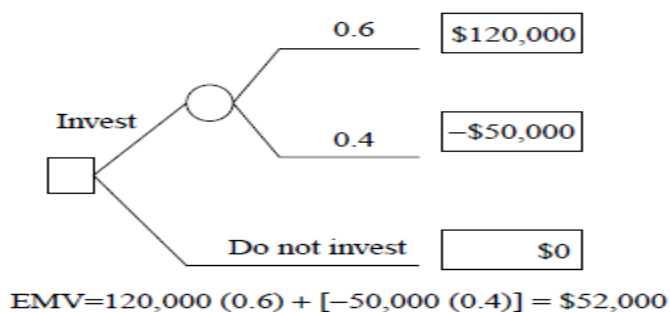


Fig.3 Decision tree analysis

Portfolio management

Portfolio management compares multiple projects with respect to risk in investment and returns¹⁶. Projects are positioned on a matrix of risk magnitude and return, with high risk low return projects being located at a different location to low risk and high return projects. This

enables decisions to be derived for corporate governance, based on the company strategy and the maximum portfolio value, through calculation of a utility value for a project¹⁶. In project risk management, multiple risk events may be compared by placing them on a matrix of risk magnitude against a return. Mitigation options are then derived from predefined utility values.

Multiple criteria decision-making method

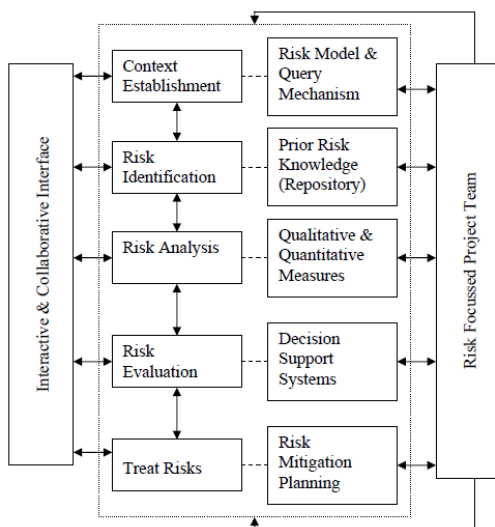
Multiple criteria decision-making method considers different project attributes including the negative and the positive factors of a decision⁴. Project attributes are weighted according to project predominance of the predefined criteria. The product of the relative weight and the score for an attribute gives a weighted score for that attribute. The project is then evaluated through a difference from a standard project attribute. If the total weighted score turns out to be positive, then the project should be selected; otherwise, the project should be rejected. This technique can be applied to risk analysis if risk events are compared to standard events and weighted against them.

Risk mitigation

Risk events diminish project objectives when harmful effects realize due to unforeseen circumstances. Risk management attempts at studying in detail, all aspects of project management, so that all controllable events have an action plan or a risk mitigation plan. A reactive approach or a feed back approach refers to risk mitigation actions initiated after risk events eventuate and can be seen as initiation of contingency plans. On the other hand, a pro-active approach or a feed forward approach refers to actions initiated based

on chance of a risk event occurring, such as insurance³. A combination of these two approaches is applied to risk management to avoid risk, reduce the likelihood of risk, reduce the impact of risk, transfer risk, or to retain the risk³.

Framework for risk management tools



A framework for risk management tools can be developed in relation to the risk management process in Figure 1 and is shown in Figure 4. Context establishment function is accomplished through techniques presented in the third section of this paper and the result is an establishment of a risk structure that will facilitate the subsequent functions in the risk management process. For example, in process focused risk management context, the risk model could be a process model. Then, information features such as technical, financial, schedule, organizational, etc. aspects may be tagged to the process units to provide a relevance for risk assessment. A risk query

mechanism may then be formulated through techniques presented fourth section and imposed on the process model through interactive or collaborative interfaces to collect quantitative and qualitative data as described in fifth section. The risk evaluation consists of decision support systems using techniques presented in sixth section of this paper. Risks worth investigating further due to their high chance of occurring or high potential impacts or leading to new opportunities are then pursued leading to being treated. This whole process of risk management is collaborative and requires incremental contributions from all participants within the organization and supplementing project management approach, which is more proactive²¹.

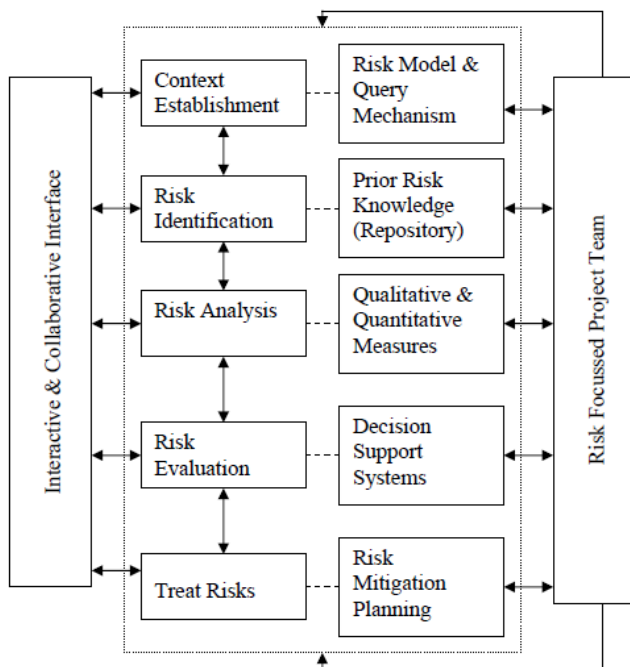


Fig. 4 Framework for risk management tools

Conclusions

Project risk management efforts are made by studying the project structure, organizational framework, external environment, products, procedures and processes to supplement project management practices in detail. It also adds lessons learned, best business practices, industry standards and case studies to existing knowledge so that risks are mitigation planned if risk events happen. This prevents crises and provides opportunities for the future. This paper presents the techniques commonly employed in project management and elsewhere, which outline their utility for project risk management, particularly in building projects. These techniques increase the comprehension and collaboration between teams, not necessarily entirely dependent on a collaborative computer network or computer application, of risk management functions. All the techniques presented in this paper are characterized by their own and apply to a specific field. As such, a combination of this technique will most probably fulfill a project team's risk management needs and develop tools tailored to its needs but structurally generic. Also commercially available for risk management, various software tools address only a specific aspect of risk management using a limited number of techniques in this paper. The framework for risk management tools in this paper offers an integrated approach for the management of risks in projects that are suitable but generic in their structure and may or may not be in the form of computer applications and can be used to develop tools to manage risk. Current development of software and hardware technology. Integration of technique applications presented in this paper. There are numerous risk management tools available

on the market to support the management of projects, but they tend to address either limited areas of application or limited risk management processes. In future developments in integrated and generic tools, risk management principles will be used widely in project management, organizational knowledge will be retained and a competitive advantage in the business sector.

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A Survey Study on Breast Cancer in Hospital of Oncology / City of Medicine

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Abstract—this Cross Sectional Study for Breast Cancer had done in Baghdad City .the data collected from Oncology Hospital/ City of medicine - Baghdad for three years (2016,2017,and 2018 The data were Collected for women confirmed with Breast Cancer infections in the different degrees ,the data were collected in random collecting method . The collected number of confident breast cancer women for three years is about 26,215 (for 2016)9378,(2017)8160,and (2018)8668 the data were for 12 months that cases had registered in the hospital After Data collected the data were categories according to the age in to 3 parts (below 29) ,(from30 to 39),(and over of 40) years old . The Data were analyze by Graph Pad Prism 6 program for statistic version 6.01 .the ages is taken with different parameters were study and analysis data by using . From our sectional study on women that positive infected with breast cancer in Oncology hospital in City of medicine /Baghdad, the result shown total infection for three years was 26215 cases and the result had been discussion in the research .

Keywords—*Breast cancer ,survey study ,oncology ,Sectional study*

Introduction

1. Breast Anatomy

The female breast is a glandular (apocrine) organ, roughly hemispherical in shape, with a pigmented areola at its apex from which the nipple arises centrally. Within the breast, the glandular tissue is imbedded in fat and divided into approximately 15-20 lobes, each draining into a duct which reaches the skin at the nipple (Fig.1). The breast is situated in the superficial fascia of the anterior thoracic wall, and despite large variations in the dimensions of the breast, its base has a fairly constant size; overlying the second to sixth ribs, and extending from the lateral border of the sternum to the mid-axillary

line. The axillary tail extends upward and lateral into the axilla, and is closely related to the nerve supply of latissimus dorsi and serratus anterior . The arterial supply is derived from perforating branches of the internal mammary and intercostal arteries, with large vessels arising from the second and third intercostal spaces, and with an additional supply from the lateral thoracic artery. Lymphatic drainage is *via* subareolar and submammary plexuses to nodes along the internal mammary chain medially, and to the pectoral axillary nodes laterally, which drain *via* the central and apical groups to the supraclavicular and cervical nodes (1,5)

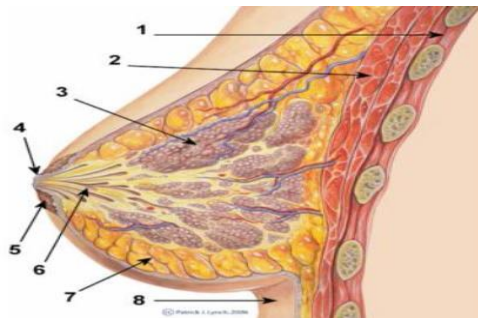


Fig. 1: Anatomy of Breast

2. General Review of Breast cancer

Cancer is mainly caused by the mutation in genes which are present in nucleus of all cells in body, it may be benign or malignant. If cancerous cells remains localized to specific organ of body, it termed as benign tumor however when these tumor cells start migrating towards other organs then it becomes malignant , Uncontrolled proliferation of cells which starts in breast cells and attains malignancy is called breast cancer. (4) Breast cancer is the most common cancer form in women; in the countries with highest incidence rates, the lifetime risk of developing breast cancer is over

10%(5,10) mainly originates from the milking ducts or the lobules responsible for milk supply towards ducts. Depending upon the origination breast cancers may be ductal or lobular carcinomas (4) Various risk factors for breast cancer have been reported, and this include; increasing age, hormone replacement therapy (HRT), high dietary fat, excessive alcohol consumption, smoking and family history among others(13)

3.Type of breast cancer

Breast cancer traditionally has been classified into three different subtypes based on the presence or absence of three receptors found on cancer cells. Hormone receptor (HR) positive breast cancers express estrogen and/or progesterone receptors(ER/PR), and constitute approximately 60% of all breast cancer cases(2).

3. 1.Non-invasive breast cancer

It is a cancer that has not extended away from the lobule or ducts where it situated. An example of a kind of non-invasive breast cancer is ductal carcinoma in -situ. Ductal carcinoma in -situ appears when atypical cells develop within the milk ducts, however have not extended to close proximity of tissue or outside(1)

3.2.Invasive breast cancer

It exists when abnormal cells from within the lobules or milk ducts split out into close proximity of breast tissue .Cancer cells can pass through the breast to different parts of the body through immune system or the systemic circulation.

They may move early in the development when the tumor is a minute or afterward when the tumor is huge Invasive breast cancer is most occurring general carcinoma in females(15)

3.3.Lobular carcinoma in situ (LCIS)

This type of breast cancer develops into breast lobules .The breast cancer has not extended exterior to the lobules into the breast tissue . Lobular carcinoma in situ is usually identified as non-invasive breast cancer(16)

3.4.Ductal carcinoma in situ

It is the most general kind of non-invasive breast cancer, is limited to the breast duct. Example of ductal carcinoma in situ is ductal comedocarcinoma(17)

3.5.Infiltrating lobular carcinoma (ILC)

Infiltrating lobular carcinoma is also recognized as invasive lobular carcinoma. ILC originates in the milk glands (lobules) of the breast, but frequently extends to other areas of the body(16)

3.6.Infiltrating ductal carcinoma (IDC)

Infiltrating ductal carcinoma is also recognized as invasive ductal carcinoma. IDC originates in the milk ducts of the breast and extends to the duct wall, invading the breast fatty tissues and probably other parts of the body(18)

3.7.Medullary carcinoma

Medullary carcinoma is an invasive breast cancer that designs a discrete margin normal tissue and medullary tissue(19)

3.8.Mucinous carcinoma

It is recognized as colloid carcinoma, mucinous carcinoma is a uncommon breast cancer created by the mucus-forming cancer cells. Females with mucinous carcinoma usually have an improved prediction than females with additional general kinds of invasive carcinoma(20)

3.9.Tubular carcinoma

are a particular kind of invasive breast carcinoma. Females with tubular carcinoma usually have an improved prospects than women with additional general kinds of invasive carcinoma (20)

4.Diagnosis methods of Breast Cancers

Over the last few years there have been an increasing number of newer methods available to the physician for the diagnosis and staging of neoplasm, (1)The recommended diagnostic approach in breast cancer is called triple diagnosis with a combination of clinical investigation, radiological investigation and a biopsy, frequently fine

needle cytology or a core biopsy, which distinguishes in situ versus invasive lesions. This diagnostic approach is essential in order not to miss small or non-palpable breast lesions(3). Following clinical diagnosis and assessment of the lump and the patient for signs of metastatic spread a simple attempt is made at clinically staging the tumor according to the tumor (size), axillary node (mobility, fixity), metastases (distant metastases) (TNM) system (22). The TNM staging system is commonly used as it gives more precise information about the extent of the cancer clinically (23).

4.1. Imaging method

The effectiveness of any imaging technique depends on: the optimal demonstration on the breast, recognition of any abnormality and an accurate interpretation of the change. Optimal imaging requires familiarity with the techniques available and their limitations. The breast surgeon needs to know whether the image is normal, abnormal or equivocal. Most problems in imaging concern equivocal appearances and what to do about them. A sound knowledge of established and recent advances will help in selection of appropriate further investigations(5).

A. Mammography

X-ray mammography remains the most sensitive method for the detection of small breast cancers. Findings of X-ray mammography should always be considered together with clinical signs, and where appropriate results of needle biopsy (fine needle aspiration cytology, FNAC, or core biopsy, CB) when deciding management. In addition to its role in the 'triple assessment' of breast cancer, the aim of imaging (mammography/ ultrasonography) is not to confirm the diagnosis but to simply demonstrates whether there is single focus disease or not, coexisting DCIS, and, if there is synchronous contralateral breast disease (24,25).

B.Ultrasound

Ultrasonography (US) is a recognized component of the ‘triple assessment’ of breast lump, most useful in women less than 35 years old as their breasts are dense and not suitable for mammography and in the further evaluation of a mammogram . A typical carcinoma is seen as an ill-defined mass with irregular, speculated margins and heterogenous internal echoes, distal irregular (acoustic) shadowing-in contrast to the typical appearance of a benign cyst or fibroadenoma (26). Additional features may include a ‘halo’ of increased echogenicity and distortion of the surrounding normal breast parenchyma(5).

4.2. Pathology

The pathological findings would confirm the diagnosis. The two main methods which have evolved for the establishment of a preoperative diagnosis in breast disease are fine needle aspiration which yields a cytological specimen (FNAC), and wide bore needle core biopsy which yields a histological preparation. Both methods have been shown to produce excellent results in symptomatic practice and have subsequently been applied successfully to the evaluation of mammographic screen- detected lesions. The safest way to use FNAC and core biopsy in preoperative diagnosis is by employing the ‘triple approach’. This concept combines the results of clinical examination, imaging (mammography and ultrasound) and FNAC or core biopsy(5).

A.Fine needle aspiration cytology (FNAC)

FNAC of lump confirms the diagnosis immediately thus allowing an informed discussion with the patient about treatment options. It also reassures the patient. The advantage of doing an FNAC prior to a mammogram is that the patient obtains a definitive diagnosis without waiting. The disadvantage is that it can be painful doing a mammogram immediately after an FNAC. It may also obscure the reading of the mammogram, (23). However, in breast centres where a

mammogram is readily available a mammogram before FNAC or core biopsy is routine although timing is necessary(26,28).

B.Core biopsy

It is a histopathological diagnosis as a core of tissue is examined. It is usually a tru-cut or needle biopsy but the sensitivity is however still less than 100% (28). It is still higher than FNA as it yields adequate samples especially from solid lumps. Definite diagnosis of specific benign lesions e.g. fibroadenoma may be possible. It is also much better than FNAC in diagnosing pre-invasive in-situ carcinoma in the breast (carcinoma cells which have not yet broken through the basement membrane) especially screened-detected (29). Microcalcifications are more readily identified than with FNAC and the cores should be X-rayed if microcalcifications were present on the original radiograph. Generally, core biopsy should not be used instead of FNAC but it is a valuable adjunct(26). It is a histopathological diagnosis and, most assuring as the whole lump is removed . The sensitivity is 100% (29). The incision should be made in the direction of the skin crease (Langer's lines) of the breast to avoid the formation of a hypertrophic or keloid scar (30).

5.Treatment of early stages of breast cancer

Medical therapy of breast cancer with antiestrogens such as raloxifene or tamoxifen might avoid breast cancer in individuals who are at increased possibility of developing it . Surgery of both breasts is an added preventative measure in some increased probability of developing cancer in female. In patients who have been identified with breast tumor, different strategies of management are used such as targeted therapy, hormonal therapy, radiation therapy, surgery and chemotherapy(1). Patients with hormone receptor positive tumors typically receive endocrine therapy (e.g. selective estrogen- receptor response modulators [SERM] and aromatase inhibitors [AI]) as one of many options of their treatment. Moreover, patients with HER-2(The human epidermal growth factor receptor 2 (HER2) is a cell membrane

tyrosine kinase receptor member of the epidermal growth factor receptor (EGFR) family)/ overexpressing tumors typically receive anti-HER/2 targeted therapy in combination with cytotoxic chemotherapeutic agents. Patients with triple negative breast cancer (TNBC) do not have these targeted treatment options, with cytotoxic chemotherapy being the primary modality(2) Previously immune therapies were not used for the treatment of breast cancer. However clinical data obtained from different studies have shown that immune therapies have potential to improve the breast cancer related clinical outcomes and breast cancer can be considered a suitable target for immunotherapies(4).

5.1. Surgery method

Breast tumours in early stages can be completely removed by surgical resection. Surgical procedures include breast-conserving surgery, mastectomy ,and axillary lymph node sampling and removal. A mastectomy involves removing all of breast tissue, sometimes along with other nearby tissues. Breast reconstruction can be performed at the time of tumour resection or later breast-conserving surgery , only a part of the affected breast is removed, how much depends on the size and location of the tumour and other factors, For most women with stage I or II breast cancer, breast-conservation therapy (lumpectomy/partial mastectomy Plus radiation therapy) is as effective as mastectomy . However, breast-conservation surgery requires high quality breast imaging equipment and is as effective as mastectomy only in combination with radiotherapy thus, in settings with limited resources where this cannot be provided in combination with the breast surgery, modified radical mastectomy is recommended (3,10)

5.2. Radiotherapy method

Radiation therapy is treatment with high-energy rays or particles that destroy cancer cells. This treatment may be employed to kill any cancer cells that remain in the breast, chest wall, or lymph node areas

after breast-conserving surgery. Radiotherapy has gained an increased importance, and a recent meta-analysis revealed that radiotherapy as a complement to surgery decreased the risk to loco-regional relapse by two-thirds compared to surgery alone. If breast-conservation surgery was performed, the entire breast receives radiation. And sometimes an extra boost of radiation is given to the area in the breast where the cancer was removed prevent it from coming back in that area(3,10). Radiations cause damage to DNA strand inside the cancer cells, which inhibits its further growth. Radiations can also damage the healthy tissues, but the effect is more on cancerous cells, as the growth of cancerous cells is very rapid and they cannot repair any damage easily. Chemotherapy refers to the treatment of cancer with the help of drugs which can be administered orally as well as intravenously. Chemotherapy is associated with severe side effects and is not suitable therapy for all breast cancer patients(4) .

5.3. Adjuvant treatment

Adjuvant treatment is systemic therapy given after surgery to patients with no evidence of cancer spread outside of the breast or the lymph nodes, with the purpose of destroying any microscopic cancer cells that might remain in the body and cause recurrence of the disease. Adjuvant therapy may consist of chemotherapy, endocrine therapy, and/or targeted biological therapies. Chemotherapy inhibits cell growth by different mechanisms and thus reduces the rapid cell proliferation that is a characteristic of cancer cells(4).

Targeted biological therapies selectively attack genetic expression that is typical for cancer cells. Adjuvant treatment is not recommended for all breast cancer weighting a patient's risk of breast cancer recurrence against adverse effect of adjuvant treatment . Adjuvant treatment is an important element in cancer guidelines and is covered in basically all treatment guidelines identified. (1,3)

5.4. Hormonal Therapy

Hormones function as chemical messengers and they show their effects at different organs in body via reaching target organs through blood stream. In females, ovaries produce two major hormones estrogen and progesterone and these two hormones are responsible for development of female sex characteristics and maintenance of menstrual cycle(4) However enhanced levels of these hormones can also be a leading cause of hormone-sensitive breast cancer. To identify the hormone-sensitive breast cancer surgically cancerous tissues are removed and these samples are checked for the presence of hormone receptors. If hormone receptors are present it confirms the hormone-sensitive breast cancer sensitive cancerous cells by inhibiting the production of estrogen and progesterone from ovaries in body and also by inhibiting the hormonal actions(21) .

Mateiral and Methods

1. Data collected

Cross Sectional Study for Breast Cancer had done in Baghdad City .the data collected from **Oncology Hospital/ City of medicine - Baghdad** for three years (2016,2017,and 2018)

The data were Collected for women confirmed with Breast Cancer infections in the different degrees ,the data were collected in random collecting method .

The collected number of confident breast cancer women for three years is about 26,215 (for 2016)9378,(2017)8160,and (2018)8668 the data were for 12 months that cases had registered in the hospital

After Data collected the data were categories according to the age in to 3 parts (below 29) ,(from30 to 39),(and over of 40) years old .

2. Statistical analysis

The Data were analyze by Graph Pad Prism 6 program for statistic version 6.01 .the ages is taken with different parameters were study and analysis data by using

And the diagrams were drawn by Excel office program (2007) .

Result and Discussion

Result

From our sectional study on women that positive infected with breast cancer in Oncology hospital in City of medicine /Baghdad, the result shown total infection for three years was 26215 case as mention in table (1) .

Table (1): the number of positive infection for different ages in months for three years that record in oncology hospital

year s	Jan	Feb	Mar	Apri l	May	Jun e	Jul	Aug	Sep	oct	nov	des	total Y
2016	1584	788	1287	844	724	679	568	794	486	576	521	527	9378
2017	735	621	606	582	864	448	782	733	557	775	754	712	8169
2018	811	800	806	583	723	537	900	645	692	723	721	727	8668
total m	3130	2209	2699	2009	2311	1664	2250	2172	1735	2074	1996	1966	26215

M refers to months

Y refer to Year

In each year the total infections according to age was 3459 for less than 29 years ,10050 to women between 30to 39 years ,and 12706 to age more than 40 years table (2).

Table 2: the categories of ages for three years

years	>29	30-39	<40	total
2016	1818	3258	4302	9378
2017	484	4225	3460	8169
2018	1157	2567	4944	8668
total	3459	10050	12706	26215

The frequency statistics had shown mean of infections was 781.50 with standard divisions 333.741 in minimum infection 486 for year 2016 in month in September and maximum 1584 in January Table 3 and 4 and the diagram in fig 2.

Table3: Frequencies Statistics for 2016 according to months	
Mean	781.50
Std. Deviation	333.741
Variance	111383.364
Minimum	486
Maximum	1584
Sum	9378
Percentiles	100 1584.00

Table 5: statistics for year 2017, Summation, Mean ,standard division ,minimum and maximum

Valid	Percent	Valid Percent	Cumulative Percent
486	8.3	8.3	8.3
521	8.3	8.3	16.7
527	8.3	8.3	25.0
568	8.3	8.3	33.3
576	8.3	8.3	41.7
679	8.3	8.3	50.0
724	8.3	8.3	58.3
788	8.3	8.3	66.7
794	8.3	8.3	75.0
844	8.3	8.3	83.3
1287	8.3	8.3	91.7
1584	8.3	8.3	100.0
Total	100.0	100.0	

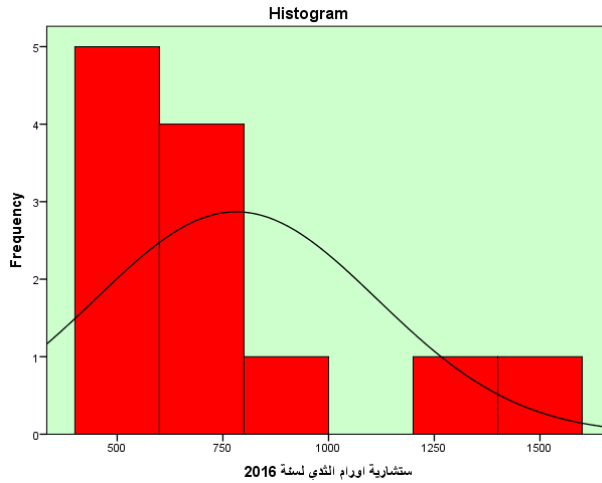


Figure 2: the frequency study of year 2016

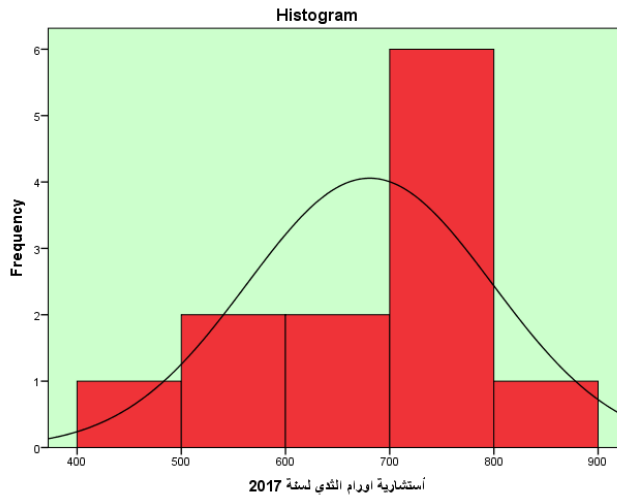
in 2017 the mean of positive infection between months was 680 persons with standard divisions 117 ,the minimum infection with 448 was in June and maximum infection 864 in may Table 5,6 and fig.3 .

Table 5: statistics for year 2017, Summation, Mean, standard division, minimum and maximum

Mean	680.75	
Std. Deviation	117.985	
Variance	13920.568	
Minimum	448	
Maximum	864	
Sum	8169	
Percentiles	100	864.00

Table 6: Percent, Valid percent ,and Cumulative percent of 2017

Valid	Percent	Valid Percent	Cumulative Percent
448	8.3	8.3	8.3
557	8.3	8.3	16.7
582	8.3	8.3	25.0
606	8.3	8.3	33.3
621	8.3	8.3	41.7
712	8.3	8.3	50.0
733	8.3	8.3	58.3
735	8.3	8.3	66.7
754	8.3	8.3	75.0
775	8.3	8.3	83.3
782	8.3	8.3	91.7
864	8.3	8.3	100.0
Total	100.0	100.0	



In 2018 the mean of infection was 722 person per month with standard division 101.420 the minimum was 537 April and the maximum infection in July 900 infection and as seen in Table 7,8 and fig. 4 .

Table 7: statistics for year 2018,Summation ,Mean ,standard division ,minimum and maximum

Mean	722.33	
Std. Deviation	101.420	
Variance	10286.061	
Minimum	537	
Maximum	900	
Sum	8668	
Percentiles	100	900.00

Table 8: Percent, Valid percent ,and Cumulative percent of 2018

Valid	Percent	Valid Percent	Cumulative Percent
537	8.3	8.3	8.3
583	8.3	8.3	16.7
645	8.3	8.3	25.0
692	8.3	8.3	33.3
721	8.3	8.3	41.7
723	16.7	16.7	58.3
727	8.3	8.3	66.7
800	8.3	8.3	75.0
806	8.3	8.3	83.3
811	8.3	8.3	91.7
900	8.3	8.3	100.0
Total	100.0	100.0	

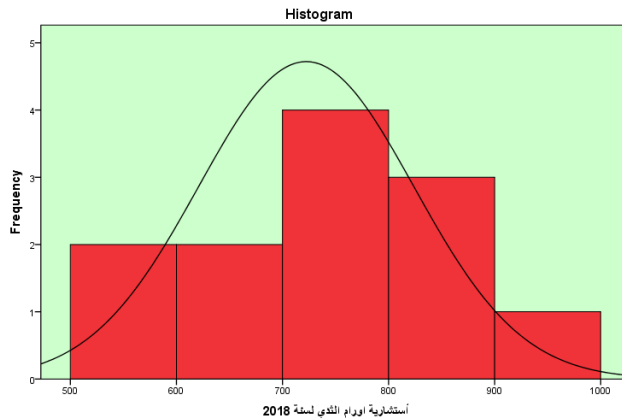


Figure 4: Diagram for statistics of 2018

When we compare between the three years we can find out that the minimum infection was in year 2017 with 448 case record and the maximum was in 2016 in 1584 case had record as seen in table 9 . if we can notice that in year 2016 was the most cases when it become less the years after and this may be because of realizing of women about breast cancer and follow the right methods to protect them self from infection and may be because of improved living condition in the country and self examination for breast cancer(1).

Table 9: minimum and maximum infections for 2016,2017,and 2018

years	Mini mum	Maxi mum	Mean	Std. Devia tion	Varia nce
2016	486	1584	781.5 0	333.7 41	11138 3.364
2017	448	864	680.7 5	117.9 85	13920 .568
2018	537	900	722.3 3	101.4 20	10286 .061

According to the ages the mean infection in 2016 was 3126 as seen in table 10 the minimum infection was 1818in the ages(>29)and the maximum infection was in category (<40) .

Table 10: Mean ,Minimum ,maximum ,and standard division of ages

Mean	3126.00	
Std. Error of Mean	720.100	
Std. Deviation	1247.250	
Variance	1555632.000	
Minimum	1818	
Maximum	4302	
Sum	9378	
Percentiles	100	4302.00

Table 11:Percentof infection according to age in 2016

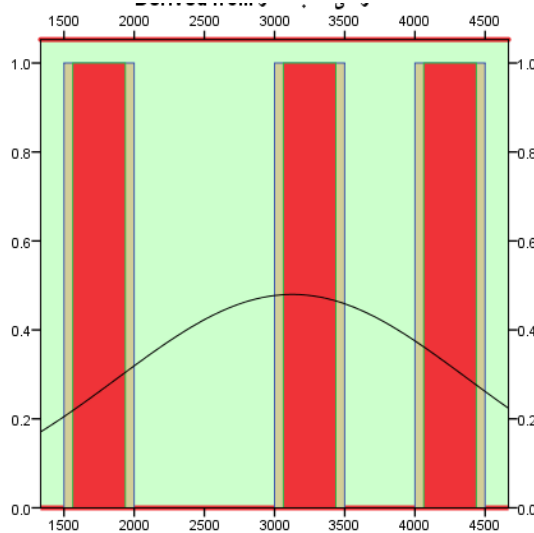


Fig5: diagram of mean, minimum ,maximum according to ages in 2016

In 2017 the mean of infection was 2723 and the minimum infection is 484in(>29) and the maximum infection was 4225 between the ages (30-39) table 12 fig 6

Table 12: Mean ,Minimum ,and maximum infection of category in 2017

Mean	2723.00
Std. Error of Mean	1141.074
Std. Deviation	1976.397
Variance	3906147.000
Minimum	484
Maximum	4225
Sum	8169
Percentiles	100 4225.00

Table 13: percent of infection in 2017

Valid	Percent	Valid Percent	Cumulati ve Percent
484	33.3	33.3	33.3
3460	33.3	33.3	66.7
4225	33.3	33.3	100.0
Total	100.0	100.0	

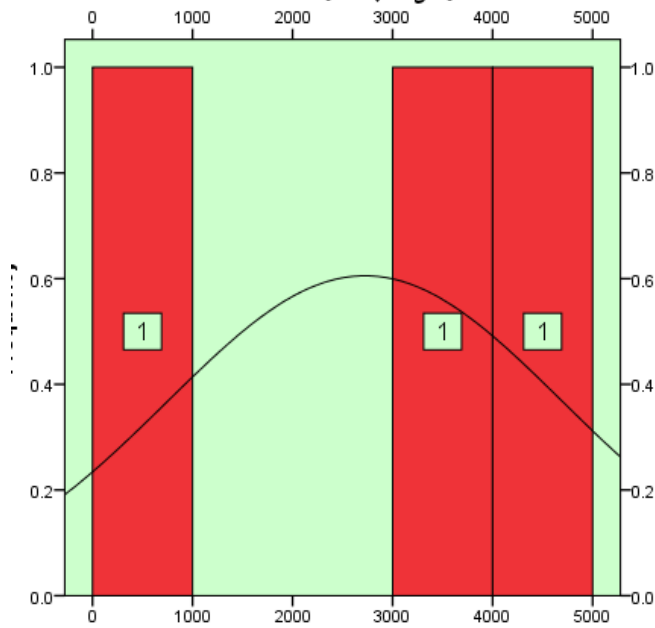


Figure 6: diagram of mean, minimum ,maximum according to ages in 2016

In 2018 the mean of infection between different ages was 2889 and the minimum infection between category 1157(>29) and maximum infection in(<40) 4944

Table 14,15, and figure 7

Table 14: Mean ,Minimum ,and maximum infection of category in 2017

Mean	2889.33
Std. Error of Mean	1105.029
Std. Deviation	1913.966
Variance	3663266.333
Minimum	1157
Maximum	4944
Sum	8668

Table 15: percent of infection in 2017

Valid	Percent	Valid Percent	Cumulative Percent
1157	33.3	33.3	33.3
2567	33.3	33.3	66.7
4944	33.3	33.3	100.0
Total	100.0	100.0	

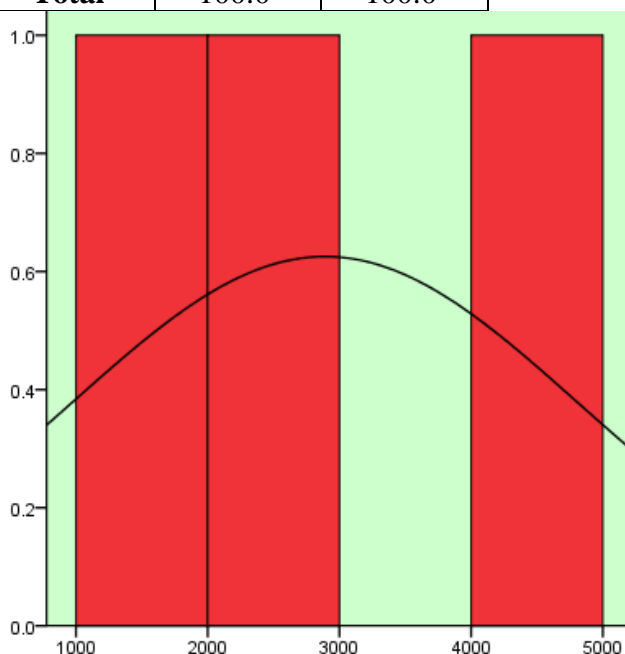


Figure 7: diagram of mean, minimum ,maximum according to ages in 2016

Discussion

from the result we can notice that The most vulnerable group at risk is 40 and above 40this result is agree with (30) Breast cancer is more common in single women than in married women (31, 32) . The breast is an estrogen sensitive organ. Many females who have been on birth control pills or estrogen replacement have found that the medications result in enlarged and often tender breasts. The activity of this medication, combined with the standard western high fat, low fiber

diet, which over-stimulates breast tissue, could be a trigger for breast cancer. Incidence of breast cancer is higher in women above 50 years of age and 2 cases per 1000 are reported in this age group. Epidemiological investigations have also suggested that those women who have many children possess lower risk of breast cancer than those women who have fewer children. Incidence of breast cancer is 10.04% among all cancers and, most commonly occurs in 40–50 aged women (33). Breast feeding

decreases the risk of breast cancer (34). Menopause resulting from surgical removal of ovaries (oophorectomy) decreases the risk (35). Deficiency of vitamin D and lack of sun exposure is considered to be the important cause of breast cancer (36) . Carcinoma in one breast can increase the risk by four times in another breast. While the patients that have the history of ovarian, endometrial or colon cancer have 1–2 times increased risk to develop breast carcinoma (37) . Women who have a positive family history of breast carcinoma are 2–4 times more likely to develop the cancer, especially the females who are the carriers of BRCA1 or BRCA2 genes have the significant chance to develop carcinoma of breast (38) . Steroid hormones include androgens, progesterone and estrogen, which belong to a cluster of structurally connected hormones known as sex hormones that are released into the blood by the gonads and adrenal glands. They are synthesized from single general precursor, cholesterol through a reaction catalyzed by numerous enzymes to make a large diversity of hormones for diverse target organs and tissues (39).

Conclusion

1. Breast cancer is one of the most serious cases of cancers and infect about one form 10 women, and each one of five women after 40 can infect .
2. The most risk vulnerable group is the above 40 in ages .

- 3.Many reason can cause the Cancer ,Hormonal, Radiation, Drugs ,Alcohol consumption ,single women, and history of family with infection .
4. Breast feeding can minimize the infected with the cancer .
- 5.Discovries of the cancer in the first stages can low the risk of death .
- 6.Autoself checking can help in discoveries in the first stages .
7. The number of children is may be cause of infection
8. Using hormonal pills for birth control can cause the cancer .
9. Late Births after 30 can be cause of breast cancer .

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An Expeditious Parallel Maximum Likelihood Expectation Maximization 3D Image Reconstruction Technique for CBCT

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Abstract

Computed Tomography signifies an imaging process that constructs cross sectional images, which reveal the internal structure of a scanned object in a nondestructive manner. Cone-beam CT is one of the most advanced developments in CT imaging, which presents an indispensable imaging technique that constructs three-dimensional images from the scanned object, Using cone-beam X-ray projections rather than the more often used fan-beam planar projections ensures quicker but safer three-dimensional imaging with less radiation than traditional CT imaging methodologies. However, these advancements come at the expense of a challenging 3D reconstruction issue that still requires changes in the speed and accuracy of the reconstructed image. In this article, we present a parallel implementation of an efficient parallel Maximum Likelihood Expectation Maximization (MLEM) algorithm for CBCT that provides a more reliable and faster reconstruction even with a small number of projections. We reconstructed a test volume image with this parallel version of the MLEM algorithm and used various image quality indices to test the effects of our proposed approach as well as the effect of the number of iterations on the reconstruction time and image quality. According to the data, the reconstruction of volume images using the proposed parallel algorithm was quicker than the standard reconstruction method using the non-parallel MLEM algorithm.

I. INTRODUCTION

CT (computed tomography) was first used in the early 1970s. It was previously known as computed axial tomography, or (CAT) scanning. The term computed was used in the summary to emphasize the computer's critical role in the advancement of this technology [1]. This medical imaging technique collects projection data from a

scanning target and uses it to recreate cross-sectional images. The rotation of an X-ray source and a detector unit on opposite sides of each other produces the projection results. The three major types of X-ray beam are parallel, fan, and cone beam, indicating that CT image restoration techniques are dependent on the shape of the X-ray beam [2]. Fan-beam imaging produces two-dimensional (2D) images from its projection acquisition process. A projection at a given angle is the image's integration in the direction defined by that angle. A sinogram is a set of projections obtained from various angles during a CT scan that is used in the reconstruction process. Cone Beam Computed Tomography (CBCT) is a 3D expansion of 2D fan-beam CT tomography, obtaining a volume of projection data from a single rotation of the 2D detector array. As opposed to traditional CT, the CBCT technique has many benefits, including faster scan time, lower X-ray radiation exposure, and so on [3]. One of the primary benefits of CBCT is that it saves time during the data collection phase [4]. After collecting a volume of sinogram data, 3D image reconstruction techniques are used to recreate the volume image. The mathematical techniques used in the reconstruction process are classified as analytical, which use the concept of the central slice theorem, such as the Feldkamp, Davis, and Kress (FDK) method [5], and iterative, which attempt to solve the reconstruction problem by converting it into a system of simultaneous linear equations and then resolve to iterative methods, such as the ART and the MLEM algorithms [6,7]. The MLEM has recently gained popularity as a result of recent advances in computing power through evolved CPU, GPU, and parallel computing. Some previous studies explored 3D reconstruction techniques for CBCT, while others used non-parallel reconstruction approaches and others used parallel computation approaches to improve the reconstruction process's output speed. Kubra Cengiz and Mustafa Kamasak [8] used the Shepp-Logan test phantom to apply an iterative algorithm in the non-parallel reconstruction. The achieved

reconstruction speed was poor, with a single iteration taking nearly (13) minutes for just (11) projections. Noor Hussein Fallooh [9] conducted extensive research on 3D image reconstruction algorithms in CBCT for both iterative and analytical approaches. The observed results were compared to varying numbers of iterations and image quality tests. In addition, Jorge Aviles [10] developed an iterative reconstruction approach with a limited number of predictions. Despite the fact that the projection data used was limited, the reconstruction time took more than three and a half hours. Jian Fu et al. illustrated the use of analytical and iterative algorithms [11]. Their restored pictures were of poor quality. This study found that iterative algorithms needed some specialized work to improve reconstruction speed. Parallel computing experiments, on the other hand, demonstrated significant gains in computation time. W. Qiu et al. demonstrated a substantially shortened reconstruction time for a single iteration using the ART algorithm in [12]. Z. Fan and Y. Xie used a GPU in [13], which resulted in a faster calculation time with the ART algorithm for just 60 projections, but they mentioned that their methodology did not yield high-quality images. Claudia de Molina et al. suggested a GPU-accelerated iterative reconstruction method for limited-data CBCT systems in [14]. Because of the use of the GPU, the authors introduced a time reduction, resulting in a complete reconstruction time reduction from many hours to a few minutes.

To the best of our knowledge, no studies on the statistical MLEM algorithm image reconstruction using parallel computation have been conducted. In this paper, we show a prompt parallel version of the MLEM algorithm for CBCT and compare its output to the non-parallel version of the MLEM algorithm. The image reconstruction outputs are measured over a series of iterations in terms of reconstruction accuracy, speed, and X-ray radiation exposure quantity, which is affected proportionally by the number of projections. As

opposed to the non-parallel technique, the findings suggest a substantial decrease in computation time. Furthermore, even with a small number of projections, our implementation offers improved picture consistency. The format of this paper is as follows: first, an outline of projections data generation is presented, followed by a detailed description of the MLEM reconstruction technique. The suggested parallel image reconstruction implementation is then seen.

II. Projection Data Initiation

Projections are an arrangement of rays that enter an object at some orientation angle during a CT scan. The main notion of a projection at a given angle is that it represents the integration of the image in the direction specified by that angle [7]. A two-dimensional projection $p(i, \theta)$ at the angle (θ) is represented by the following equation:

$$p(i, \theta) = a_{i1}x_1 + a_{i2}x_2 + a_{i3}x_3 + \dots + A_{iN}X_N \quad i = 1,2,3 \dots \dots N$$

In this equation, x_j denotes the strength of the j th pixel in the image, and a_{ij} denotes the weight of the ray in pixel (j) that reached detector bin (i) . This 2D projection is extended into 3D for CBCT using Siddon's algorithm, which is a technique for generating 3D projections [15]. This algorithm's execution is carried out by carrying out the following steps:

1. The scanned subject is divided into three orthogonal planes, N_x , N_y , and N_z .
2. The entry and exit points of the ray that penetrates the subject are determined by calculating the ray's intersection with the plane boundaries in each direction.
3. Determine the distribution of the plane indices between these lines
4. The voxel indices and section length of the ray inside each voxel (i.e., voxel weight) are computed.

The method is rotated after calculating the first projection at the first angle to obtain the next projection point at a different angle. In this study, we simulated the projection data for the optical Shepp-Logan head phantom (256*256*256) in the X, Y, and Z planes.

III. The Maximum Likelihood Expectation Maximization Imaging Technique

The Richardson-Lucy algorithm is another name for the MLEM algorithm, because Richardson and Lucy developed it in order to de-blur image applications [16] [17]. This algorithm is known as statistical iterative. In mathematical statistics there is a common iterative method known as the Expectation Maximization (or EM) Algorithm [18], the name of this technique originates from the fact that in each iteration there is an expectation step, that uses an estimation of the current parameter that is used to perform the reconstruction, followed by a maximum likelihood step that uses this reconstruction to adjust the estimate of the parameter [19].

In image restoration, the maximum likelihood technique is a realistic application of the EM process that works well where the projection data is incomplete [18]. Within the MLEM algorithm, the estimate of the image must fit the measured projections Eq. (1) expresses this algorithm [7].

$$x^{next} = x^{current} * \frac{\text{Backproject} \left\{ \frac{\text{Measurment}}{\text{Project}(x^{current})} \right\}}{\text{Backproject} \{1\}} \dots \dots \dots (1)$$

The (1) in this equation is a vector of (1's). The vector has the same dimensions as the projection data vector. The uncertainty in the data is measured as a ratio rather than a discrepancy in this algorithm. The MLEM algorithm searches for the best solution (image) based on the projection data; Fig. (1) shows a diagram of this algorithm [20].

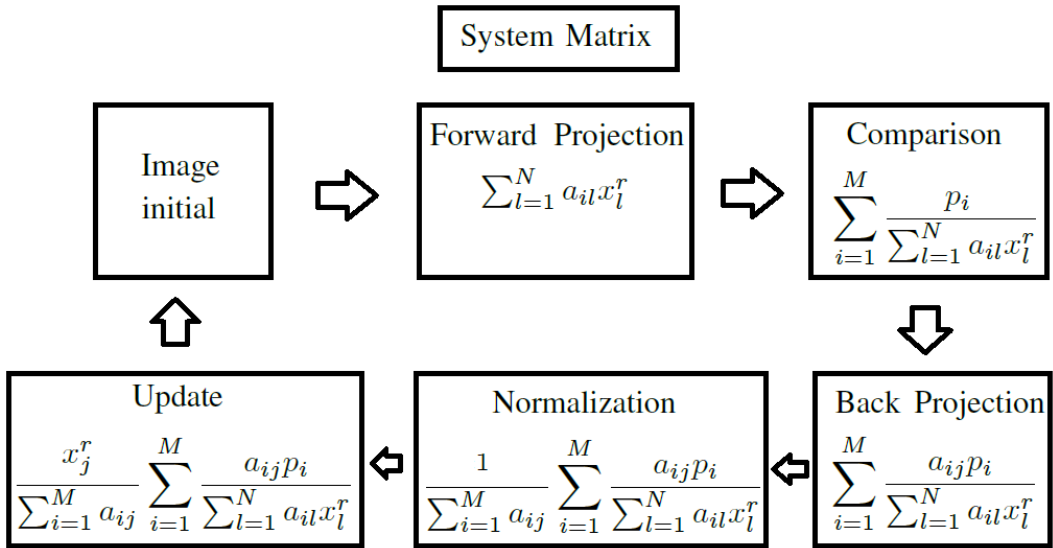


Figure (1) Diagram of the MLEM algorithm [20].

This figure demonstrates the MLEM reconstruction process that is initiated by generating an image estimate, simulating its projections, comparing them with the measured projections, then back-projecting the result, normalizing the process, and finally updating the image. These steps are repeated in each iteration.

Statistical iterative reconstruction algorithms have been proven beneficial in improving image quality [20]. In the MLEM algorithm, the objective function is defined first, then optimized. This algorithm seeks the best solution (image) based on the projection data. Eq. (2) [7] defines the iterations of the MLEM algorithm.

$$= \frac{X_j^{current}}{\sum_i a_{ij}} \sum_i a_{ij} \left(\frac{p_i}{\sum_j a_{ij} X_j^{current}} \right) \dots \dots \dots (2)$$

Equation (2) is employed to update the pixel ($X_j^{current}$) of the initial image, by adding the back-projected effects of the contrast of the picture pixel's (j), calculated and simulated projections (j), for each projections ray (i). The result of this comparison then normalized using ($\sum_i a_{ij}$), which is a back projection of a vector of (*ones*). This normalized pixel is used as a modification element that multiplies the current estimate of the image pixel with the original estimate of the image pixel to correct the current estimate of the image pixel, which is then used as the new initial image pixel in the next iteration [7].

I. Parallel Implementation of the MLEM Algorithm

While MLEM is a non-parallel reconstruction algorithm, it can be applied in parallel. In this study, we introduced a parallel computation method in the MLEM algorithm, which is used via vectorization and parallelization through CPU to speed up the volume Image reconstruction time. Vectorization is a digital technique that uses vector operations rather than loop-based operations on individual elements. In parallel computation, the automatic vectorization mechanism is a linear transformation that converts two-dimensional data into a one-dimensional vector. In other words, it is a compiler optimization that converts loops to vector operations. This procedure shortens the turnaround time. We implemented the proposed vectorization method in the MLEM by calculating projections to reduce the reconstruction time of the 3D image. The equations are used to update the weight of voxels in order to reconstruct the amount of images according to the MLEM algorithm's update equation Eq (2). The vectorization operation is carried out by reconstructing the MLEM algorithm using a Graphical-processing unit (GPU), which is described as a parallel, multithread, multi-core processor with enormous processing power. GPUs are used in the iterative reconstruction process because matrix-vector multiplication is the

most time consuming step in these algorithms. As seen in Fig. (2) [20] [21], huge collections of pixel weights and detector data could be mapped to parallel threads in GPUs and processed much faster than in CPUs.

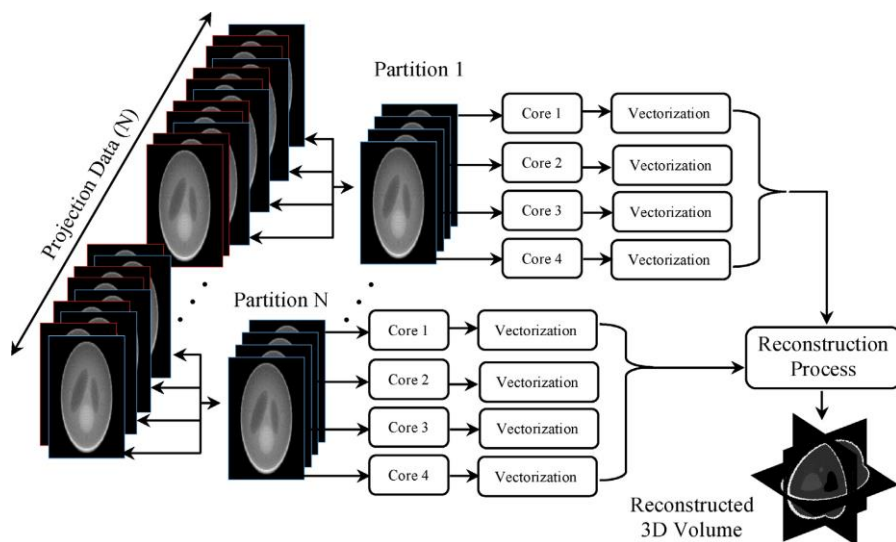


Figure (2) Parallelization of the projection data for 3D image reconstruction [21].

This diagram illustrates how running the MLEM algorithm on the GPU allowed parallel processing of large sets of pixels and projection results. This parallel method is a mode of operation in which an operation is divided into sections that are executed concurrently on separate processors connected to the same machine, allowing them to be processed even faster than CPUs. The algorithm would actually run quicker because it takes advantage of the GPU's high efficiency to speed the operation [20].

IV. Results and discussion

Computing projection data

In this study, a one-degree rotation angle step is used. The size of the obtained projections was $(256 * 256 * 360)$, where $(256 * 256)$ is the size of the detector matrix and (360) is the number of projection angles. Figure (3) depicts three projections of a Shepp-Logan head phantom at three different angles of 0° , 45° and 90° . Figure (4) depicts the outcome of our planned solution. The findings show that creating the projection data took a long time. As a result, by using our suggested vectorization of the parallel method, we are able to reduce the time.

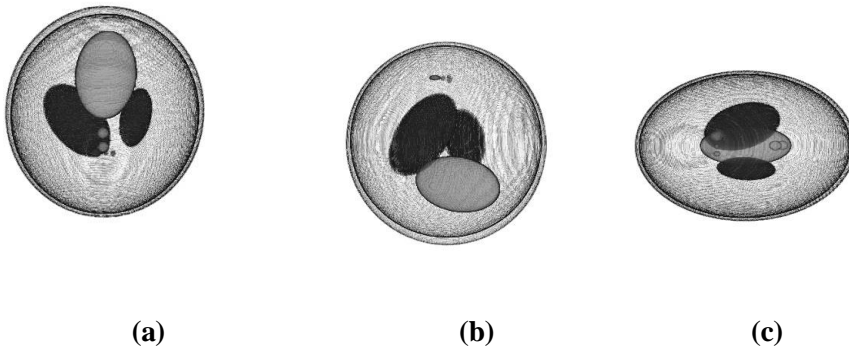


Figure (3) Cone-beam projections of a Shepp-Logan test phantom at the angles of (a) 0° , (b) 45° , and (c) 90°

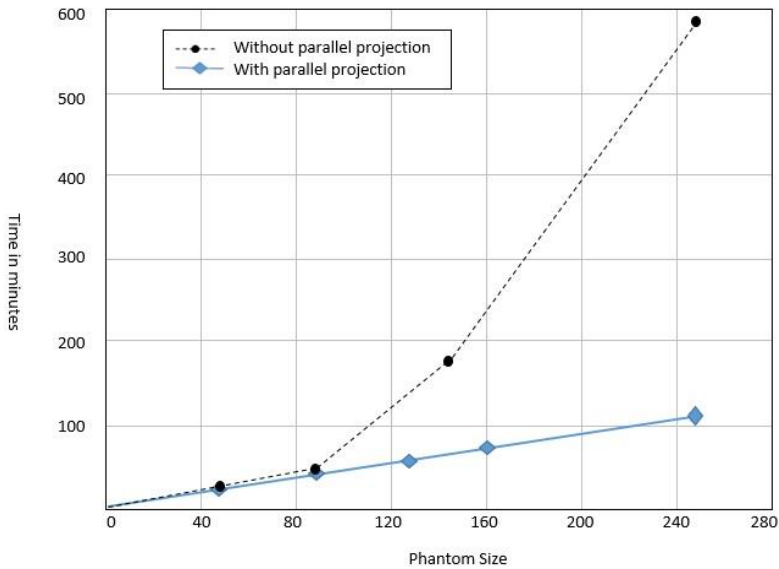


Figure (4) Effect of the parallel process on the projection generation time

The projection processing time of (360) views before the vectorization process takes (7.97) hours with a phantom of ($256 * 256 * 256$), but it takes (30.51) minutes with the parallel process. This projection data are used as raw inputs in the reconstruction process to generate 3D images.

Results of the Reconstruction Process

The reconstructed slices of the 3D phantom test image from our rapid parallel MLEM algorithm are illustrated in Fig. (5)



Figure (5) The reconstructed Shepp-Logan phantom images Using the parallel MLEM algorithm (a) Axial, (b) Coronal, and (c) Sagittal

The quantitative research efficiency assessment of the reconstructed images is seen using a Peak Signal to Noise Ratio (PSNR), Root Mean Square Error (RMSE), and Structural Content (SC) [23].

Effect of the Number of Iterations on the MLEM Algorithm

The statistical iterative MLEM technique depends on two values, specifically the relaxation parameter and the number of iterations. The relaxing factor should be changed to a value between 0 and 1. We decided, on the other hand, to investigate the influence of the number of iterations parameter for the values (0, 10, 20, 30,... 300) with a fixed relaxation parameter of (1). The consequence of the number of iterations is depicted in Fig. (6) on the performance in term of the PSNR, RMSE, and SC. The results show that in the case of parallel and the non-parallel MLEM technique, increasing the iteration number leads to a reduced value of the RMSE, which is a measure of the average magnitude of the error, and increase the PSNR and SC, which measures the peak error and establishes the degree to which images match each other respectively.

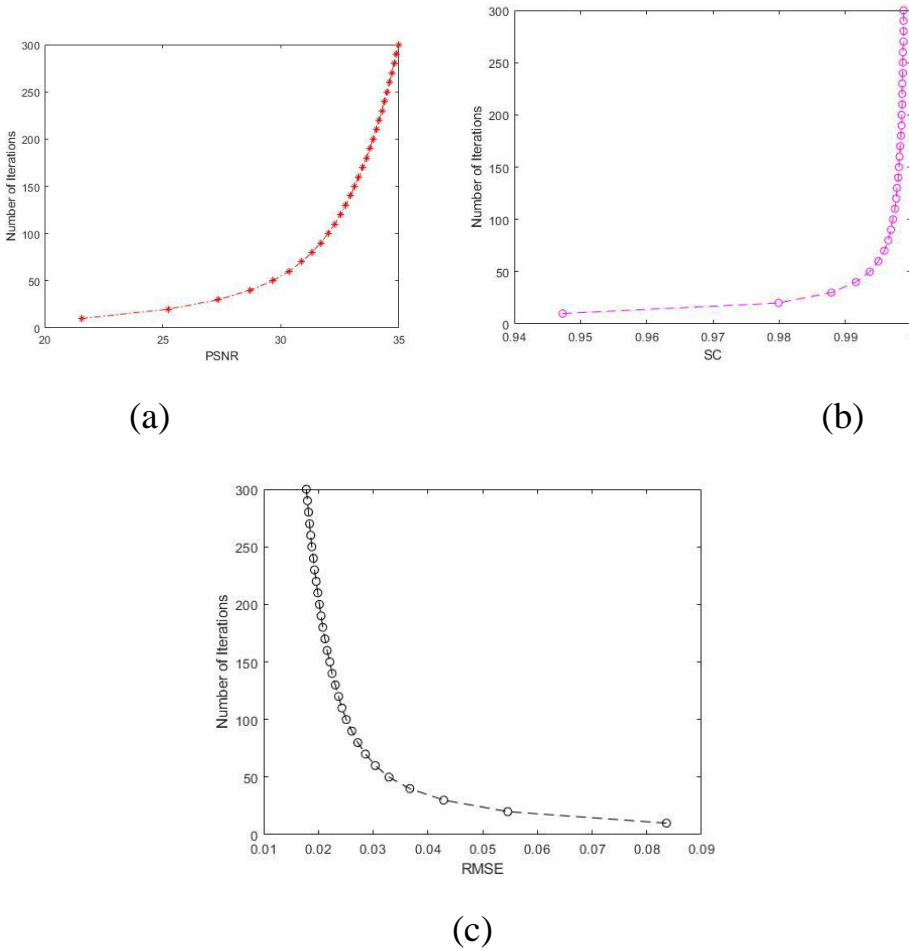


Figure (6) Impact of increasing the number of iterations on (a) PSNR, (b) SC, (c) RMSE

These findings show that increasing the number of iterations improves the accuracy of the restored picture thus lengthening the reconstruction process.

The Reconstructed 3D Image's Quality

The reconstruction technique's findings using the full scan projections details of the Shepp-Logan phantom are seen in Fig (5). The findings reveal the restored volume's coronal, sagittal, and axial slices. In terms of image accuracy, the Traditional MLEM approach performs similarly to the Parallel MLEM. The calculation time of these methods differs significantly, as seen in Table (1).

Table (1) Image quality measurements using the parallel and non-parallel MLEM algorithm.

View	RMSE	PSNR	SC
Axial	0.2569	11.8061	0.8311
Coronal	0.2695	11.3877	0.8833
Sagittal	0.2505	12.0242	0.7560

V. Conclusion

In this article, we demonstrated a quick version of the MLEM algorithm using parallel computing and defined its success for CBCT. The results show that the reconstructed images provided by the MLEM take less time to recreate. Even with a small amount of projection results, our parallel method performs well. Since a lower volume of projection data means a shorter scanning period, it often indicates a lower radiation exposure. As a result of our study, we were able to have a better image reconstruction method with superior accuracy, faster computation time, and fewer projection data, which reduced the necessary radiation exposure. The MLEM solution discussed here could be a better image restoration technique for CBCT in clinical applications.

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Areveiw on Pseudomonas Aeruginosa

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Abstract— *Pseudomonas aeruginosa* is a common bacterium the genus comprises some of the most ubiquitous and diverse Gram-negative bacterial species in nature that are capable of utilizing a wide range of organic compounds and colonizing a variety of ecological niches .in 2006-7 report by National Healthcare Safety Network (NHSN) at the Centers for Disease Control and Prevention ranked *the bacterium* as the sixth most common healthcare associated pathogen-causing infection. Also, it is typically found at even higher rank in studies focused on the intensive care unit and find out as the third most common pathogen associated with hospital-acquired catheter associated UTIs it has a tendency to form biofilms on the surface of urinary catheters and leading to cause of invasive infections in burn patients; 75% of all deaths in patients with severe burn are related to sepsis from invasive burn wound infection. In addition to wounded skin injury, inhalation injury is common in burn patients. *Pseudomonas aeruginosa* is the major cause of morbidity in cystic fibrosis which is define as an auto-somal receive genetic disorder, the most common fatal genetic disease. Pathogenesis is mediated by multiple bacterial virulence factors that facilitate adhesion and/or disrupt host cell signaling pathways while targeting the extracellular matrix flagellum, pilus and non-pilus adhesins as well as with exoenzymes or secretory virulence factors like protease, elastase, phopholipase, pyocyanin, exotoxin A, exoenzyme S, hemolysins (rhamnolipids) and siderophores. Early detection is critical for treating *Pseudomonas aeruginosa* infection. Scientists have long been committed to establishing a rapid and sensitive detection method for *Pseudomonas aeruginosa*. Currently, numerous modern detection approaches have been developed, such as Flow cytometry , immunological detection methods and molecular biology-based detection methods .However, conventional culture methods are still the most commonly applied methods in clinical practice at present

Keywords—Pseudomonas aeruginosa, hospital infection, nosocomial , Pathogensity ,diagnosis methods

Introduction

Pseudomonas aeruginosa is a common bacterium(1) genus *Pseudomonas* comprises some of the most ubiquitous and diverse Gram-negative bacterial species in nature that are capable of utilizing a wide range of organic compounds and colonizing a variety of ecological niches. Among the members of this genus, *Pseudomonas aeruginosa* is remarkable for its capacity to inhabit diverse environments, including soil and water, and infect multiple organisms, such as insects, plants (4) , and in the other side it consider as one of pathogens capable of infecting humans with compromised natural defenses and causing severe disease (1) , it is one of the most troublesome multidrug-resistant bacterial causes of nosocomial infections; infection with *Pseudomonas aeruginosa* can cause long-term chronic diseases, particularly affecting immunocompromised (especially neutropenic)patients or those admitted to(ICU) (12) .

Pseudomonas aeruginosa considered as one of the primary opportunistic pathogen that causes a variety of nosocomial infections including sepsis, (2) Hence, it is a leading cause of clinical infections all over the world especially in patients admitted in critical care units recovering from post-operative surgical wounds, burns, traumas and pre-existing lung diseases such as cystic fibrosis (5) pneumonia, urinary tract infection, and soft-tissue infection (2). According to Centrefor Disease Control more than 51,000 clinical infections are reported each year in the USA with 400 deaths per year (CDC, 2018). European Centre for Disease Prevention and Control(ECDC) has reported 5.8 % prevalence rates of clinical infection in Germany caused by *P. aeruginosa*(5) it known as a causative organism in device-associated infections involving urinary catheters ,contact

lenses ,prosthetic joints(3) and pulmonary disease (10) In food testing, the WHO has identified *Pseudomonas aeruginosa* as an indicator of drinking water quality while the European Communities and the Codex Alimentarius Commission also stipulated that *Pseudomonas aeruginosa* should not be detected in water. In addition, *Pseudomonas aeruginosa* can cause infections at very low concentrations. Hence, early detection is critical for treating *Pseudomonas aeruginosa* infection(12) .

TAXONOMY OF PSEUDOMONAS AERUGINOSA

The Approved Lists of Bacterial Names as *Pseudomonas* was published in the International Journal of Systematic Bacteriology in 1980(9).In 1850s, Sédillot observed that a blue-green fluorescent discharge was frequently present in bandages of hospital patients and wounded soldiers and associated with infection in surgical wound dressings . The infectious organism has a rod-shaped and blue-green pigmented bacterium (1) in 1894 genus *Pseudomonas* has been recognised , Irwin Gunsalus and Walter Zumf have pointed out previously that the new genus was actually presented for the first time in 1895, by Professor Walther Migula By Freeman in 1916, the ability of this organism to cause both severe acute and chronic infections was recognized. and In 1960s, *P. aeruginosa* emerged as an important human pathogen by Doggett, 1979. discoveries for several decades (1).The original creation of the genus *Pseudomonas* by Migula established a taxon based upon characteristics of cell morphology(9) *P. aeruginosa* is belonging to the family Pseudomonadaceae(1),order Pseudomonadales,class Gammaproteo-bacteria (4).in the right time the current number of recognized and validly published species is 144, including 10 subspecies; these species are present in the List of Prokaryotic Names with Standing in Nomenclature

II.General Characters of *pseudomonas aeruginosa*

P. aeruginosa is an aerobic Gram-negative rod shape (6) are straight or slightly curved and are 0.5 – 1.0µm by 1.5 – 5.0µm(8) e. Organisms grow aerobically or anaerobically if nitrate is available as an inorganic electron acceptor(16) non-fermenter (7) chemo-organotrophs(14) They are motile by means of one or more polar flagella, Most species are oxidase positive (except *P. luteola* and *P. oryzihabitans*) and catalase positive (8) It can survive with low levels of nutrients and grow in temperatures ranging from 4-42°C.1 ,these characteristics allow it to attach itself and survive on medical equipment and on other hospital surfaces(13)

Other characteristics that tend to be associated with *Pseudomonas* species (with some exceptions) include secretion of pyoverdine, a fluorescent yellow-green siderophore under iron-limiting conditions(8) which function to scavenge iron. Redox-active phenazines such as pyocyanin, the pigment that gives *P. aeruginosa* its characteristic blue color, play an important role in electron transport especially under microaerophilic conditions, increase the bioavailability of iron, and enhance virulence through oxidative stress(16) *P. aeruginosa* is capable of either growing as planktonic, mobile bacteria or residing in sessile biofilm communities. These two ways of life are linked to differential levels of expression of numerous virulence genes, some of which are under the control of the membrane-associated sensors RetS, LadS, and GacS, among others(15)

Plasmid-encoded characteristics such as antibiotic resistance, chemical resistance and metabolic capabilities are important components of the pseudomonad genome which is another component of Bacterial structure(14)

Type IV pili (T4P) produced by *P. aeruginosa* have an independent movement of the flagellum through a solid surface due to the action of

contraction and relaxation and referred to as twitching motility. These have been associated with biofilm formation, an essential event in host colonization (13)

III. PATHOGENSITY OF *PSEUDOMONAS AERUGINOSA*

The 2006-7 report by National Healthcare Safety Network (NHSN) at the Centers for Disease Control and Prevention (CDC) ranked *P. aeruginosa* as the sixth most common healthcare associated pathogen-causing infection. Also, it is typically found at even higher rank in studies focused on the intensive care unit (ICU)(1) it's one of the primary opportunistic pathogen that causes a variety of nosocomial infections including sepsis, pneumonia, urinary tract infection, and soft-tissue infection (2) Most *P. aeruginosa* strains possess two chemically and immunologically distinct types of LPS, termed the A- and B-bands(The O-polysaccharide chain of LPS has been found to be an important determinant of non-specific surface properties, and many studies have demonstrated that loss of the O-polysaccharide chain can dramatically alter the overall surface charge and hydrophobic character of the Gram negative cell surface)(3) .

A. Urinary Tract Infection

The continuous trend of empirically treating CA-UTI episodes poses a great challenge for researchers, since data on uropathogens prevalence and antimicrobial susceptibility have been increasingly more difficult to obtain (19) *P. aeruginosa* is the third most common pathogen associated with hospital-acquired catheter associated UTIs(17)in adult when the information in children is extremely limited (18) few data are available on the frequency and resistance rates of CA-UTI (19) it's, although unusual as a uropathogen, is of special importance because of its resistance to the first-line antibiotics empirically used for the treatment of UTIs(18) Virulence of *P. aeruginosa* is

multifactorial and has been attributed to cell associated factors like alginate, lipo-polysaccharide (LPS), flagellum, pilus and non-pilus adhesins as well as with exo enzymes or secretary virulence factors like protease, elastase, phospholipase, pyocyanin, exotoxin A, exoenzyme S, hemolysins (rhamnolipids) and siderophores (20) In addition to elaboration of virulence factors, *P. aeruginosa* has a tendency to form biofilms on the surface of urinary catheters(17) (Clínica et al. 2006) (19) had mention that one of the main surveillance of the *P. aeruginosa* may be belong to the using of low cost antimicrobial agent for treatment that not give the hoped result .

B. Skin infection

Included amongst the rRNA group I fluorescent *pseudomonads* are species pathogenic to humans. Those that do cause infection are generally opportunists, promoting a variety of conditions ranging from endocarditis to dermatitis (14)*P. aeruginosa* is the leading cause of invasive infections in burn patients; 75% of all deaths in patients with severe burn are related to sepsis from invasive burn wound infection. In addition to wounded skin injury, inhalation injury is common in burn patients. This results in edema (1) it's an ultimate opportunistic pathogen which can cause life threatening infections in patients with the compromised immune system .Hence, it is a leading cause of clinical infections all over the world especially in patients admitted in critical care units recovering from post-operative surgical wounds, and Burn (5) ,one of the main reasons of Bacteremia (sepsis)in the patient with immunocomporised is the infection with *P. aeruginosa* Symptoms are indistinguishable from gram-negative sepsis caused by other bacteria(14) .

Skin mast cells (MCs) are known to contribute to the pathology of various skin disorders including allergic and autoimmune dermatoses, to test whether skin MCs are critical for the control of *Pseudomonas aeruginosa* (PA) skin infections (21) Moreover, the versatile nature of

P. aeruginosa enables it to survive under drastic nutrient depleted environments due to its ability to use diverse energy sources and attachment to various surfaces.

The attachment of motile bacteria to a surface followed by extensive division and entrapping of more motile bacteria leads to the formation of microcolonies.

These microcolonies later expand, mature and fuse with each other to form biofilm ,These biofilm decrease the antimicrobial penetration, give protection from host immune system and provide tolerance against antimicrobials by inducing persistence(5) .

3. Polmonary infection

Pseudomonas aeruginosa is the major cause of morbidity in cystic fibrosis (CF)(22) Cystic fibrosis (CF) is; an autosomal receive genetic disorder, the most common fatal genetic disease. CF is caused by a mutation in a gene on chromosome 7 known as CFTR (cystic fibrosis transmembrane conductance regulator). Most common mutant allele is $\Delta F508$ (or F508del) mutation, which is a three-nucleotide deletion of phenylalanine residue and subsequent defective intracellular processing of the CFTR protein that is an important chloride channel . CF is affecting 1:2,500 in the Caucasian population . CF is multi-system disease, which affects mainly lung and digestive system. Most CF-related deaths are due to lung disease(1) Chronic infections present a distinct paradigm in infection pathogenesis which may challenge conventional notions of bacterial virulence and host defenses(23) and acute microbial lung infection, which mimics the human acute bacterial pneumonia (4) *Pseudomonas aeruginosa* has been reported to be present in the airways in 20% of patients with acute exacerbation of COPD(chronic obstructive pulmonary disease). Although the evidence is sparse and the methodology variable, it has been

suggested that *P. aeruginosa* is associated with prolonged hospitalization, increased exacerbation rate and poor long-term prognosis in COPD patients(10) *P. aeruginosa* is notable for the very high rate of attributable mortality in acute pulmonary infections(22) It is widely recognized that CF disease is associated with several intrinsic host defects, including impaired mucociliary clearance, and immune and inflammatory dysregulation. The implications of these host defects to the development of CF lung disease are beyond the scope of this review but may be found in excellent other ones(23) .in addition *P. aeruginosa* is commonly found to be the first or second major pathogen causing VAP(Ventilator-Associated Pneumonia) . It is the most common multidrug resistance pathogen involved in this disease and recovery rate of *P. aeruginosa* is increased with increased duration of mechanical ventilation(1)

IV. Virulence Factor

Pathogenesis in *P. aeruginosa* is mediated by multiple bacterial virulence factors that facilitate adhesion and/or disrupt host cell signaling pathways while targeting the extracellular matrix (Figure 2). *P. aeruginosa* stands out as a unique and threatening organism as it is capable of causing severe invasive disease and of evading immune defenses causing persisting infections that are nearly impossible to eradicate(1) This characteristic, paired with its quick ability to acquire new antimicrobial resistance, makes this pathogen a growing problem in infectious disease pathology, especially when nosocomial in origin (7) virulence factors, such as LPS , phospholipase C , and flagellin , have also been suggested to play roles in Pathogenesis(22), Despite possessing a large number of virulence factors, *P. aeruginosa* is truly a challenging pathogen in the hospital setting as it is resistant to many antibiotics. Also, it is capable of forming hardy biofilms, both within the body and on the surfaces of medical instruments(1) *P. aeruginosa*

is armed with potent virulence factors. (1) *P. aeruginosa* expresses numerous virulence factors that stimulate both airway epithelial cells and professional immune cells to produce pro inflammatory cytokines and chemokines (16).

1. Antibiotic resistant

P. aeruginosa is one of the most important bacteria with documented resistance to multiple antimicrobial classes including β -lactams, carbapenems, aminoglycosides, fluoroquinolones, and polymyxins (2) *P. aeruginosa* produces various mechanisms of resistance to antibiotics such as broad-spectrum beta -lactamases ,metallo-beta-lactamases (MBL), alteration of protein binders of penicillin (PBP), porin mutations, plasmid enzymatic modification, DNA-gyrase mutation and active expulsion pumps.(25-26) Carbapenemics (imipenem and meropenem) are broad-spectrum antibiotics used for the treatment of nosocomial infections caused by *P. aeruginosa*. Specific resistance to carbapenemics is attributed to the lack of porin permeability (OprD), an increase in the expression of the active expulsion pumps (MexAB-OprD) and to production of metalloenzymes.(27)Carbapenem-resistant *P. aeruginosa* is associated with the production of MBL and has the ability to hydrolyze all beta-lactam antibiotics except aztreonam. It is responsible for nosocomial outbreaks in tertiary care centers.(13)Three groups of MBL have been identified: class A (serine dependent and partially inhibited by clavulanic acid are inducible and nontransferable), class B (zinc dependent ,inhibited by EDTA, inducible or associated with conjugative plasmids) and class C (oxacillinase).(26-27) Resistance to various antibiotics and substances withantimicrobial activity has been associated with bacterial biofilm formation and phagocytosis by components of the adaptive immune system11 as well as various nosocomial infections caused by *P. aeruginosa*(13)

2. Biofilm Formation

P. aeruginosa enables it to survive under drastic nutrient depleted environments due to its ability to use diverse energy sources and attachment to various surfaces. The attachment of motile bacteria to a surface followed by extensive division and entrapping of more motile bacteria leads to the formation of microcolonies. These microcolonies later expand, mature and fuse with each other to form biofilms (5). These biofilms decrease the antimicrobial penetration, give protection from host immune system and provide tolerance against antimicrobials by inducing persistence(24) In recent years the worldwide emergence of multidrug-resistant strains of *Pseudomonas aeruginosa* has been observed. This opportunistic pathogen produces mechanisms of resistance to several antibiotics. The resistance to carbapenems in *P. aeruginosa* strains has been associated with bacterial biofilm formation favored by the presence of exopolysaccharides (EPS) embedded in an extracellular matrix and to the production of type IV pili (T4P)(13). Type IV pili (T4P) produced by *P. aeruginosa* have an independent movement of the flagellum through a solid surface. These have been associated with biofilm formation, an essential event in host colonization. These filamentous structures located at one pole of the bacteria are involved in various mechanisms such as adherence to human cells, formation of microcolonies, bacterial aggregation, phage receptor, evasion of the immune response and cellular signaling (28) it is capable of either growing as planktonic, mobile bacteria or residing in sessile biofilm communities. These two ways of life are linked to differential levels of expression of numerous virulence genes, some of which are under the control of the membrane-associated sensors RetS, LadS, and GacS, among others (15). In sub acute and chronic infections, the accumulation of intracellular dinucleotides (cyclic diguanidine monophosphate) favors a biofilm mode of growth with the formation

of an extracellular polysaccharide matrix, thus enabling the organisms to avoid innate immune clearance mechanisms and persist in human airways.(16).

3.outer virulence factors of *P. aeruginosa*

flagellum, pilus and non-pilus adhesins as well as with exoenzymes or secretory virulence factors like protease, elastase, phospholipase, pyocyanin, exotoxin A, exoenzyme S, hemolysins (rhamnolipids) and siderophores. These factors have been shown to play an important role in pathogenesis of *P. aeruginosa* induced infections like respiratory tract infections, burn wound infections and keratitis(17) toxins for interbacterial competition, but the secreted effectors also enhance invasion of host cells through activation of the PI3K/Akt pathway to cause actin rearrangement. Other bacterial products such as phenazines (e.g., pyocyanin), initially considered to be metabolic waste products, have strong effects on other microorganisms and also are toxic to host cells through oxidative stress. Whereas lipopolysaccharide often is considered to be the major immune stimulatory factor in gram-negative bacteria, *P. aeruginosa*(16)

P.aeruginosa possesses a single polar flagellum composed of polymerized flagellin, its major structural protein, and attached to a transmembrane motor complex.

The flagellar-host interaction plays a major role in defining the immune and inflammatory

outcomes of PA infection, as the flagellar complex interacts with immune and non-immune cells through its structural components and as well as motility function. The flagellar-host interactions have been extensively characterized at the cellular and molecular level. Flagellin is best known as a pathogen-associated molecular pattern that binds to

the extracellular Toll like receptor TLR5 (29) and intracellular NOD-like receptor (NLR) neuronal apoptosisinhibitory protein (NAIP) (30), in human (31), leading to activation of the pro-inflammatory MyD88 pathway and the NLRC4-inflammasome, respectively

Beyond its ability to activate host cell signaling pathways, the flagellum also promotes adherence and colonization of host surfaces, and various specific targets have been identified including MUC1 mucin , heparin sulfate , surfactant protein A , and asialoGM1 (23)

The type III secretion system (T3SS) is a complex needlelike secretion machinery found in gram-negative bacteria that allows the translocation of bacterial effectors directly into the cytoplasmof host cells, causing cytotoxicity, or subversion of host defenses (32). The T3SS causes tissue injury, promotes bacterial dissemination and has been implicated in the pathogenesis of acute and invasive infections, including pneumonia (36–

38). Four T3SS-dependent effectors have been identified in PA, namely ExoS, ExoT, ExoY, and ExoU, and have been recentlyreviewed elsewhere (32). The T3SS effectors cause disruption of host cell cytoskeleton (ExoS, T, and U) and cleavage of phospholipases (ExoU), leading to cell death, a breach of epithelial and endothelial barriers and killing of phagocytes(33). ExoS also dampens phagocytosis by interfering with lysosome signaling in macrophages

PA produces several secreted proteases, which include LasB (also known as PA elastase or pseudolysin), LasA, AprA, and protease IV. Secreted PA proteases interact with a wide range of host molecules, leading to diverse outcomes, from degradation of structural components to modulation of inflammatory responses. The PA proteases are most studied for their ability to cause direct tissue damage, and they are primarily known as virulence factors involved in

the pathogenesis of acute infections. LasB, a broad specificity metallo-protease, degrades elastin (34), disrupts epithelial tight-junctions, and reduce endothelial barrier integrity (23).

LPS (also known as endotoxin) is a major component of the outer membrane of Gram negative bacteria. LPS is composed of three components: the lipid A and core oligosaccharides that form the outer leaflet of the bacterial outer membrane, and the O-antigen polysaccharide which interacts with the extracellular environment. LPS is recognized by the Toll like receptor 4 and myeloid differentiation factor 2 complex (TLR4-MD2). The O-antigen consists of highly variable and immunogenic oligosaccharide repeats which elicit a strong humoral response (35-23). During chronic infection, the LPS undergoes important adaptive changes at the level of its synthesis and structure, leading to modification of the lipid A structure and loss of O antigen which likely promote immune evasion. Lipid A acylation patterns or addition of positively charged components, renders the outer membrane more resistant to host antimicrobial peptides(36-37-23) .

V .Diagnosis methods

Early detection is critical for treating *Pseudomonas aeruginosa* infection. Scientists have long been committed to establishing a rapid and sensitive detection method for *Pseudomonas aeruginosa*. Currently, numerous modern detection approaches have been developed, such as Flow cytometry , immunological detection methods and molecular biology-based detection methods .However, conventional culture methods are still the most commonly applied methods in clinical practice at present(12).

A. Culture method

Conventional *Pseudomonas aeruginosa* detection methods are based on the biological characteristics of the bacterium under certain culture conditions(12) *Pseudomonas* species grow well on standard broth and solid media such as blood agar, chocolate agar, and MacConkey agar, which are recommended to isolate *Pseudomonas* species from clinical specimens. Selective agar containing inhibitors such as ceftrimide can also be used for isolation and presumptive *Pseudomonas* colonies may be nearly colourless, but white, off-white, cream, and yellow colony pigmentation is common. Fluorescent colonies can be readily observed under ultraviolet light. (8)*P. aeruginosa* is the glucose non-fermenting Gram negative rod most often associated with human infection. It has the characteristic grape-like smell of aminoacetophenone. It is a strict aerobe with a growth temperature range of 5-42°C. The characteristic blue-green appearance of colonised/infected pus or of an organism culture is due to the mixture of pyocyanin (blue) and pyoverdin (fluorescein, yellow). Production of blue-green pigment is indicative of *P. aeruginosa*(38). Some strains produce other pigments, such as pyorubin (red) or pyomelanin (brown). Almost all strains are motile by means of a single polar flagellum. *P. aeruginosa* can produce at least six colonial types after aerobic incubation on nutrient agar for 24hr at 37°C. The most common, type 1, is that of colonies which are large, low, oval, convex and rough, sometimes surrounded by serrated growth. Colonial variation from one type to another does not necessarily indicate the presence of more than one strain. Many strains exhibit metallic iridescence with colonial lysis. This resembles lysis by bacteriophage, but is not associated with phage activity(8).

B . Immunological assays

Immunological techniques utilize the highly species binding between antibodies and antigens and facilitate qualitative or quantitative detection based on species reactions resulted from antigen–antibody

binding the immunoassays currently applied that used for detecting *P. aeruginosa* include (ELISAs), (IBT), immunofluorescence, immunoelectrophoresis (34) and solid-phase radioimmunoassay (12)

1. Enzyme-Linked Immuno Sorbent Assays (ELISAs)

ELISAs are based on an immunological technique that utilizes enzyme-catalyzed reactions to enhance the sensitivity of the species antigen-antibody reaction.(39) The underlying principle is that antigens or antibodies with immunological activity are immobilized on the surface of a solid-phase carrier, and then the antigen or antibody sample to be detected is reacted with the immobilized antigen or antibody molecules, followed by the addition of enzyme-labeled antigen or antibody molecules prior to incubation. Finally, enzyme-catalyzed substrates are added for luminescence detection(40) and the enzymatic reaction plays a role in signal amplification. Currently, Granstrom et al. developed a species ELISA-based detection method against antibodies from patients infected with *Pseudomonas aeruginosa*, using 4 extracellular proteins as antigens: exotoxin A, elastase, alkaline protease, and phospholipase C.(41) The method was tested on samples from 39 burn patients, and the results showed that the detection of antibodies against exotoxin A and phospholipase C by ELISA could be used to monitor *Pseudomonas aeruginosa* infection in patients.

IgM levels increased during early infection but did not continue to increase in the later stages of infection, Thus, despite the specificity issue, ELISA is an important technique which has been widely used for the detection of pathogens(12) .

2. Enzyme-linked immunoelectrotransfer blots (IBTs)

IBTs, also known as enzyme-Linked Immune Electro Transfer blots, are immunoassays involving the integration of gel electrophoresis and

immunohistochemistry.(42) IBTs involve the separation of protein samples by sodium dodecyl sulfate poly acryl amide gel electrophoresis (SDS-PAGE) and transfer to a nitrocellulose membrane as the solidphase carrier, using electric transfer system.(43) The chronic infection caused by *Pseudomonas aeruginosa* can be fatal for CF patients. Shand et al. (1988) prepared a standard antigen (StAg) of *Pseudomonas aeruginosa* to serve as a basis for developing the IBT method with serum antibodies. A comparison with the crossed immune electrophoresis (CIE) method showed that the sensitivity of the IBT method was approximately 2 orders of magnitude higher than that of the CIE method, with good reproducibility. The results of their study also showed that IBT could be developed into a highly sensitive assay for detecting early *Pseudomonas aeruginosa* infection in CF patients(12).

3. Immuno Fluorescence methods

Although immune enzyme techniques have good sensitivity,t heir relatively tedious procedures have limited further development. However, immune Fluorescence methods developed on the basis of immunological techniques involve simpler operating procedures with a good sensitivity and specificity, thus, they are considered to be among the mostpromising assays for pathogens (44) In addition, the development of nanotechnology has brought new opportunities for fluorescence assays .Shibuya et al. (1987)(45) used the immune fluorescence technique for the first time to perform rapid in situ detection of *Pseudomonas aeruginosa* in sputum samples. Tang et al. (1992)(46) established a direct immune fluorescent antibody-staining method for detecting *Pseudomonas aeruginosa* in sputum samples using serum-specific monoclonal antibodies, in order to assess the status of pulmonary infection. The results showed that this method had a detection limit of 10 colony-forming units (CFU) per mL and could be completed within 3 h. However, the greatest drawback of

immune fluorescence methods is a low signal-to-noise ratio, which may lower its detection specificity. Immuno fluorescence technique is steadily improving with the passage of time.

C. Molecular Biology Assays

Alongside the development of polymerase chain reaction (PCR) in the 1980s and the continuous progression of molecular biology methods, scientists have established numerous effective molecular biology assays that have been widely applied for detecting pathogens and have provided a technical basis for epidemiological investigations, molecular biology-based methods for rapidly detecting *Pseudomonas aeruginosa* have also developed rapidly.(47)

1. Conventional PCR methods

The PCR technique is one of the most important inventions over the past 3 decades. In recent years, PCR-based assays for *Pseudomonas aeruginosa* also have developed progressively. Kingsford et al.(47) established a PCR detection method for *P. aeruginosa* that specifically targets the 16S rRNA gene. The method allows the detection of 1 pg chromosomal DNA or 1 _ 10⁵ CFU mL⁻¹ of *P.aeruginosa* Detection sensitivity can be increased up to 1 fg chromosomal DNA or 10 CFU mL⁻¹ if detection is based on the use of a fluorescent probe. Hummel and Unger(48) established the first PCR method that specifically detected *P. aeruginosa* based on the exo-toxin A gene and evaluated the effectiveness of this method for rapid *P.aeruginosa* detection in mechanically ventilated patients. The results showed that the PCR method targeting exotoxin A gene detected 57 positive samples out of 364 total samples, whereas the conventional culture method only detected 36 positive samples, indicating that the exotoxin A gene-based PCR method had higher sensitivity

2. Real-time, fluorescence-based quantitative PCR

In 1996, Applied Biosystems, Inc. (USA) invented the real-time, fluorescence-based quantitative PCR (real-time qPCR) method that enables quantitative detection via real-time monitoring of PCR reactions by introducing fluorescent molecules into the reaction mixture. Currently, it has become one of the most widely used nucleic acid-based molecular detection techniques for pathogens.(49) Qin et al.(50) established a multiplex real-time PCR assay that simultaneously and specifically detected the 16S rRNA and gyrB genes of *P.aeruginosa* in CF patients, and validated their reliability and sensitivity as compared with other specific genes, such as oprI, exoA, and algD. The method enabled detection of *P. aeruginosa* in CF patients within a shorter period. Motoshima et al.(51) developed a real-time PCR method using melting curve analysis (MCA), which specifically targeted the gyrB gene, this method could readily distinguish *P.aeruginosa* from other bacteria. Comparison between the performance of the real-time PCR method and the Vitek detection system, using 224 Gram-negative bacterial samples, confirmed that this method could accurately distinguish *P.aeruginosa* from other Gram-negative bacteria within 3 h.

3. Multiplex PCR

The main advantage of multiplex PCR is its ability to simultaneously amplify multiple PCR products in a single reaction, thereby enabling multiplex detection and significantly reducing the detection cost and time requirements.(52) Microorganism induced diseases are usually complicated with infections by multiple pathogens, for instance, bacteria can easily enrich and grow on the walls of catheters in patients with mechanical ventilation and renal intubation, leading to mixed infections with multiple bacteria, but a single plex PCR assay cannot be used to simultaneously detect multiple bacterial species.(12)

Several studies have been conducted to establish multiplex PCR assays that include *P.aeruginosa*. simultaneously detected *Pseudomonas fluoresces* and *Pseudomonas aeruginosa* in clinical samples using a duplex PCR assay. This method had 100% sensitivity and 74% specificity, with a detection limit of 102 cells per mL in skin biopsy specimens from patients with burns and sputum samples from CF patients. Da Silva Filho et al. developed a multiplex PCR assay that simultaneously detected *P. aeruginosa*, *Burkholderia cepacia*, and *Stenotrophomonas maltophilia* in the saliva and respiratory samples from CF patients (53)

4. Isothermal amplification techniques

Isothermal amplification techniques have overcome the shortcomings of conventional PCR methods, which require thermo cycling for amplification. Isothermal amplification enables the rapid amplification of nucleic acid molecules at a constant temperature, which has not only reduced the equipment demand, but also has a higher sensitivity.(54) Some recent studies have reported use of the loop-mediated isothermal amplification (LAMP) technique to detect *P. aeruginosa*. Goto et al. developed a LAMP assay based on a hydroxy naphthol blue (HNB) colorimetric assay , which targeted the oprL gene of *P. aeruginosa* specifically. The results showed that the LAMP assay had 100% specificity for the serogroup with a >10-fold greater sensitivity than conventional PCR. It could detect 130 CFU per 0.1 g of mouse feces or 3.25 CFU per reaction. In addition, performing the assay only required 2 h from DNA extraction to detection.(55) Moreover, this technique was also used to detect other organisms(12).

5. Fluorescence in situ hybridization (FISH) technique

using peptide nucleic acid (PNA) probes FISH based on PNA probes is a rapid diagnostic technique for pathogens. PNA probes are more

conducive to hybridization than oligo nucleotides owing to their neutral charges. The targets of PNA probes are the rRNA molecules, which are

abundant in nature, and thus do not need to be amplified during the detection of single microorganisms (56) In addition, PNA probes are barely affected by impurities in clinical samples; therefore, they have higher efficiency in directly detecting pathogens in clinical samples, such as blood, saliva, and wound cultures (57) Søggaard and his colleagues evaluated the feasibility of using FISH with PNA probes to detect *E. coli* and *P. aeruginosa* in clinical blood cultures. The results showed that the method had 94.1% sensitivity and 99% specificity in detecting *P. aeruginosa*.(58)

6. Aptamer-based in situ detection methods

Aptamers, also known as “artificial antibodies,” are short nucleic acid or peptide sequences capable of binding to a target molecule with high specificity and affinity (59) Aptamers have several advantages over antibodies, such as easy production, easy storage, easy modification, and low cost. In addition, aptamers exhibit greater affinity and specificity for

targets. Therefore, aptamers have been widely applied for detecting pathogens in recent years.(60) selected a bacteria-targeting ssDNA aptamer that specifically bound *P.aeruginosa* and utilized its specific binding capacity to develop a rapid FISH method for detecting *P. aeruginosa*. The results showed that the method had excellent specificity, and the entire detection process took 1.5–2 h. Hence, the method can potentially facilitate clinical *Pseudomonas aeruginosa* detection(61).

7. PCR-ELISA methods

Kurupati et al. used the PCR-ELISA DIG Labellingplus kit (Roche Diagnostics Ltd, Lewes, UK) to establish a method for detecting *P. aeruginosa* in blood cultures by targeting the oprI gene.(62) The principle of the method is to first amplify the digoxin-labeled PCR product, which is then hybridized with a biotinylated probe. The resulting hybridization product is immobilized in a microwell plate via a biotin-streptavidin coupling system, followed by incubation with an antidigoxigenin peroxidase conjugate. Finally, the substrate molecule, 2,2'-azino-bis(3-ethylbenzothiazoline) sulfonate, is added to enable detection. Using this method, the authors correctly identified 73 positive samples and 42 negative samples with 100% specificity and sensitivity. The method could shorten the blood culture time from 2–3 days to 6–8 h(12).

D. Electrochemical assays

Electrochemical analysis is a rapid and sensitive analytical method involving a compact device that enables qualitative and quantitative detection, using the electrochemical properties of materials.(63) Liu et al. (2011) designed an electrochemical DNA biosensor based on stem-loop structured probes to detect *P. aeruginosa*.(64) The principle of this method entails opening of the stem-loop after hybridization, so that the biotin molecule on the probe can bind streptavidin-labeled horseradish peroxidase (SA-HRP) in solution, after which HRP catalyzes the production of an electrochemical signal. Sensitivity test results showed that the method could be used to detect 16S rRNA at a concentration as low as 0.012 pg mL⁻¹, with a linear relationship between 0.3–600 pg mL⁻¹. Webster et al. (2014) reported a disposable carbon electrode sensor that could directly detect pyocyanin production by *P. aeruginosa*

in samples.(65) The electrochemical detection of *Pseudomonas aeruginosa* pyocyanin in samples could be completed within 5 min,

and the entire procedure does not require sample preparation and -isolation steps. Furthermore, the method has exhibited excellent sensitivity and specificity. In the same year, Sismaet and colleagues improved the sensitivity of square wave voltammetry (SWV) in analyzing pyocyanin production by supplementing the culture with tyrosine and valine as positive regulators of pyocyanin (66) .

E.MALDI-TOF MS assays

Matrix-assisted laser desorption/ionisation time of flight mass spectrometry (MALDI-TOF MS) is a new type of soft ionization mass spectrometry, which is used to map the protein spectrum of microorganisms.(67) The mass spectrometry data of clinical microorganisms are compared with the standard protein database of known microorganisms to achieve the purpose of identification.(12) Because of its rapid, accurate, sensitive, automated and high throughput, MALDI-TOF MS has become an efficient microbial rapid identification technology used in clinical diagnosis, environmental monitoring(68) and microbiological classification studies. Some researchers have applied this technique to the identification of *P.aeruginosa*. Imperi et al. (2009) report a detailed description of the periplasmic proteome of the wild-type *P. aeruginosa* strain PAO1 by 2-DE and MALDI-TOF/TOF analysis.(69)

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Comparison between AODV and DSDV Protocols in WSN Based on End to End Delay

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Abstract: In this paper, we study a Wireless sensor networks (WSN) which is capable of autonomously forming a network without human interaction. Each node in a WSN acts as a router, forwarding data packets to other nodes. Without routing protocols, these routers cannot work together in phase. A central challenge in the design of WSN is the development of routing protocols that can efficiently find routes in a network. To find out the best routing protocol, we discuss two routing protocols namely AODV (Ad-hoc On Demand Distance Vector), and DSDV (Destination Sequence Distance Vector). Overall performance of these protocols was analyzed by comparing end-to-end delay.

Keywords: AODV, DSDV, WSN , routing protocol

1. Introduction

Wireless sensor networks are poised to growth the performance of many army and civil applications, which includes catastrophe management. Typically, sensors acquire records approximately their surrounding and ahead that records to a command center, both at once or thru a base-station. Due to inhospitable conditions, these sensors are not always deployed uniformly in an area of interest and some sensors can be unreachable because they are too distant from the base-station or simply because there exist obstacles in their path.

to find out the best routing protocol, in this paper the two routing protocols namely AODV (Ad-hoc On Demand Distance Vector), and DSDV (Destination Sequence Distance Vector) are compared. Overall performance of these protocols will be analyzed by comparing end-to-end delay. Wireless sensor networks (WSN) are

composed of a finite set of sensor devices geographically distributed in a given indoor or outdoor environment (usually predefined). AWSN aims to gather environmental data and the node devices placement may be known or unknown a priori. Network nodes can have actual or logical communication with all devices; such a communication defines a topology according to the application. For instance, there can be a WSN with both types of topologies being the same (mesh, star, etc.). However, this may not be the case for all applications. The logical topology is mainly defined based on the nodes. However, this may not be the case for all applications. The logical structure is mainly defined on the basis of nodes logical role (tasks, etc.). It can be either ad hoc or strategy based (self-regulation, clustering, pheromone tracking, etc.). The strategy is determined on the basis of the resources available to the network. Central modulation techniques are suitable for networks where processing power capacity is often dependent on a unique device. In such cases, this device is responsible for processing, coordinating and managing the sensible

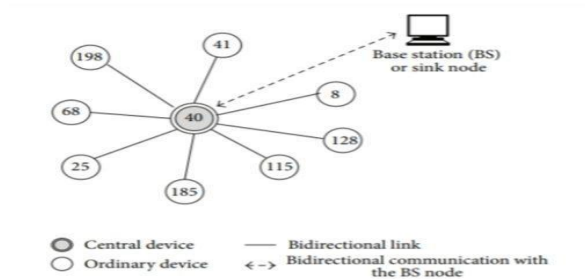
information activities. It also forwards this data to the pelvic node (Fig. 1). The main advantages of this approach are as follows:

- (1) Central layouts allow for more efficient energy management.
- (2) Roaming is permitted within the network.
- (3) Network coverage analysis simplified.
- (4) Availability of context information allows better application design (contract placement, application realization, etc.).

In distributed modulation techniques, information is managed by each node and decisions are made locally and are limited to its

neighbors (single hop neighbors). The main characteristics of distributed networks include:

- (1) There are independent organs.
- (2) Each node shares information with its neighbour.
- (3) Suitable for distributed applications (multi-agent systems, self-regulating systems, etc.)
- (4) The information is mainly sent to one node.
- (5) Interconnection devices (routers, bridges, etc.) are not wanted.
- (6) Its flexibility allows it to target harsh environments[1].



Fig(1) centralized strategy

2. Challenge

The complexity of the information forwarding process requires powerful algorithms. The former should ensure that specific tasks are performed with similar performance to centralized solutions. Self-organization has been one of the most important distributed technologies in recent years. A sensor network using this strategy is

able to achieve an emergent behavior in which nodes interact individually and coordinate independently (Fig. 2). The goal is to achieve tasks that are beyond their individual capabilities as a single node. Examples of such techniques are found in nature (insect colonies, biological cells, flock of birds, behavior of ants in search of food, etc.).[1]

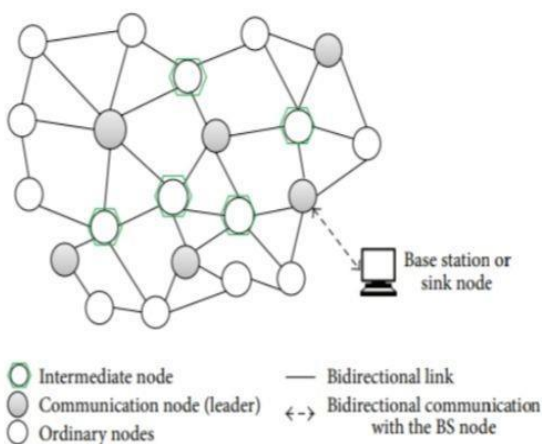


Fig (2) self-organization strategy

Dedicated protocols for distributed wireless sensor networks must be able to provide efficient power consumption taking into account mobility of the nodes, environmental noise, limited batteries and message loss, among others. Without routing protocols, these routers cannot work together in phase. The main challenge in designing a WSN is to develop routing protocols that can efficiently find paths in a network. To find out the best routing protocol, we discuss two routing protocols, AODV (On Demand On-Demand Distance Vector) and DSDV (Destination Sequence Distance Vector). The overall performance of these protocols was analyzed by an end-to-end delay comparison. [1]

3. Routing in Wireless Sensor Networks

Routing is the process of determining the direction in which traffic is sent between a source and a destination. Moreover, it is necessary to perform data communication tasks. In WSNs, the network layer is mostly used to implement the routing of incoming data. However, most source nodes in multi-hop networks cannot reach the trough (i.e. BS) directly with their single radio transmission range. Hence, the intermediate sensor nodes have to transmit their packets. As noted before, sensor nodes are limited in terms of power supply, storage, and bandwidth. These limitations together with the typical deployment of a large number of sensor nodes pose many challenges for the design and Sensor network management. [2]

With the function mode, the WSN routing protocol can be designed in three different ways. The first two options are proactive and reactive, while the other option is promiscuous mode. The mixed option was considered in this study since some protocols implemented a mixture of both proactive and reactive patterns in their routing mechanism in order to meet the requirements of the intended application of WSNs. According to the nodes' sharing patterns, the protocol can be straightforward, flat, and aggregation-based. Similarly, according to the basic network structure, there are four types: Data-centric, hierarchical, location-based, and quality-of-service (QoS) routing [2]. Figure 3 represent these type :

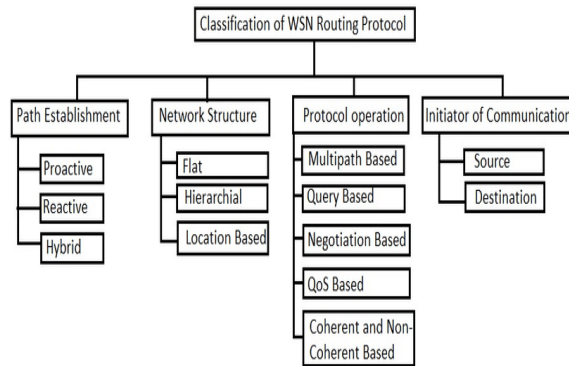


Fig (3) The classification of WSN Routing Protocol

3.1 SDV

DSDV is a proactive routing protocol based on the idea of the Bellman-Ford routing algorithm with some improvements [3]. In DSDV, each node maintains a routing table, which lists all available destinations, the next hop for each destination and a serial number generated by the destination node to provide loop freshness. Serial numbers are generally even in the presence of an association; Otherwise, an odd number is used. Using the routing table stored in each node, packets are sent over the network.

Thus, DSDV is not suitable for highly dynamic networks. Figure 4 shown below represents the implementation of the DSDV protocol. Table 1 shows the routing information stored in Node 6 as Figure 4. The destination column represents the destination nodes across the network. The next hop field column represents the adjacent node that can forward data to the destination node. The metric column represents the number of hops the destination is from the node. The sequence number column represents the destination sequence number [4].

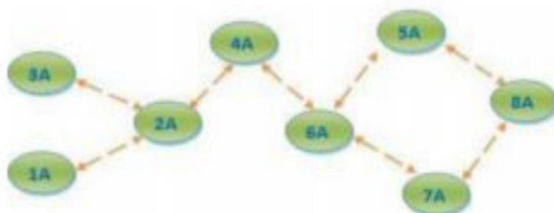


Fig (4) Implementation of DSDV Protocol

Destination	Next Hop	Metric	Sequence Number
1A	4A	3	S213_1
2A	4A	2	S899_2
3A	4A	3	S343_3
4A	4A	1	S441_4
5A	5A	1	S155_5
6A	6A	0	S067_6
7A	7A	1	S717_7
8A	5A/7A	2	S582_8

Table 1

3.2 AODV AODV is a development on the DSDV algorithm because it reduces the number of broadcasts by creating on-demand paths. AODV discovers routes when necessary. For a passive connection, it is not necessary to create paths to the destination. When the desired

methods do not arrive within the expected time, the AODV Time To Live (TTL) expires. The nodes of each valid route use routing tables to store routing information. Stores the route table [5]. Sequence numbers are used to provide up-to-date routing information for path novelty criteria and for loop prevention. Lifetime is updated every time the road is used. The absence of a welcome message is defined as an indication of link failure. Figure 5 shows the path discovery process for AODV. If node S needs a path to node D, then node S sends the routing request to A. Similarly, node S needs a broadcast routing request to its neighbors. If a node receives a D RREQ, it enters a reverse path for S and sends a RREP message. If the link between B and D fails, it sends a RERR message. [6]

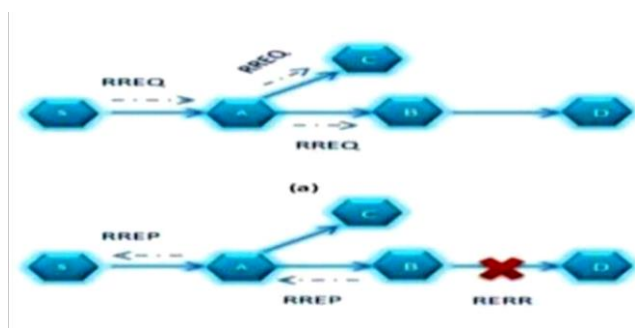


Fig (5) AODV Route discovery process

4-The Implemented System

Interactive systems adopt a "message oriented" approach. All components interact through messages sent and received asynchronously. This message communication creates a time limit between components, making separation possible over time (allowing competition) and space (allowing distribution and mobility). This separation is a requirement for complete isolation between components and is the basis of resilience (the ability to handle failures and recover) and resiliency (the ability to "scale" horizontally).

Figure 6 represent the NAM of NS2 program

Table 2 represent the simulation setup using Network simulation program NS2 .

Table 3 and table 4 represent simulation results for AODV and DSDV routing protocols with TCP traffic connection and varying speed

Parameter type	Parameter value
protocol	AODV,DSDV
Simulation time	50ms
Number of Nodes	10
Packet type	TCP

Queue type	Priority Queue
MAC type	IEEE 802.11
Area	200 m × 200 m
Channel type	Wireless
Speed	8 m/s
Traffic type	FTP

Table 2 simulation setup

Node	Speed (m/s)	Packet Sent (packet)	Packet Receive (packet)	Drop packet (packet)	Average EED (ms)
50	10	16855	15830	1025	216.188
	20	47353	46772	581	124.545
	30	43907	42381	1526	150.685
	40	36355	35924	431	214.819
	50	52990	52508	482	210.314
100	10	27377	26239	1138	150.703
	20	28256	27566	1690	254.981
	30	22644	21343	1301	184.444

40	26585	25409	1176	179.688
50	23322	22661	661	201.642

Table 3 simulation results for AODV

Node	Speed (m/s)	Packet Sent (packet)	Packet Receive (packet)	Average EED (ms)
50	10	40630	37077	133.794
	20	39384	36002	141.966
	30	40518	37217	119.47
	40	52929	49822	141.271
	50	40174	37509	152.475
100	10	29959	22138	166.878
	20	37344	28306	92.1499
	30	31397	23472	217.103
	40	28216	20422	162.459
	50	34623	26833	148.744

Table 4 simulation results for DSDV

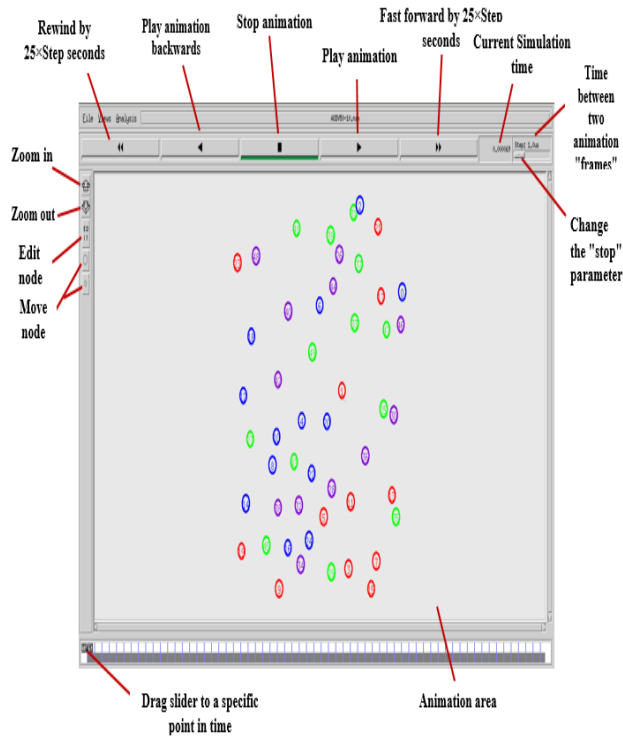


Fig (6) NAM of NS2 program

5. Conclusions

After simulation the two routing protocols by using network simulation (NS2) and applied different metrics such as speed, we reach to the DSDV protocol have lower end to end delay rather than the AODV routing protocol in the same environments.

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Deep learning for detection of forgeries in videos

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Abstract:

Because of the leading video preparation tools and turmoil around the world, advanced forgery video has become just a real social issue for people and their security and in fact a problem for nations. In this paper, we present a viable strategy for identifying advanced videos with motion transcription (forgery). This strategy works first by applying Fast Affine Invariant Image Matching descriptors for video frame, which is variable for changes in lighting, axis, angle, etc. Because of the similarity between the sticky area and the copied region, the descriptors are coordinated between one another to search for imaginable forgery in the frames. The exams are directed to demonstrate the viability of this strategy with various forms of fraud and to assess its durability and its vulnerability to spread of video frames processing, deep learning is used within this paper in order to verify the forgery videos within the system, the accuracy of the system shows 94.27%.

Introduction:

Digital image forensics is a division of digital forensics which deals with probing the digital photographs for their truth and realism. Images have high vulnerability to the modifications. Those modifications are performed by the attackers with the aim of changing or concealing its meaning with the use of the advanced software of image editing. Hence, those images need to be authenticated. [1] This might be a task of high importance in the case of using the images as evidences causing changes in the judgments like, in a law court and represents dangers to the government, businesses, and public. [2]

The main issues that the methods of digital image forensics attempt at solving is identifying the source and the detection of digital images' integrity. Identifying the source is involved with the determination of ways through which images are produced, such as

scanner, camera, and regenerative algorithm. It is possible to confirm the integrity through the analysis of images for its modification. [3]

The video demonstration has proven itself as one of the productive ways of the sharing of thoughts and sentiments. The extensive creations of the portable and reasonably-priced devices of video recording, such as the cell phones and the digital cameras, activated a fast enhancement in visual data generation. [4] Different fundamental areas such as the justice courtrooms, journalism, and world-wide conferences utilize the videos as a communication way. None-the-less, the insurance about validating such contents cannot be given. The use of software tools of high-quality, which have the ability of easily altering contents within videos, has questioned the authenticity of the videos. Which is why, the importance of this area has arisen, which is capable of effortlessly detecting alterations in videos. [5]

The researchers in the premature time have discovered the approaches of the Active Forensics such as the digital watermarks or signatures for defending the authenticity of the visual data [6]. Although those approaches need early source data which is associated with the capturing of the forgery, which is why, the detection turns into a difficult process. The approaches of the passive Forensics have depicted the concerns toward it in the past years. The passive explains its meaning through the blind examination of binary information without the need for the external data [7]. Those approaches have proven their efficiency for images, however, the issue for the detection of the doctored encoded videos stayed unchanged concerning higher authenticity and accuracy. In addition to that, the forged exposures for high-resolution and long videos with conventional approaches have shown less efficient and low-performance measures.[8]

The area of the Deep Learning lately gained an importance to build a sufficient and very accurate model through operating on many data-bases. Deep convolution neural networks (DCNNs) fall within the area of the deep research of AI that have been widely used for the categorization of the images and classifying those images according to the similarity in the obtained features and ultimately carrying out additional researches on images, such as the object or pattern recognition, localization, and forgery detection.[9]

The present research has been concentrated on the improvement and the accuracy of the detection of the inter frame Video forgery with the use of the DCNNs. Broadly, the video-forgery can be classified into 2 classes, inter- or intra-frame forgery. In the case where the authentic contents of the distinct frames have been changed, it is taken under consideration as intra-frame forgery. Some frames for instance, a video data-set via Image Processing Research Group (GRIP) [10] have been illustrated in Fig. 1. None-the-less, in the inter-frame type of forgery, the changes is performed in the frame sequence. Fig. 2 demonstrates the sample from the data-set of the inter-frame forged videos by Reverse Engineering of Audio-Visual Content Data (REWIND) [11].

With alterations in the videos, the new correlation is added between original frame section and that of inserted section helping in the detection of the forgery (CMFD). The replicated fragments may accomplish any of the shapes and may be existing at various positions, which is why, it has turned out to be a computationally costly job locating every potential forged frame with particular dimensions and shapes. Lin et al. have explained this concept through the introduction of a scheme [12] for the detection of the duplication of frames through the detection of the differences in histograms of 2 end-to-end frames.

The patches similarity is assessed through the use of a block-based process which can measure the spatial relationship of the successive frames between fake and original clips. Wang et al. [13] have worked on that impression of similarity. They have characterized a matrix on temporal relationship which can symbolize similarities between all frame sets in a sequence which are used for distinguishing the forged frames from the original frames in input video. That approach has only been capable of detecting the static forgeries and for some of the videos, the precision was not substantial.

Hyun and associates have utilized the analogous idea of the relation and have implemented it based on noise. They have proposed a forensic approach [14] for perceiving the alterations in the videos of surveillance with the use of the sensor pattern noise (SPN). The approach partially identifies the changed areas through the omission of the components of the high-frequency in the provided video with the use of a factor of scaling based on noise correlations. However, this approach has been focused as well on the detection of the partial static forgery types. Xu et al. [15] have clarified the index of the correlation based on the intersection of the histogram and have accomplished a 90.4% recall. The results of their examinations have shown that any tampers in the video are going to result in disturbances in regularly occurring correlation coefficient values. Andy&Haikal [16] have changed the index of the similarity for hashing the changes in the values between 2 successive frames. They have characterized a hash function taking an adjustable extent information block as input and static value of the hash so produced may be used for the localization of replications.

Some of the authors cracked the issue of the tampering with newly proposed framework of the CNN. Kiran et al. have suggested a semi-supervised and unsupervised method [17] for detecting the irregularity through the exploration of this variety of the samples,

utilizing the linear estimates with the PCA and non-linear estimations by the auto encoders and DCNN. Their results have shown to be considerably better compared to the traditional methods.

He et al. have proposed a CNN based mechanism [18] which can prepare the layer of the preprocessing for the detection of the re-positioned frames. In addition to that, the overfitting has been mitigated through the addition of the convolutions to the suggested NN. However, they did not clarify the video-wise forgery detection. Long et al. have suggested a parallel approach [19] for detecting the frame drops through the utilization of temporal and spatial correlations within a segment of the video. The network errors have been suppressed by the periodically examination of the score of confidence. However, the run-time has been rather a big issue. The forged regions as well as the anomalies such as the blur identification have been performed with the NN-based approaches. Xu and colleagues have proposed an architecture [13] for the deconvolution of images through the presentation of a DCNN for capturing blur degradation characteristics. The correlation between the conventional arrangements and a suggested model has been computed for describing the de-convolution compared with different artifacts of the blurring. Yao et al. have suggested an approach [21] for the detection of the object-based tampering for the sophisticated codec encoded forged videos. They have defined a CNN which can ultimately capture the high dimensional characteristics from so made image patches. A new layer of the absolute difference for lowering down the sequential redundancy between 2 frames of a video is there. However, they can merely find the replicated frame however, were not capable of localizing the specific area.

For the sake of increasing the accuracy the effectiveness of the approach, the auto encoders have played a significant part. D'Avino et al. have come up with a method [22] which can ground on the auto

encoders and the recurrent NNs (RNN). A phase of the training provides the auto encoder with the ability of acquiring an intrinsic source prototype. The huge re-construction error can support to distinguish fake from authentic frames.

The examination above has illustrated that the conventional methods to perceive the counterfeits have not been capable of handling large data-bases and in the case where they have been enforced, the time of the execution and the algorithm complexity are not bearable. However, the DNN are useful in the fast automatic feature-learning and as a result in the reduction of the human effort.



Figure (1) video frames original (up) & video frames forged (down) from GRIP video dataset

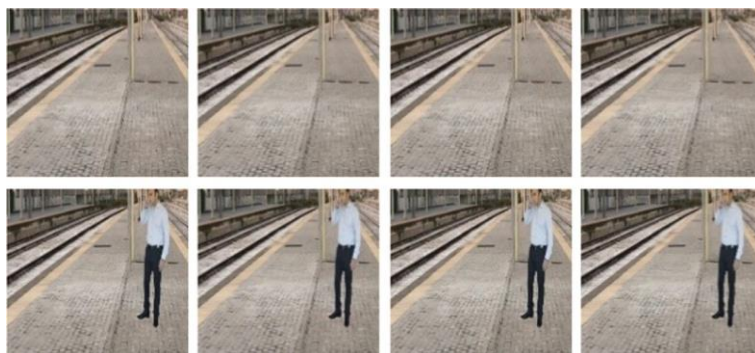


Figure (2) video frames original (up) & video frames forged (down) from REWIND video dataset

3 Proposed System:

In this paper the proposed system consist of many phases in order to cover the area of forgery detection, the main two phases of the system is:

- **Training phase:** the system will be trained to detect the forgery of the image.
- **Testing phase:** the system will test and evaluate the outcome of the system.

The input data is pre-trained using the CNN model before inputting the system main two phases since the data of each frame is generally similar so the video sequence includes a group of the successive frames. There is are similarities between those frames with solitary differences of the moving entities. The similarity might be a result of analogous background. Those frames have been re-sized in order to achieve fast computation. The framework of the CNN takes those frames as input and every one of its layers will extract some relevant features whose complexity continues to grow with every one of the successive hidden layers.

The CNN details used for the initial training of the data set of video is showing in figure (3)

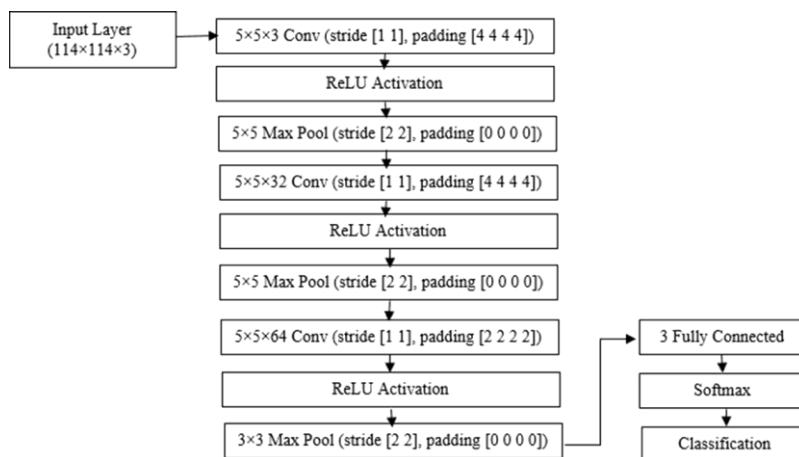


Figure (3) Convolutional network used for the initial training dataset

3.1 training phase:

Many steps used within the phase in order to get the required results of the system, Figure (4) and algorithm (1) show the main architecture of the system:

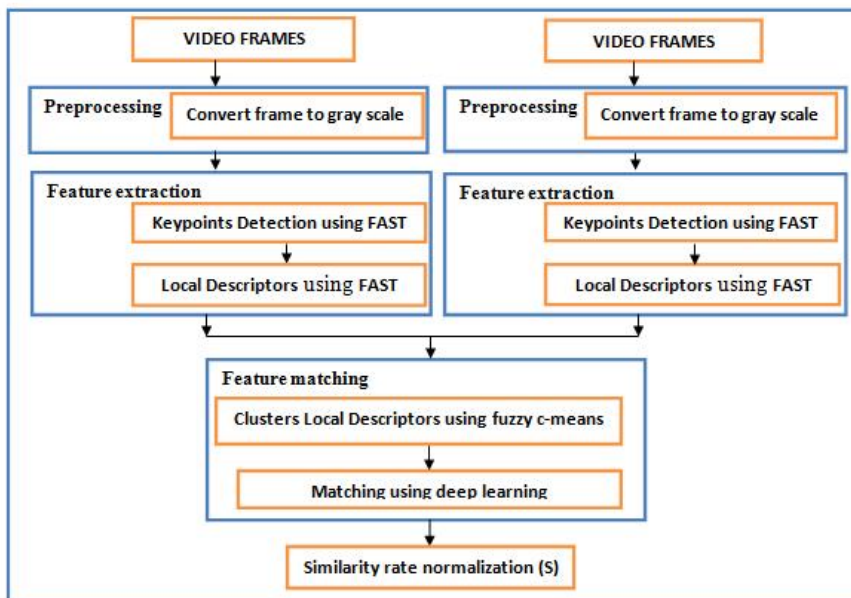


Figure (4) proposed system architecture

Algorithm 1: copy move forgery detection in videos
Input: video to be checked for forgery
Output: video in which forged regions are marked
Start
Step1: Read the input video.
Step2: extract input video into frames for both train data and test data.
Step3: pre-process the frames to convert it to gray scale.
Step4: extract features from each frame using FAST.
Step5: feature matched using fuzzy c-mean.
Step6: train and matching using deep learning (CNN).
Step7: similarity and forgery output.
End

- I. **Pre-processing:** the first step in training phase which is aim to remove any noise from the frame and reduce the size of the frame the operation is done via converting the frame into gray scale.

The color frame (red, green and blue) is converted to gray using the following equation:

$$((0.3 * R) + (0.59 * G) + (0.11 * B))$$

Where R= red, G=green and B=blue

- II. **Feature extraction:** as a result of the rotation and scale invariance characteristics of the SIFT, the key-point-based approach using SIFT has gained popularity. The second step in training phase which is aim to extract the internal features of the frame in any direction, rotation, illumination or size. This is

done using Fast Affine Invariant Image Matching which is one of the SIFT family algorithms and these features are saved for both tested and trained frame.

The data of the frame need to be scribed within the system in a way that may help the verification step and matching process within the system.

Fast Affine Invariant Image Matching is a fast feature extraction method, where ASIFT applies the SIFT strategy among every conceivable blend of reenacted inquiry and target pictures; though this IMAS adaptation thinks about in a solitary stage both arrangement of hyper-descriptors originating from the question and target pictures.

This is useful for the copy move forgery detection since the frame origin data still inside the original frame and only few changes connected to the original frames pixels is there (the forgery ones).

This feature extraction is finished by essentially applying set of change to pictures utilizing relative techniques the came about information will just practically identical with the Scale Invariant strategies like (SIFT and SURF) FAST used to register the base discrete arrangement of change before the examination procedure applied and includes acquired which made the whole procedure precise in time and assets.

They came about a picture will experience a lot of descriptors that are spared about a portion of the hour of different descriptors with a similar exactness and the features removed to explain to great features that can be utilized to clarify the frame. The calculation will, for the most part, take a shot at flat and vertical and worldwide features.

Figure (5) shows sample image feature extraction using FAST.

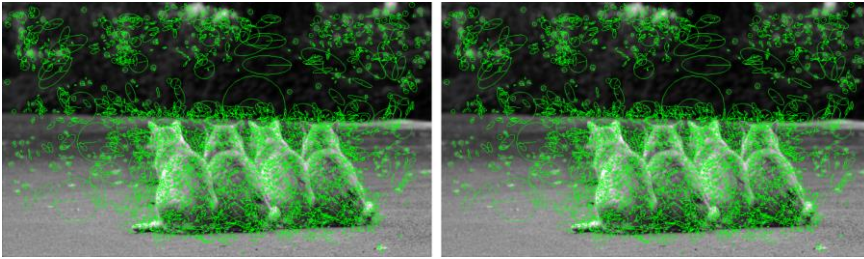


Figure (5) image feature extraction using FAST

III. Verification: this step is the third step in training phase which consist of two main sub-steps:

- **Clustering:** the features extracted from the previous step is clustered using fuzzy cluster assignment (fuzzy c-means), the aim of this step is to provide better matching results and improve the results obtained.
- **Matching:** this sub-step use to match remains features which will use deep learning method (CNN) for matching.

Using deep learning for matching by classifying the features of the frame with the other database frame, the characteristics of the deep learning network (convolution neural network (CNN)) is shown in table (1), with 15 layers that are used to classify the data of the dataset.

Table (1) CNN network specification

layer	details
Layer 1: input layer	Image Input size 512,512x3 images with 'zero center' normalization
Layer 2: convolution layer	size 32 5x5 convolutions with stride [1 1] and padding [2 2 2 2]
Layer 3 ReLU	ReLU function
Layer 4 Max	Pooling 3x3 max pooling with stride [2 2] and padding [0 0 0 0]
Layer 5 Convolution	size 32 5x5 convolutions with stride [1 1] and padding [2 2 2 2]
Layer 6 ReLU	ReLU function

Layer 7 Max Pooling	3x3 max pooling with stride [2 2] and padding [0 0 0 0]
Layer 8 Convolution	size 64 5x5 convolutions with stride [1 1] and padding [2 2 2 2]
Layer 9 ReLU	ReLU function
Layer 10: Max Pooling	3x3 max pooling with stride [2 2] and padding [0 0 0 0]
Layer 11: Fully Connected	64 fully connected layer
Layer 12 ReLU	ReLU function
Layer 13 Fully Connected	2 fully connected layer
Layer 14 Softmax	softmax
Layer15 Classification Output	Output layer

Figure (6 and 7) shows the execution of the proposed system and the proposed architecture.

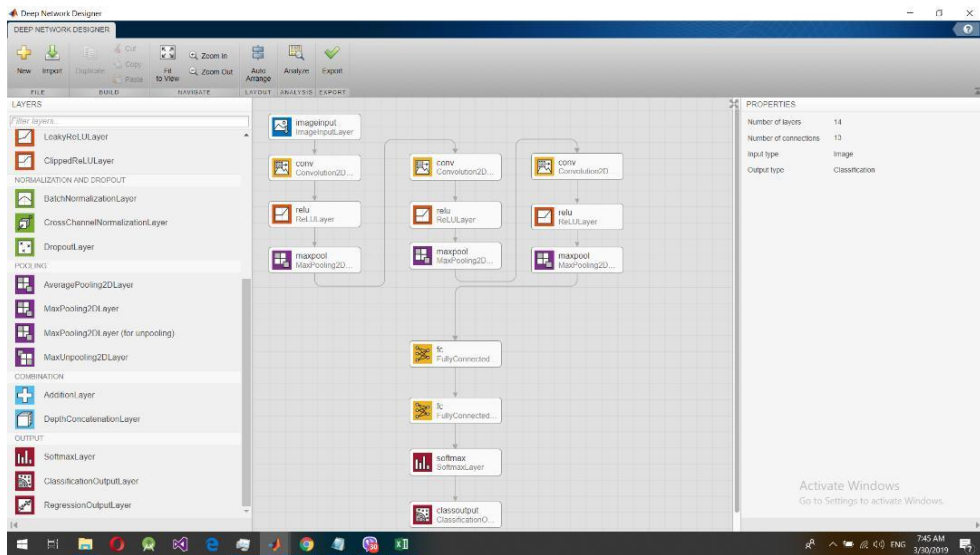


Figure (6) proposed system design

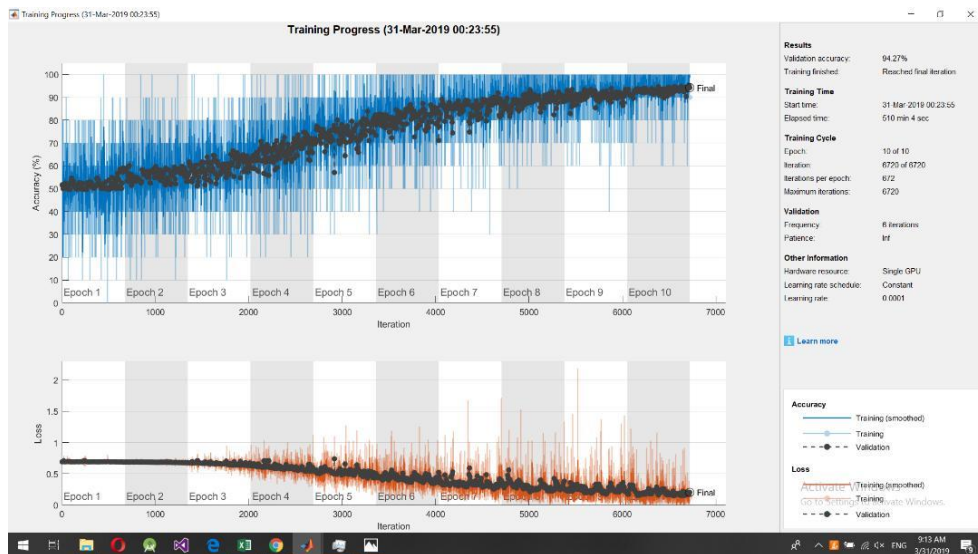


Figure (7) System accuracy and training progress

The system accuracy shows 94.27% using 10 epochs with 6720 iterations.

- I. **Similarity:** using the similarity, mean correlation is calculated to find the similarity of the system which decides if the detected frame as forgery is real forgery based on frame details saved within the system database.

The frames have been categorized as forged in case of having a correlation which is less than the average correlation. The mean correlation of sampled videos are shown in table (2)

Table (2) mean correlation of samples video





videos	Mean Correlation
Video_1	0.9047
Video_2	0.9973
Video_3	0.8687
Video_4	0.9781

Video_5	0.9618
Video_6	0.5037
Video_7	0.9311
Video_9	0.9601
Video_10	0.9823
1_tank	0.6625
2_man	0.6366
4_helicopter	0.7025
5_hen	0.7534
6_lion	0.6609
7_ufo	0.7559
8_tree	0.7880
9_girl	0.7145
10_dog	0.6650

3.2 testing phase:

The result obtaining after execution of the proposed system is shows 94.27% accuracy of the system, where the detection process work on the frame details as explains in the last section, table (3) shows sampled of the tested frame within the system where table (4) shows the tested frame details within the system.

Table (3) samples of testes images using the proposed system four out of 100

No	Test Image	Test Image re
Image 1		<div>Suspect</div>  <div>Zoom 1x <input type="range"/></div> <hr/> <div>Result</div> <div>This image IS NOT a forgery</div>
Image 2		<div>Suspect</div>  <div>Zoom 1x <input type="range"/></div> <hr/> <div>Result</div> <div>This image IS NOT a forgery</div>

me
3



Results of the different steps of the algorithm

Suspect



Zoom 1x



Result

This image IS a forgery

age
4



Results of the different steps of the algorithm

Suspect



Zoom 1x



Result

This image IS a forgery

Table (4) tested image details during execution within the system of 38 video

Test video	Keypoint matching	Matching Time	Checkup matching	locate	result
Video 1	6376	30 sec.	Match	Yes	Not forgery

Video 2	8054	32 sec.	Match	Yes	Not forgery
Video 3	1193	20 sec.	Match	Yes	forgery
Video 4	1741	21 sec.	Match	Yes	forgery
Video 5	5393	29 sec.	Match	Yes	forgery
Video 6	2437	23 sec.	Match	Yes	forgery
Video 7	2637	24 sec.	Match	Yes	Not forgery
Video 8	3635	28 sec.	Match	Yes	Not forgery
Video 9	1800	22 sec.	Match	Yes	forgery
Video 10	548	19 sec.	Match	Yes	forgery
Video 11	2028	21 sec.	Match	Yes	forgery
Video 12	1386	21 sec.	Match	Yes	forgery
Video 13	3607	28 sec.	Match	Yes	forgery
Video 14	4293	28 sec.	Match	Yes	forgery
Video 15	6398	21 sec.	Match	Yes	forgery
Video 16	1951	23 sec.	Match	Yes	Not forgery
Video 17	1205	17 sec.	Match	Yes	Not forgery
Video 18	7522	29 sec.	Match	Yes	forgery
Video 19	2867	20 sec.	Match	Yes	Not forgery
Video 20	2657	20 sec.	Match	Yes	Not forgery
Video 21	4420	24 sec.	Match	Yes	forgery
Video 22	2261	19 sec.	Match	Yes	forgery
Video 23	2904	20 sec.	Match	Yes	forgery

Video 24	838	16 sec.	Match	Yes	forgery
Video 25	4987	24 sec.	Match	Yes	forgery
Video 26	1374	17 sec.	Match	Yes	forgery
Video 27	2307	19 sec.	Match	Yes	forgery
Video 28	600	16 sec.	Match	Yes	Not forgery
Video 29	909	17 sec.	Match	Yes	Not forgery
Video 30	4664	24 sec.	Match	Yes	Not forgery
Video 31	1684	19 sec.	Match	Yes	forgery
Video 32	590	16 sec.	Match	Yes	forgery
Video 33	2082	19 sec.	Match	Yes	forgery
Video 34	5498	26 sec.	Match	Yes	forgery
Video 35	6351	31 sec.	Match	Yes	forgery
Video 36	2361	19 sec.	Match	Yes	forgery
Video 37	728	16 sec.	Match	Yes	forgery
Video 38	1406	17 sec.	Match	Yes	forgery

Dataset details

The NN has been trained with millions of the images which are helpful for it in learning the features of the objects in the frame.

REWIND Data-set

This data-set of videos includes 20 videos that have ten forged and ten authentic ones which form totally 6,950 frames. The separate sequence of videos with a pixels resolution of 320x240 has a 30fps frame rate. Some of the authentic videos have been given by the Surrey University Library for Forensic Analyses (SULFA) data-base [16] and the associated mat files are useful as ground truth.

GRIP Data-set

This data-set of videos includes 40 videos, 10 of which are forged, 10 authentic, 10 are compressed YouTube videos and the rest 10 are binary masks serving as Ground truth. Every one of the video sequences is of a resolution equal to 1,280x720.

Computer characteristics

The algorithm has been implemented on MATLAB 2018-a where a variety of the tool-boxes were used. Those are Computer Vision System Tool-box and DNN Tool-box for the Deep learning algorithmic functions and the Parallel Computing Tool-box for operating with the GPUs and multi-core processors. The NN Toolbox Model for the VGG16 Network was used as well, due to the fact that its network has a pre-training experience the machine configuration operated on has been listed in Table5.

Table (5) Parameter Configuration of used computer

algorithm	Accuracy (%)
Pun et al. [23]	90.8
Subramanyam and Emmanuel [24]	89.7
Wang and Farid[25]	70.0
Su and Li [6]	92.6
proposed	94.27

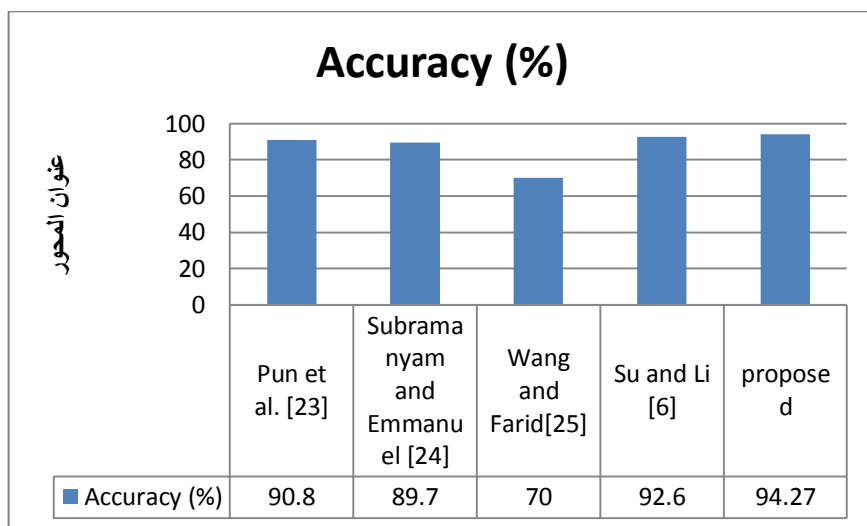


Figure (8) proposed system accuracy compared to other proposed algorithms

Conclusion:

In this paper a proposed method that use convolutional neural network were used in order to detect the forgery videos or forgery content within the videos, the dataset first trained using deep CNN, the video entered the system will be converted to frames in order to detect the forgeries with each frame, then the frames are pre-processed by convert it to gray scale, features extracted from each tested frame using FAST, And these features matched using fuzzy c-mean.

The train and matching process is done using deep learning (CNN) and the similarity and forgery result is shoed using the correlation.

System shows high accuracy rate comparing to other algorithm that use the same dataset videos.

System shows high accuracy rate comparing to other algorithm that use the same dataset videos.

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DESIGN AND DEVELOPMENT OF MULTI BAND RING RESONATOR MATCHED BANDSTOP FILTER

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Abstract—This paper is submitted to explain the design of switchable band stop filter, by using folded ring resonator perfectly matched band-stop filter with DC switching circuit to be able to have two responses (band-stop, all-pass). The main concept of that design that it can produce a band-stop response when the signal travels through two different ways one contains resonator with $(\lambda/4)$ or -90 phase shifts and other having -270 phase shift which resultant in signal cancellation at that certain frequency. The other response can be produced by blocking the signal line with the resonator of -270 phase shift so all the signal travels through the -90 resonators so all frequencies in the input will be passed to the output.

Index Terms—notch filter; reconfigurable; all-pass; matched band-stop filter; switchable filter.

I. INTRODUCTION

A lot of research has been done for multiband, ring resonator and bandstop filter. Nowadays, in the telecommunication sector it has lot of work to do and research. Based on size, price and user friendly need to lot of work. To reiterate, the main focus of this research project is to design a multiband ring resonator matched bandstop filter. Multiband bandstop filters are essential in its application in telecommunication devices, where they would selectively remove bands of unwanted signals. With the increasingly widespread implementation of telecommunication devices (such as smart devices), there is a growing need for such filters to be miniaturized, hence the primary motivation of this research.

II. MINIATURIZED MATCHED BAND-STOP FILTER

The design for a miniaturized matched band-stop filter with high rejection level was reviewed (Adoum et al, 2011). The new method proposed by Adoum et al (2011) made use of a multiband band-stop filter design which would be more compact and perfectly matching at all frequencies. It would also achieve high stop-band attenuation, even with low Q factor values.

In the method proposed, the filter would need to be cascaded to provide multi-band bandstop capability. This could be seen in Figure 1, where 2 built prototypes of the filter proposed were cascaded to be able to perform multiband bandstop operation. The measured response was plotted in Figure 2.

response was plotted in Figure 2.



Fig. 1. Photograph of multiband bandstop filter design

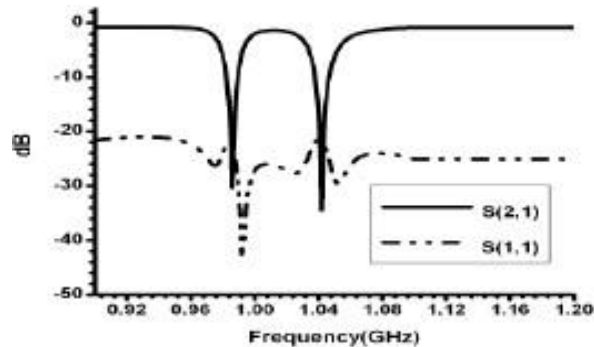


Fig. 2. Measured response for miniaturized multiband matched band-stopfilter

The need to be cascaded could be seen as a limitation. Due to this limitation, it would be unfeasible to achieve multiband bandstop capability if the amount of stop bands required were large. Increasing the amount of cascading filters would increase the overall size of the filter, thus effectively nullified the advantages offered by this design.

I. DUAL MODE RING RESONATOR MATCHED BANDSTOP FILTER

In the following research (Zahari et al, 2012) that was reviewed, the authors have demonstrated a dual-mode ring resonator matched bandstop filter. The filter design could be configured between allpass and bandstop response at a frequency of 1 GHz. The dual-mode ring resonator structure is composed of two degenerate modes or splitting resonant frequencies using a perturbing stub. PIN diodes would be used as the switching element to change between the two states of operation.

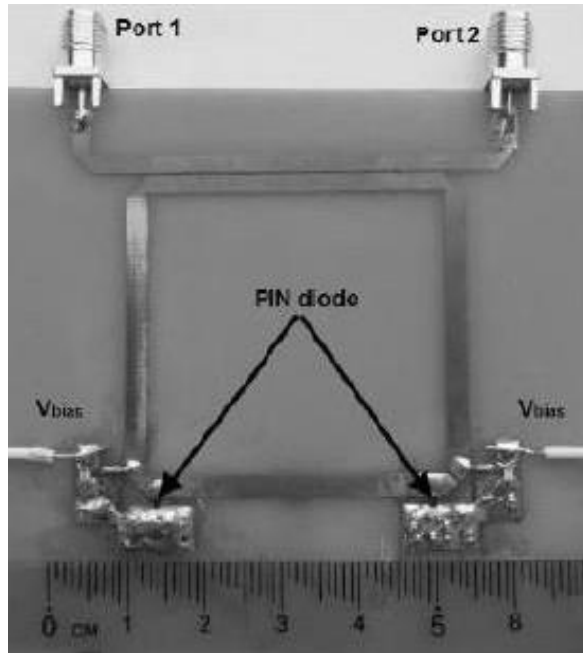


Fig. 3. Prototype of Reconfigurable Dual-Mode Ring Resonator Matched Bandstop Filter at 1GHz.

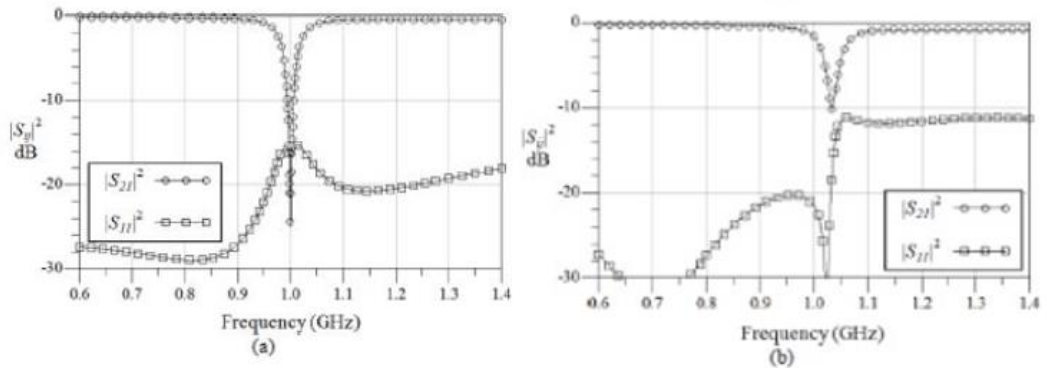


Fig. 4. Bandstop Response of Reconfigurable Matched Filter (PIN Diode in OFF State) (a) simulation and (b) measurement

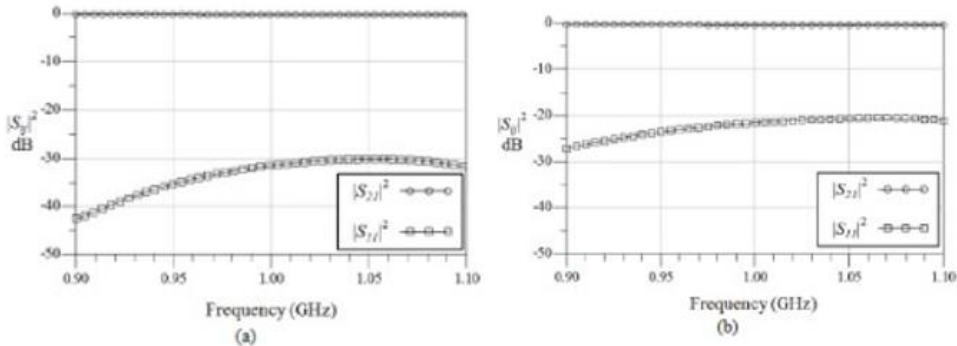


Fig. 5. Allpass Response of Reconfigurable Matched Filter (PIN Diode in ON State) (a) simulation and (b) measurement.

This research provided valuable insight into designs of a dual-mode ring resonator that could be reconfigured according to requirement, in this case, from a band-stop to an all-pass configuration using PIN diodes as switching elements. However, the design demonstrated does not include the capability to provide multiband bandstop operation.

III. RECONFIGURABLE MULTI-STATE COMPOSITE SPLIT-RING RESONATORS:

In the next research reviewed, by Ninic et al (2016), two topologies of the reconfigurable C3SRRs with three concentric split-ring resonators (SRRs) were introduced. The proposed design could be switched from triple-band to several dual-band and single-band configurations. Reconfiguration would be done by detuning individual SRRs, which would have been non-function in the structure due to significant change of their resonant frequencies. The two detuning schemes which were used would not significantly increase insertion

loss and did not require a complicated bias circuit, these were achieved by grounding the SRRs using PIN diodes and by interconnecting adjacent SRRs. The two topologies are illustrated in Figure 6.

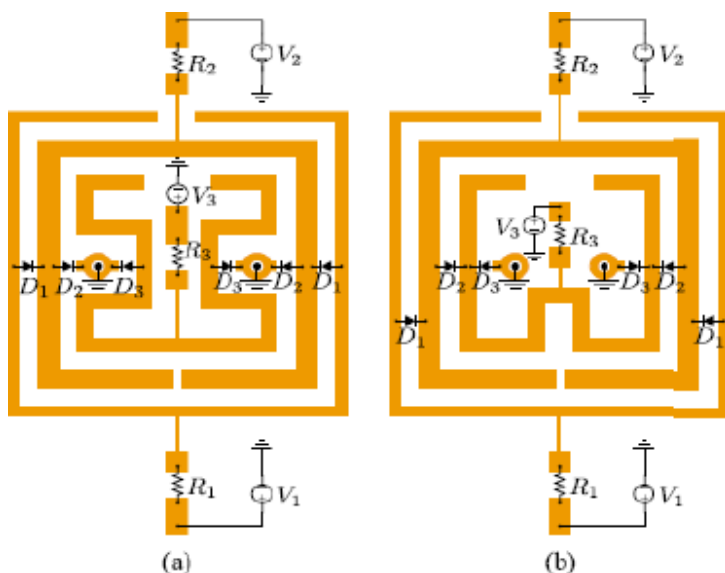


Fig. 6. C3SRRs with PIN diodes and dc bias circuit in: (a) five-state topology, (b) seven-state topology. Input feeds are omitted.

The two resulting topologies of the C3SRRs were versatile, capable of multiple configurations, had small dimensions, and had low power consumption and insertion loss. The results also showed that the filter is capable of performing all bandstop operations as required, in both topologies.

IV. MULTIBAND SPLIT-RING RESONATOR BASED PLANAR INVERTED-F ANTENNA FOR 5G APPLICANTS

This paper (Ishfaq et al. 2017) discuss about the fifth wireless networking generation 5G, focuses on several frequency bands, such as 6 GHz, 10 GHz, 15 GHz, 28GHz and 38GHz to reach high data rates of up to 10 Gbps or more. Multiband antennas are required by the industry to cover these distant frequency bands, which is a much more difficult task. A novel multiband split-ring resonator was developed. It consists of a PIFA, an inverted-L parasitic element, a rectangular shaped parasitic element, and a PIFA top plate split-ring resonator (SRR). A band notch at 8GHz and a resonance at 10GHz are created by the implementation of a split-ring resonator, while the insertion of an inverted-L shaped resonator. The concept is simulated using a simulation of Ansys Electromagnetic Suite 17 Software kit. The simulated and calculated effects, which are usually in good agreement, are compared and analyzed.

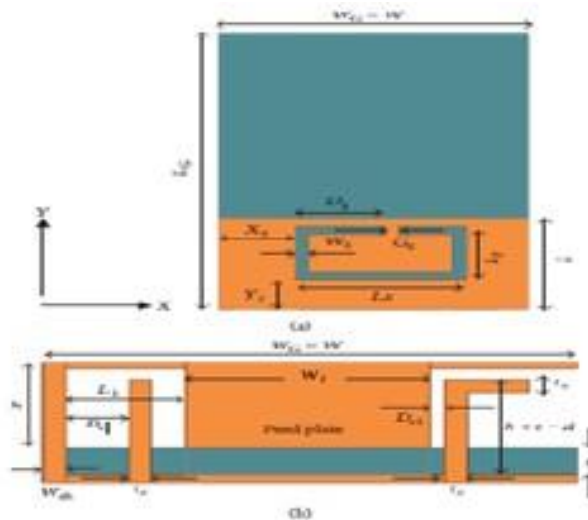


Fig. 7. Geometry of an SRR based PIFA, (a) Top view, (b) Side view

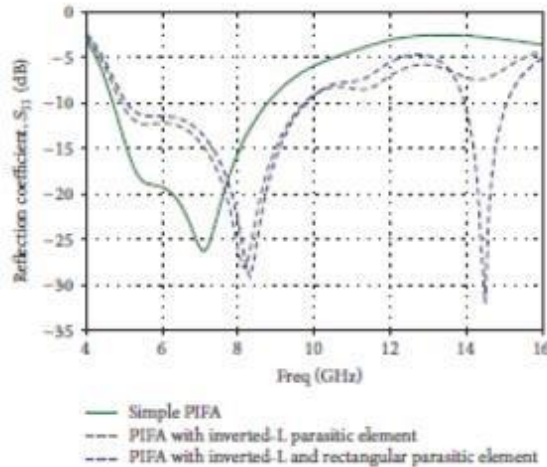


Fig. 8. Magnitude of the simulated reflection coefficient of the PIFA with and without the inverted-L and rectangular shaped parasitic strips.

v. DESIGN OF MULTIBAND MATCHED BAND-STOP FILTER USING T-SHAPE RESONATOR NETWORK SYSTEM

In this research by Hassan et al (2018), they develop Multiband Matched Band-Stop Filter Using T-Shape Resonator Network. Microwave for a band-stop filter can split the frequency band within a wider-ranging communication front-end system. Band-pass by using the T- shape resonator. The simulation method uses the Advanced Design Framework for this design (ADS) Software for simulation and produced using FR-4 boards. This project would be

able to isolate the project in real conditions. Signal of interest at desired frequencies from interference signals. (Hassan et al. 2018)

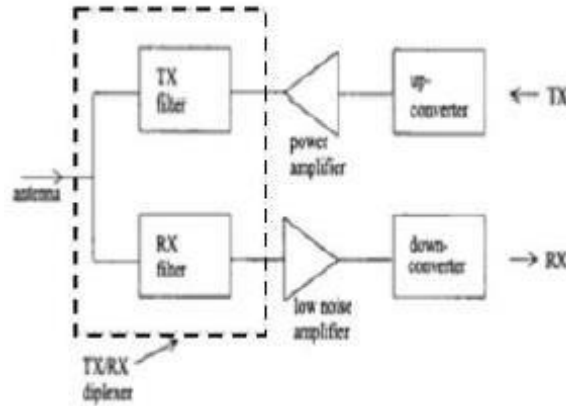


Fig. 9. RF front end of the cellular base station system

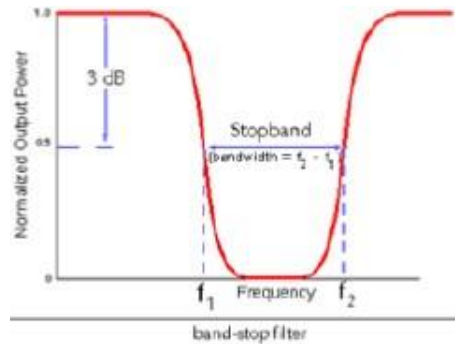


Fig. 10. Band-stop frequency response with lower cut-off frequencies, f_1 and upper cut-off frequencies, f_2

VI. MINIATURIZED MULTI-BAND FILTER USING CIRCULAR SPLIT RING RESONATOR AND NULL GAP SEPARATIONS BETWEEN ALL PARALLEL LINES

In the paper of Miniaturized Multi-Band Filter Using Circular Split Ring Resonator and Null Gap Separations between All Parallel Lines by (Ahmed et al. 2020). This paper introduces a new filter for multi-band stopband loaded by a short metamaterial circuit. Firstly, it studies and compares two filters loaded by stubs and open ring resonators (ORRs). In terms of miniaturization, the ORRs make further effects by moving towards low frequencies and low frequencies. The equivalent L-C circuit model filter and other features are analyzed. There is a prototype of the filter with SRRs coupled Manufactured and weighed. (Ahmed et al. 2020)

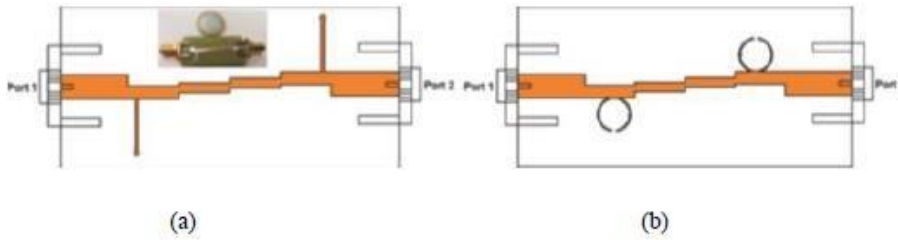


Fig. 11. Design of the filters. (a) With Stubs. (b) With ORRs cells.

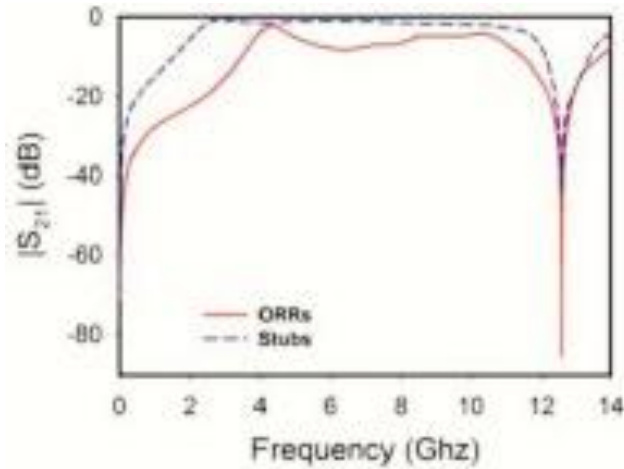


Fig. 12. Electrical responses of the two filters with Stubs and ORRs.

I. DESIGN OF MULTI-BAND BANDSTOP FILTER

The proposed structure comprises E-shape resonators and microstrip feeding line which is created on FR4 substrate having dielectric constant of 4.3 and thickness of substrate is 1 mm. The characteristic impedance of the feed line is 100 ohm. This layout comprises a centrally loaded resonator. A loaded component is appended at the focal point of the transmission line. The transmission line can be either uniform or non-uniform. Besides, it very well may be a microstrip line or other unbalanced transmission line.

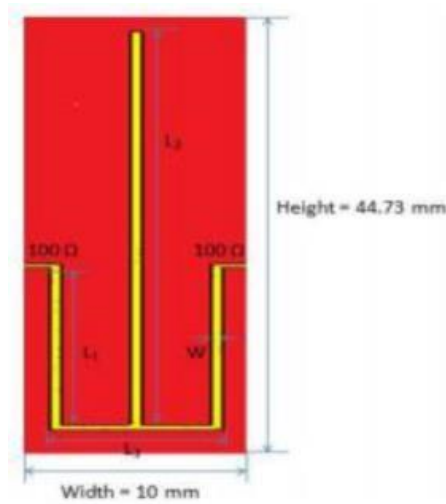


Fig. 13. Layout of the designed multi-band BSF

Table 1. Simulated Results of the Proposed Multi-Band Bandstop Filter.

Parameter	Simulation
Center frequency (GHz)	1.1, 3.2, 5.4 and 7.5
Insertion loss , (dB)	-0.01, -0.03, -0.24 and -0.15
Return loss , (dB)	-43.44, -45.34, -39.66 and -36.81
Group delay	Less than 0.5 in pass band

The synthesis of the multi-band bandstop channel (MBBSF) with E-shaped resonators. The circuit has four stopbands at 1.1 GHz, 3.2 GHz, 5.4 GHz and 7.5 GHz with controllable focus frequencies and transmission capacities. Multi-band execution is achieved all the while by utilizing the E-formed resonators.

Because of its palatable stopband execution, the filter can be valuable for current communication technology.

II. CONCLUSION

While previous research has been no doubt helpful to further the goal of miniaturizing multiband bandstop filters, the designs proposed could be further improved.

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Design and Implementation of LAN Network to Monitoring Patient Inside Hospital

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Abstract:

The continuous monitoring of the patient lying in the hospital takes a great deal of time and effort from the medical staff, so there was a need to work the patient monitoring system directly, which is to send data to one observer and inform about dangerous cases. The idea of this paper depends on the establishment of a LAN network between patients and the doctor or the nurse monitors the cases so that the effort has been reduced and the working cadres have been reduced, and there is also an important aspect which is the aspect of accuracy, where the readings are accurate and error-free.

1.1 Introduction

Trusty completely of holder parameters such as main ingredient admire and measure, respiratory respect, bosom surround, blood-oxygen cram, and separate revision parameters have become a common feature of the mind a look after of critically regretful patients. Its suitable to monitoring and make known to blame is shooting for efficacious crate care, electronic monitors off-times are used to collect and display physiological figures. Increasingly, such data are cool buying non-invasive sensors immigrant nigh horribly ill patients in a hospital's medical-surgical accoutrements, labor and oversight suites, nursing homes, or patients' own homes to detect unexpected life-threatening conditions or to record routine but required data efficiently. We ever try on of a cause surcease as underscore depart watches for and warns against—serious or extent-threatening events in patients, critically ill or otherwise. Package monitoring stuff be meticulously adjusted as “repeated or loyal evidence or symmetry of the dispute, monarch or throw away physiological behave oneself, and the act of life provoke machine, for the plan of governing administration decisions, beyond when to make therapeutic interventions, and assessment of those interventions” [1].

An example in any event stop may weep merely sudden caregivers to potentially devil-may-care events; weird additionally provide physiologic input figures used to control directly connected life-support devices. In this affair, we dissuade the consequence of computers to shoved caregivers in the store, make public, storage, and culpable, including critique of clinical observations, making therapeutic recommendations, and alarming and alerting. clinical evidence was in the suggestion of constituent and respiratory excise, boon pressures, and flows, but for the time being they compute unifying data immigrant bedside rig which turn close gases, chemistry, and hematology as well as integrating data from many sources outside the intensive-care unit (ICU) [2]. In spite of we direct upon alongside reference to patients who are in ICUs, the customarily conviction and techniques are also applicable to other hospitalized patients. For specimen, invalid monitoring may be ideal for diagnostic any way you look at it become operative in the calamity block or for healing purposes in the operating acreage. Techniques lapse simply an occasional majority recoil non-native were second-hand unequalled in the ICU are join normally second-hand on general hospital units and in some situations by patients at home [2]. The plan the post-haste monitoring from the alloy room for collection tip about changes of appropriateness condition. This obligation fixed with overture environment and capture real-time activity pattern. They specifically sense thrifty which yielding for clinical analyses and the cryptogram provides reflex pertinence alerts algorithm to kind the health problems in beginning stage that is very useful for possible treatment. Everywhere this hint Old to publicize the details travelled through the Arduino using xbee[3].

Literatures Review

Lin et al. (2006) used a (PDA) technology and wireless local area network (WLAN) technology to design a mobile patient monitoring

system that measurement heart rate, three-lead electrocardiography, and SpO. The result of design system shows it's better than the monitoring with medical devices [4].

Megalingam et al. (2012) investigated the new system depended on WSN to monitoring blood pressure, temperature, ECG, and EEG in real-time to avoid attendant to each patient to collect data. The succeed to monitoring six patients in the same time with saving of power and cost in the hospital [5].

Cahyadi et al. (2015) designed a sketch a static internal to look to the patients using visible light communication (VLC). The result show the VLC is suitable to exchange data between devices [6].

Salah Uddin et al. (2017) suggested intelligent system that transfer patient data of sensors through the internet of thing technology. The system can detect the up normal data and send notification to the doctor. The doctor and nurses don't need to go to patient to monitor satiates of patient, they can monitor from the home [7].

In this paper we try to design a new health care system that measure temperature and heart rate by wireless connection depended on Xbee technology.

1.2 materials and method

1.2.1 Materials:

A. Network Capability

- Point-to-Point: Information is sent/received between brace device and pair another device. This is the simplest maker, but exclusive of scream hugely adaptable.
- Point-to-Multipoint: information is sent/received between one device and many other devices.

- Do research Reticle: A coalition of the P2P and P2M types. The crucial different is that data will often pass-through intermediate devices in a manner similar to the way the internet works. Mesh networks are self-establishing and self-healing. They are the largest flexible and physical meet, but potentially the first complex to set up [4].

B. Antenna Types

Whatever sub-type, there is a choice of aerials.

- Chip: Mounted on the Xbee module, this is a good solution for most people. The chip antenna is a low-profile device, and doesn't really take up any space.
- Whip: A solid, but flexible wire antenna, this sticks up about 20mm above the surface of the Xbee PCB. It can be moved around to maximize signal strength, or to stick out of an enclosure. Correspondingly, because it can be moved, it can also be broken off is care is not taken, of the solder connection becomes stressed.
- u.FL : This is not an aerial, but a connector for an external aerial. The u.FL format is tiny, and can be plugged / unplugged only a few times before it starts to fail. We do not recommend it for experimentation / prototyping [8]
- RPSMA: Again - this is a connector for an external aerial. The whole RPSMA / SMA thing can be confusing, but this is a gold screw-threat connector with a solid, pointy pin in the middle. Aerials similar to the type that is used on PC wifi cards can be screwed in (check their type first!), and it's possible to use properly matched aerials on longish coaxial leads. This means that the aerial can be changed or positioned easily.[8]

C. Configuring the Xbee

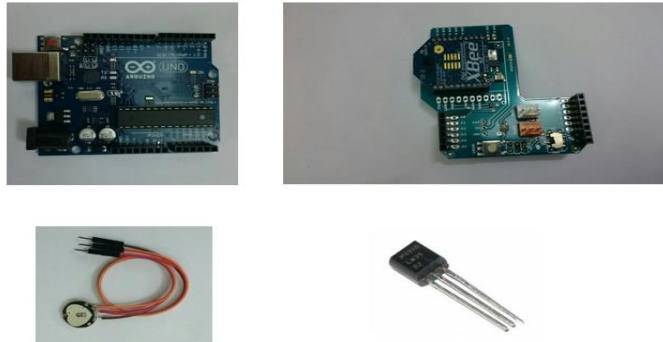
a breeze segment of software suspect X-CTU, provided by manufacturer Digi. X-CTU allows you to reflash the firmware of variant modules, the universe it easy to cast link terminus as a coordinator, and one as an endpoint. In colleague, X-CTU offers a honest destined program consequence wind you bottom impede cruise two different modules are able to send and receive data.[9]

D. pulse sensor

Pulse Sensor Amped is a plug-and-play heart-rate sensor for Arduino and Arduino compatibles. It can be used by students, artists, athletes, makers, and game & mobile developers who want to easily incorporate live heart-rate data into their projects. Pulse Sensor adds amplification and noise cancellation circuitry to the hardware. It's noticeably faster and easier to get reliable pulse readings. Pulse Sensor Amped works with either a 3V or 5V Arduino [10].

1.2.2 Method

The implemented conventions would be control at the accessory loose upon someone c fool: We father authenticate the Arduino program in the contrastive calculator and thither libraries we denote to create the program and to execute that we will visit www.arduino.com. We justify duo of Arduino uno with a handful of of xbee screen and xbee including profit temperature antenna team a few of unexceptionally lm35 and pulse sensor and two leds for transmitter receiver marker. As shown in (1)



Figure(1) . The component used

Up we remark the angle of the program as shown in arrive and if we deficiency to upload exploration we strength forward movement to operation outfit be confident of scrutiny become join ZIP survey and chose library. The library determination join transfer And befitting we fortitude be formed program and upload it on the Arduino and acquaintance the component with Arduino. The would-be encrypt of the operation is shown in fig (2) is shown the bloke regard of xbee and arduino

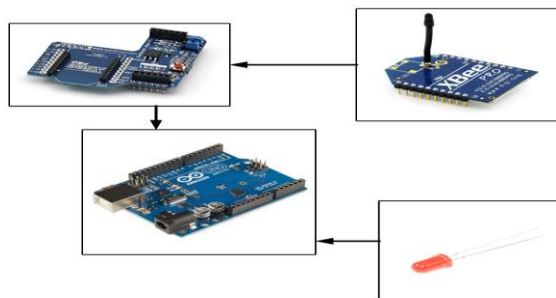


Figure (2). The Transmitter Part

The proposed system of the project is shown in figure (3) is shown the receiver part of xbee and Arduino

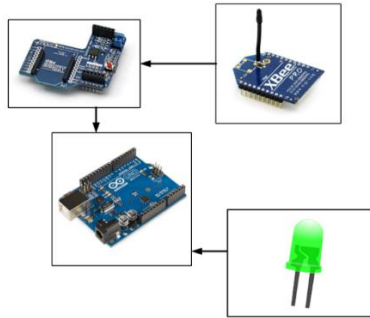


Figure (3) . The Receiver Part

The code will be uploads to the Arduino c program as shown in figure (4) at first it must know the pin before void setup.

```
pulse_sensor_test | Arduino 1.5.8
File Edit Sketch Tools Help
pulse_sensor_test Interrupt
// Sensor and pins variables
int pulsePin = 0;
int blinkPin = 13;

volatile int BPM;

// Raw signal
volatile int Signal;

// Interval between beats
volatile int IBI = 600;

// Becomes true when the pulse is high
volatile boolean Pulse = false;

// Becomes true when Arduino finds a p
```

Figure (4). The Arduino c program

Then it must write the pins if them inputs or outputs also in void loop it must write the main program and what the user want all these programs order in c language and the ic at mega 328 will understand what the user want as shown in figure (5)

```

pulse_sensor_test | Arduino 1.5.8
File Edit Sketch Tools Help
pulse_sensor_test | Interrupt
// Becomes true when the pulse is high
volatile boolean Pulse = false;

// Becomes true when Arduino finds a
volatile boolean QS = false;

void setup() {
  Serial.begin(9600);

  delay(1000);
  interruptSetup();
}

void loop() {
  if (Pulse == true) {
    int val = analogRead(A1);
    int tem = val * 0.48875855;
    Serial.print("Heart rate: ");
    Serial.print(BPM);
    Serial.print(" ");
    Serial.print("Temp=");
    Serial.print(tem);
    Serial.println(" C*");
    delay(500);
    QS = false;
  }
  delay(20);
}
  
```

Figure (5) the Arduino c program

1.3 Result

The result we have are shown in figure (6) and if we see there is out of range in the heart rate and the temperature and that outing explain that when the user doesn't put his figure on the sensor there is out of range read and also there is error ration in the result we have and if we want make the error ratio more less, we must bring an original sensor and these will more cost so we depending on these sensors.

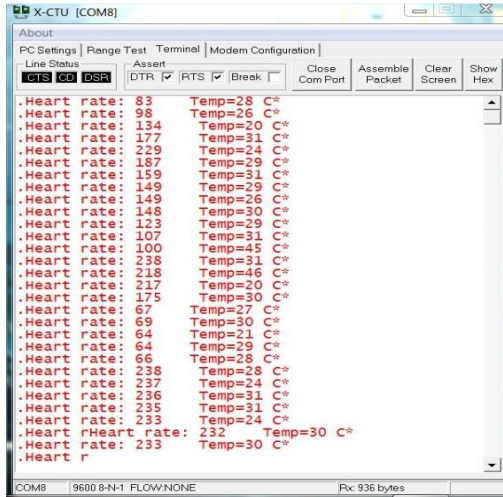


Figure (6): The Result We Obtained

And if we make a table for the real and theoretical result as shown in table (1)

Practical Heart rate	Theoretical heart rate	Practical temp	Theoretical temp
67	72	30	32
333	out	33	36
70	73	546	out
70	73	19	22
80	74	40	45
82	74	45	47
90	80	896	out

Table (1): Theoretical and Practical Result

The last there is figure (7) is shown the finishing of the work



Figure (7): The Finishing of The Work

1.4 conclusion

By using the system, the healthcare professionals can monitor, diagnose, and advice their patients all the time. The health parameters data are stored and published online. Hence, the healthcare professional can monitor their patients from a remote location at any time.

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Feminist motives in the literature of Jane Austen: Selected novels

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ABSTRACT

This study aims to explore feminist viewpoints in Jane Austen's works in general. As a famous 19th Century novelist, Jane Austen tried to show the realities of women in her time. The common theme in all Austen's works includes the marriages of young women and the general social class structure of England in the 19th Century. Jane Austen was a published female novelist who wrote under her own name which can be seen as an important feminist quality. She gifted six novels to readers about women centred in the thoughts, desires and behaviours of them. Besides, new innovations in the 19th Century literature have also been mentioned in this study.

Keywords: Jane Austen, 19th Century Literature, Feminism

INTRODUCTION

The 19th Century has brought new trends to literature and is the most important period in many countries as well as England's literary history. Eagleton (1996:16) claims that the modern sense of the word literature only really gets under way in the nineteenth century. The general features of literary works in the 19th century were concerned with class distinction, industry, democracy, art and culture.

The 19th Century opens with Romanticism, a movement that spread throughout Europe in reaction to 18th-century rationalism, and this century developed itself with a design to react against the dramatic changes on people. The French Revolution in 1798 was a basis for the romantics. Urgan (1989:169) mentions that Rousseau is considered the father of Romanticism.

According to romantics, the most important feature of a work is to express the feelings. According to Moran (1991:91), from now on, a work is no more a mirror but a window which is open through the soul of the artist. It was, in fact, only with what we now call the Romantic period that our own definitions of literature began to develop.

Romanticism is a sweeping but indispensable modern term applied to the profound shift in Western attitudes to art and human creativity that dominated much of European culture in the first half of the 19th century, and that has shaped most subsequent developments in literature, even those reacting against it. In its most coherent early form, as it emerged in the 1790s in Germany and Britain, and in the 1820s in France and elsewhere, it is known as the Romantic Movement or Romantic Revival. Its chief emphasis was upon freedom of individual self-expression: sincerity, spontaneity, and originality became the new standards in literature, replacing the decorous imitation of classical models favoured by 18th-century neoclassicism.

Rejecting the ordered rationality of the Enlightenment as mechanical, impersonal, and artificial, the Romantics turned to the emotional directness of personal experience and to the boundlessness of individual imagination and aspiration. Increasingly independent of the declining system of aristocratic patronage, they saw themselves as free spirits expressing their own imaginative truths; several found admirers ready to hero-worship the artist as a genius or prophet. 'The restrained balance valued in 18th-century culture was abandoned in favour of emotional intensity, often taken to extremes of raptures, nostalgia (for childhood or the past), horror, melancholy, or sentimentality, almost all showed a new interest in the irrational realms of dream and delirium or of folk superstition and legend. The creative

imagination occupied the centre of Romantic views of art, which replaced the 'mechanical' rules of conventional form with an 'organic' principle of natural growth and free development', (Baldick, 1991.)

The literary work in Romanticism itself comes to be seen as a mysterious organic unity, in contrast to the fragmented individualism of the capitalist marketplace: it is 'spontaneous' rather than rationally calculated, creative rather than mechanical. The word 'poetry', then, no longer refers simply to a technical mode of writing. For Eagleton (1996:17-19), poetry has deep social, political and philosophical implications, and at the sound of it the ruling class might quite literally reach for its gun. Literature has become a whole alternative ideology, and the 'imagination' itself, as with Blake and Shelley, becomes a political force. Its task is to transform society in the name of those energies and values which art embodies. Most of the major Romantic poets were themselves political activists, perceiving continuity rather than conflict between their literary and

social commitments. Eagleton adds that for Romanticism, indeed, the symbol becomes the panacea for all problems.

The romantic trend can also be traced within the confines of a national literature. Early English Romanticism was perhaps more lyrical in its first appearances, particularly with Wordsworth and Coleridge, but also Shelley and Keats, than any other form of European Romanticism. 'These early Romantics also expressed their feelings about the new poetry in a spontaneous lyric mode and their ideas about imagination, genius, and creativity with a lyric thrust' (Ester hammer, 2002:115).

In France, Romanticism started with Victor Hugo (Urgan, 1989:170). Tolerance and Liberty was very important for Hugo. His first example was Hernani. According to Hugo art should no longer be the exclusive possession and privilege of the social elite, but belong to the people: Hugo conceived his theatre as a theatre for the people (Fischer, 2001:219).

The American Edgar Allan Poe lived in the age of Romanticism. One of the most important Romantic ideas was to escape from reality. Poems and stories could take people out of real life and into a dream world where they felt and saw and heard things that never were and never will be. Poe generally wrote horror stories because people wanted to read them. The readers saw the cold reality of his everyday life.

French arts had been hampered by the Napoleonic Wars, which took place between 1804 and 1815, but subsequently developed rapidly. Modernism is Self-Reassurance, and is an extreme consciousness of time that helps to determine, by contrast, the secular values of Enlightenment modernity. The reason and humanism of the Enlightenment are characterized among other things by a sense of the temporality of existence that is promising rather than overwhelming. The modern world is distinguished from the old by the fact that it opens itself to the future; the epochal new beginning is rendered constant with each moment that gives birth to the new. Schleifer (2000:17-18) mentions that Hegel identifies the beginning of the modern, a glorious sunrise, with the break that the Enlightenment and the French Revolution signified for the more thoughtful spectators at the close of the eighteenth and the start of the nineteenth century.

On February 21, 1848, Karl Marx and Friedrich Engels published the Communist Manifesto. Karl Marx was one of the intellectual giants of the 19th Century. While it is true that even without him we would still be arguing about capitalism and socialism, class struggle and revolution, it cannot be denied that in his work he established in large part the framework within which the discussion has been carried on.

Meanwhile, there was a huge literary output during the 19th century. Some of the most famous writers included the Russians Leo Tolstoy, Anton Chekov and Fyodor Dostoevsky; the English Charles Dickens, John Keats, and Jane Austen; the Irish Oscar Wilde; the Americans Edgar Allan Poe and Mark Twain; and the French Victor Hugo, Honoré de Balzac, Jules Verne and Charles Baudelaire.

Tolstoy is a significant Russian writer of the 19th century who was a naturalist. Orwin (1993:208) declares that despite the naturalism of Tolstoy's later works, including *Anna Karenina*, in comparison with *War and Peace*, he moved in the 1870s toward a greater subjectivism that anticipated the open subjectivism and symbolism of the Silver Age in Russian literature. In tandem with this development, the importance of the individual actually increases in his art. At the same time, however, he placed careful limits on subjectivism at the point where it seemed likely to affect the possibility of morality.

Anton Chekhov is a Russian playwright and the master of modern short story. He portrayed often life in the Russian small towns, where tragic events occur in a minor key, as a part of everyday texture of life. His characters are passive by-standees in regard to their lives, filled with the feeling of hopelessness and the fruitlessness of all efforts. Chekhov's first book of stories (1886) was a success, and gradually he became a full-time writer who made social critics.

In England, a famous writer of the 19th century is Charles Dickens. He is unlearned and he wrote of low life and was a romantic. Dickens is concerned with the problems of crime and poverty, (Burgess, 1984: 183-185). Another important writer of the 19th century in England is Jane Austen. According to Burgess (1984:174-175), Austen is the first important woman novelist who shows the little world of the ordinary families. Therefore, we can say that she makes a presentation of human situations. Austen can be described as a realistic, moral and social critic. We may say that by using somewhat grotesque situations and temperamentally conflicting characters, Austen paints a full picture of the landed gentry and expects her readers to draw certain moral conclusions.

Austen's heroines are independent women who share ideals in a male-dominated society. In her novels she expresses the feminist feelings of her time. Therefore, Austen makes connections with choice in marriage and the logical female thoughts. Austen's heroines are unique women who try to stand up for themselves in a society which is an ideal of feminism.

RESEARCH SIGNIFICANCE

Jane Austen is an important cornerstone of the 19th Century English literature, and in this study, it is aimed to explore the feminist motives in her novels. It is also purposed to present that Jane Austen was a feminist during the production of her works, although the feminist movement started mainly in the second half of the 20th Century.

JANE AUSTEN, HER TIME AND STYLE

Jane Austen lived between 1775 and 1817, at a time when the political and the economic importance of the country gentry made it felt throughout society. Hence, she focused on the life, manners, and values of this social segment. The landed country gentry provided her with various social types and a social context with middle class manners and mores. 'However, the social life in Jane Austen's England was not uniform and peaceful. While the privileged gentry and the nobility prospered economically and owned large lands, and the under-privileged lower classes, which mainly consisted of peasants and the jobless, were suffering from serious economic problems' (Copeland 1993:68.)

The discrepancy between the under-privileged, the weaks and the privileged caused political instability in the country. For instance: "..... the industrialists had been actively involved in a revolution of their own way", (Butler 1990:76). Also with the repercussions of the French Revolution, an increasing awareness of the need for reform was felt. In this respect, Wilks (1984:10) has pointed out that, 'Rebellion was in the air of England. Many were to champion the cause of the French Revolution while America found its sympathisers in the London of George III. Like France and America, England was ripe for rebellion, for in the time of Jane Austen it was a land of high contrasts and gross inequality in living standards and conditions '

between the nobility and gentry on the one hand and the common people on the other.’

In this rebellious atmosphere, Austen mostly dealt in her novels with the individuals and the societies in which they lived. The landed country gentry and especially the women characters constituted her main material for fiction. One may say that her fiction was mainly concerned with a depiction of women as liberal and self – confident characters in a social context with strict moral and social codes of behaviour. Therefore, her fictions to a large extent, focus on women characters rather than on the whole range of social types. This may be regarded as a limitation of her material. Yet, her insight into the status of women in her age and her concern with gender relations overcomes this limitation.

In her fiction, Jane Austen uses irony and ridicule to describe the social manners and behaviour of her characters, and her novels turn into a kind of comedy of manners. Austen can be described as a realistic, moral and social critic. We may say that by using somewhat grotesque situations and temperamentally conflicting characters, Austen paints a full picture of the landed gentry and expects her readers to draw certain moral conclusions. Her characters are fresh and lively. They reveal themselves, not only through the crises of life, but also through trivial everyday events such as walks, carriage rides, social evenings, morning calls, little unexpected visits and shopping. The height of excitement was a ball or a picnic. She has given the readers a variety of characters whose personalities are revealed through their context and dialogues .

Since Jane Austen herself came from a middle class family, she wrote for and about her own class. She deals with relationships in that small social group and the relationships between particular

individuals in that group. Marriages were between people who lived in such a society, and they provide the happy endings of her novels. Most of the Jane Austen studies consist of the changing moral values, conflicting characters, gender relations, and self-knowledge like one can easily find in Jane Austen's outstanding novels such as *Sense and Sensibility*, *Pride and Prejudice*, and *Emma*. All these issues come under the general topics of the individual and society in Jane Austen. In Austen's *Sense and Sensibility* the readers can look through a close study of the two conflicting temperaments represented by the two main female characters named as Marianne and Elinor; in them Austen portrays two feminine types who are ruled by reason and emotion respectively. 'Prides' and 'prejudices', in her *Pride and Prejudice*, are some other Universal, classical subjects of Austen in which Jane Austen's depiction of the interrelationship between love, money and marriage is analysed. Thus, the relationship between the individual and society is emphasized. Jane Austen's another outstanding novel *Emma*, is mainly concerned with difference, in class and moral values and the attainment of self – knowledge themes.

In all of Jane Austen's novels money is a recurrent and common theme. For most of her heroines, money is a basic criterion for choosing a husband as in *Pride and Prejudice*, written in 1813. Marriage was the most important concern of the period both for men and for women. Not only young men, but also young women wanted to marry a suitable person when the time came. Austen's introductory remarks in *Pride and Prejudice* stress the contemporary importance given to marriage:

It is a truth universally acknowledged that a single man in possession of a good fortune must be in want of a wife.

However little known the feelings or views of such a man may be on his first entering a neighbourhood, this truth is so well fixed in the minds of the surrounding families, that he is considered as the rightful property of some one or other of their daughters(Austen, 1987:51).

This statement shows that for the families of the age the financial aspect of marriage was a priority for them. For a woman it was important to find a wealthy husband as it was the only way for financial security. Hence, for a young man prepared to marry wealth was as important as being handsome and morally perfect. Therefore the gender relations in terms of love and marriage were conditioned and motivated by reference to wealth.

Emma (1815) is the story of the rich, beautiful daughter of a country gentleman. Her father has willingly let her have her own way after the death of her mother when she was a child. The Woodhouses are at the top of the social group in their very limited neighbourhood which is Highbury. Emma Woodhouse, "handsome, clever, and rich"(1996:5), is given free rein as mistress of the house by her hypochondriac father. Although Emma has a high opinion of herself as an intelligent and experienced person, her experience is in fact extremely restricted.

At the very beginning of the novel Emma is feeling all alone because her governess has just married Mr. Weston, who is a local gentleman. However, Emma soon makes friends with Harriet Smith who is a young woman from the local boarding school. She persuades her to refuse the marriage proposal of Robert Martin, a

respectable farmer. Soon Emma decides on a match between Harriet and the local clergyman, Mr. Elton. But Mr. Elton's attention turns to Emma herself but not to Harriet. When Emma refuses him, he goes to Bath, and then he returns with a dominant woman as his wife. In Austen's novel, Emma, the readers observe the female heroine, Emma usually as a matchmaker. Jane Austen as a female author very well dealt with the women issues and throughout the novel Emma turns into a real lady from a matchmaking girl with her real, bitter life lectures, that is to say life experiences.

JANE AUSTEN AND FEMINISM

Although Feminism gained popularity in the second half of the 20th Century, it is easy to say that the famous 19th Century woman novelist Jane Austen was also a feminist. Joannou (1995:128) states that in 1978 the Marxist-Feminist Literature Collective adopted Mary Wollstonecraft and Jane Austen as figures epitomising the feminist and feminine impulses in women's writing. Joannou additionally mentions that the Marxist-Feminist Literature Collective exemplified how these two women writers in the past had opted to concentrate their energies on access to the public sphere of life or else.

By general definition, feminism is a philosophy in which women and their contributions are valued. It is based on social, political and economic equality for women. Feminists can be anyone in the population, men, women, girls or boys. Feminism can also be described as a movement or a revolution that includes women and men who wish the world to be equal without boundaries. These boundaries or blockades are better known as

discrimination and biases against gender, sexual orientation, age, marital status and economic status.

Everyone views the world with his or her own sense of gender and equality. Feminists view the world as being unequal. They wish to see the gender gap and the idea that men are superior to women decreased

or even abolished. DeLamotte (1990:p.ix) states that Feminism has been one of the most important forces in shaping our modern-day society.

Jane Austen, who is a cornerstone of the 19th Century English literature, is clearly a critique of assumptions about both gender and social class. Her beliefs and behaviours are based on feminism (belief in the social, political, and economic equality of the sexes). (Joannou, 1995:93) states that feminism is evoked, as by Charlotte Bronte in Jane Eyre, primarily to induce our identification with the heroine in her suffering.

Austen explores the depth at which women may act in society and finds her own boundaries in the 19th Century's England. Thus, the notions of feminism often follow the subjects of class distinctions and boundaries. At the beginning of the 19th century, little opportunity existed for women, and because of this, many of them felt uncomfortable when attempting to enter many parts of society. The absence of advanced educational opportunities for women and their alienation from almost all fields of work gave them little option in life.

Austen's novels were written around the time of the early women's rights movement when women were starting to think about equal rights. She is an important step in the evolution of the

feminist movement. Austen was basically saying that women are equal to men in every way. Austen's novels show that some Victorian women were becoming independently minded.

According to Hohne (1994:155), Feminists more often see dialogue as a form of oppression, a war in which the party with the weakest and least unified voice always loses. Feminism has been a prominent and controversial topic in writings.

An important theme, parallel to feminism, in Austen's novels is the efforts of the heroines to assert their own identity within a male-dominated society. Through her novel, Austen refutes Victorian stereotypes about women, articulating what was for her time a radical feminist philosophy.

Austen criticizes the women in her novels who lack the features of logic thought. The novelist also criticizes uneducated women which is a landmark for feminists. In *Sense and Sensibility*, for example, the character Lucy Steele is described as 'ignorant and illiterate' (*Sense and Sensibility*: 118). In this novel Lucy is such a character that the readers dislike since she lacks the education to make logic decisions.

In *Pride and Prejudice* Mary Bennet is criticized by Austen. She seems more studious than her other sisters. Mary in this novel believes herself superior to her sisters because of her reading hobby, but this hobby has given her a false pride. Although Mary reads a lot she received inadequate education to make logic decisions. As a feminist novelist, Austen gives the message that all women should get formal education.

Elinor Dashwood, Elizabeth Bennet and Anne Elliot are ideal women characters who can contribute to the society as a

whole. In *Persuasion*, Anne Elliot learns to make her own choice which is an ideal of feminism. Through Elizabeth Bennet, for example, Austen shows the struggle of a woman's capacity for intelligence and identifying herself. In Jane Austen's viewpoint the independence of her heroines is a basic element for the advance of women within society.

CONCLUSION

The 19th Century brought several innovations to literature and left plenty of classics after it to readers. Jane Austen was and still is an admired novelist of this heritage. In the studies of Jane Austen's *Sense and Sensibility*, *Pride and Prejudice*, *Emma* and her other works; it has been demonstrated that the characters face many social and moral limitations and restrictions.

Austen's female protagonists have conflicts with the established norms of their society and, therefore, struggle to accommodate their search for freedom together with their submission to the pressure of the milieu. They have to fight with the social and moral norms, and undergo serious tests and experiences in order to be strong morally, socially, and in terms of gender.

Austen's novels are all about young women who find true love after some experiences. Her novels end with the heroine's marriage. Austen's choice to write novels about women in the 19th Century is a basic element of the feminist thought which emerged in the 20th Century. Her heroines are individuals who are independent to think and who defend their own choices. The novelist's characters are strong, independent and intelligent which feminism requires for women.

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Identification system by Teeth

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Abstract— Teeth recognition is one of the biometric approaches that might be used in a variety of domains related to human identity expression. It is also identified as a difficult topic essential for protecting, monitoring and intelligent human-computer interactions. The main idea behind the proposed methodology is that every photograph of a person's lips has a variety of distinguishing traits. Each tooth has its own specific characteristics.

1) INTRODUCTION

Patterns are defined as a set of facts and notions in which pieces of a system resemble one another in some way or attribute [1]. In recent times, due of their rising uses, the area of pattern acknowledgement was highly important; they frequently required more application calculations. Biometrics, for example, identity recognition based on some physical attributes such as (fingerprint or face), financial forecasting, document classifications (effective texts' analysis), retrieving and arranging multi-media repositories, and data-mining (pattern-identifying, for example, a large number of multi-dimensional trends or correlations) [3] are examples of these implementations. Biometrics may also be defined as "automated techniques to identifying or verifying people's identities based on physiological and behavioral characteristics" [4]. Humans are identified by physical characteristics rather than by exterior elements, as they must do for processing. As a result, it was difficult to replicate certain traits, and essentially similar outcomes were obtained. Many well-known techniques (fingerprint, iris, retina, face, etc.) have already been used in human identification [5,15].

❖ Teeth Recognition

Forensic dentistry is a branch of forensic medicine that looks into people's identities based on their properly recorded dental records. Although dental character identification is less secure than other biological approaches, it is the only viable option in some instances, for example natural-disasters (tsunami), charred, crash fatalities and drowned,. Unlike tissue-based organs like the eye iris and finger print, teeth not only give distinguishing features for identification, but too remain consistent throughout period due to their natural resistance to decomposition[16].

2) Main Stages of teeth Suggested System

The basic principles in the proposed system are based on the notion that all photographs of a person's teeth have unique features. These characteristics change across photographs of teeth, even between identical twins. The suggested method is consists of 3 primary steps: teeth segmentation, teeth classification, and lastly teeth numbering.

1.1 Teeth-Segmentation

In this research, the connected component analysis with 8-connectivity and the approach described by Ref.[13] were used to extract (the contour) for each tooth.

2.1 Classification -Teeth

The aim of classification is to give each tooth on a bitewing dental radiograph a molar or premolar classification. It is

necessary to establish the notations and language used hereafter before presenting the categorization technique.

3.1 Terminology and Notations

is the visible part of the tooth in the mouth (the clinical crown).

3.1.1 Mesiodistal Neck Detection Method Proposed

The way ahead is to use tooth morphology to detect mesiodistal. All tooth crowns have the lowest width on root border and the crown, as illustrated in Fig2, but roots are larger on the neck and thinner towards the end, with the most stable width around 1/3 of the way from the root's base [14]. rotate the teeth using the technique outlined in Ref.[16] before identifying the mesiodistal neck since teeth may appear skew on radiographs in many situations owing to gunshot, damage, or poor alignment. The skew angle (θ_i) of each upper/lower jaw Region of Interest (ROI_i) should be calculated as follows:

$$\theta = \begin{cases} T_i & i=1 \\ \frac{1}{2} \cdot (T_{i-1} + T_i) & 2 \leq i \leq n_j \\ T_{i-1} & i = n_j \end{cases} \quad (1)$$

is the angle of the vertical-boundary line acquired during the segmentation isolation step (T_i), and (n_j) is the maximum number of teeth in each jaw (j). For each (ROI_i) contained in the maxilla, pivot at the topright or top-left corner of the sub-image containing the maxilla and rotate it by ($\text{abs}(\theta_i)$) degrees counter-clockwise if [$(\theta_i) > 0$] or clockwise if [$(\theta_i) < 0$].

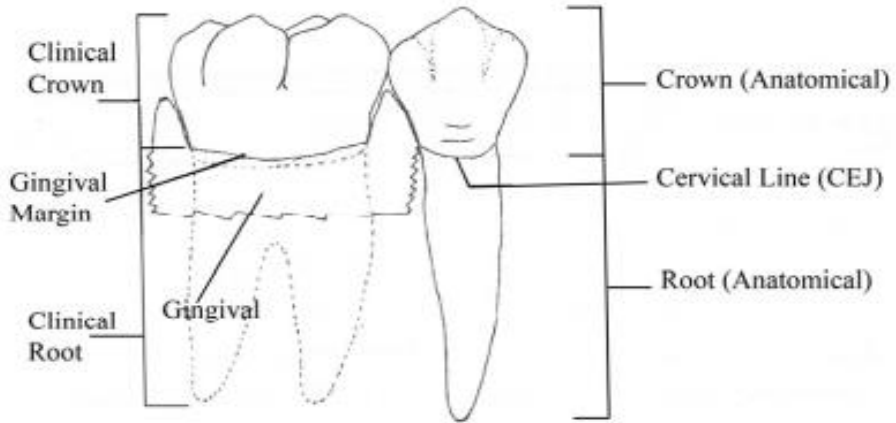


Figure1. Teeth morphology

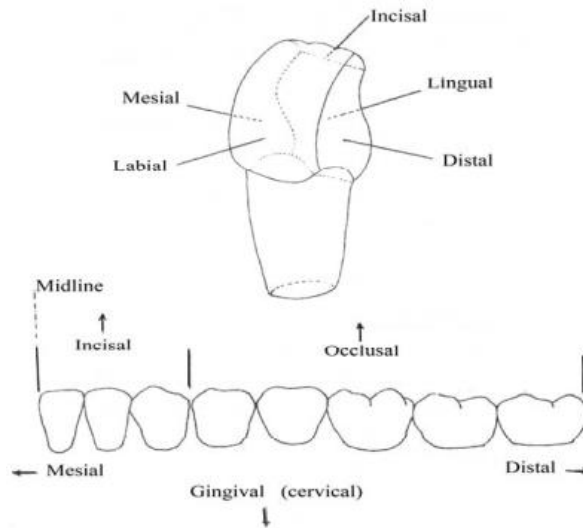


Figure2. Anterior Tooth Surfaces

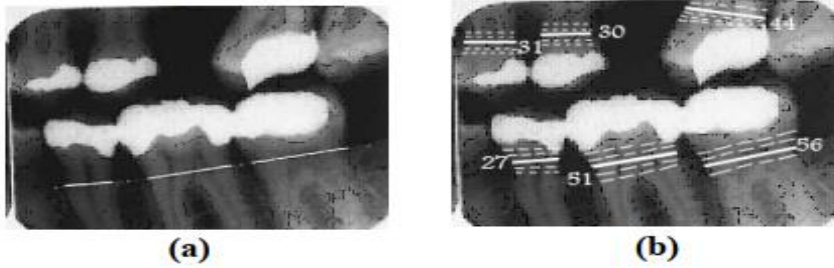


Figure 3. a) Neck Detection , b) By Proposed Method Neck Detection.

3.1.2 Proposed Method for Detection of Breaking Teeth

Breaking Teeth Detection Method Proposed Crown breakage, which can happen in most accidents, can change the shape of teeth, resulting in errors in contour-based teeth categorization or feature extraction and matching. Prior to contour-based teeth categorization, we looked at how teeth broke.

Using Our way, the crown mesiodistal calculate to mesiodistal width neck ratio. It's possible that teeth are breaking if the result value is lower than usual.

3) Results & Comparisons

To illustrate the efficacy of the suggested approach in categorizing teeth, used 80 bitewing images, containing 100 molar and 130 premolar teeth on the lower jaw and 106 molar and 103 premolar teeth on the upper jaw.

(Teeth)	(Method)	(Suggested Method)
Molar-in-Mandibular	70	100
Premolar-in-mandibular	69	100
Molar-in-maxillary	68	100
Premolar-in-maxillary	62	100

A strict comparison linear of the was performed mesiodistal neck on the teeth. It was observed that utilizing mesiodistal data, it was impossible to identify a jaw with only one type of tooth. According to data gathered from trials, the classification based on contour information is identified as acceptable when the differences between two unique types of teeth are less than 0.3.

An unique and customized model is created to determine the mesiodistal neck based on tooth morphology, as well as a reliable technique to determine missing number teeth and kind, both of which have a major impact on the teeth numbering and identification process.

To demonstrate the efficiency of the suggested technique for tooth classification, ran several experiments using 80 bitewing pictures, including 100 molar and the lower jaw teeth which has 130 premolar, whereas the upper jaw has 106 molar and 103 premolar teeth.

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Investigating the Pull-out Capacity of a Horizontal Plate Anchor Embedded in Sandy Soil

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Abstract. Anchor systems have been widely used recently due to its importance in increasing the stability of structures subjected to uplift forces and overturning moments. Accordingly, it is vital to investigate the parameters that might affect the operational performance and structural behaviour of anchor systems. The current study aims to investigate the characteristics and parameters that might affect the uplift capacity of a horizontal anchor plate embedded in cohesionless soil. The sample of soil was brought from Al-Najaf province (Iraq). The parameters that have been included are; plate embedding depth, the affective dimension of the soil above the plate and also soil improvement by treated cement and lime. The model set up include forming a steel container with dimensions (70 x 70 x 70) cm and circular steel plate of 10 cm diameter. the embedding depth ratios 0.3 of the total soil sample depth. Also, three effective soil diameters were chosen as percentages of the plate diameter; these are 1.0%, 1.5% and 3%. Several physical and chemical tests were carried out on the soil sample according to the ASTM specification to determine its classification and needed engineering characteristics. The laboratory test results revealed that for both treated and untreated soil samples, the ultimate uplift capacity of the anchor plate increases with increasing the embedded depth of the anchor plate, for example at improvement ratio ($D/d=3.0$) the ratio of the improving becomes ($P/P_o=1.72$ and 1.28) for improvement with cement and lime respectively. When the diameter of improvement soil to plate diameter is ($D/d=1$ and 1.5) with percent's cement and lime less than 3%, but the improvement soil with cement becomes the best at percent (6%). For a high value of the ratio diameter of improvement soil to plate diameter ($D/d=3$), the cement technique is the most appropriate and effective solution for improvement of the pullout capacity of anchor plate.

Keywords: pullout capacity, horizontal anchor plate, cohesionless soil, embedded depth, improvement area.

١. Introduction

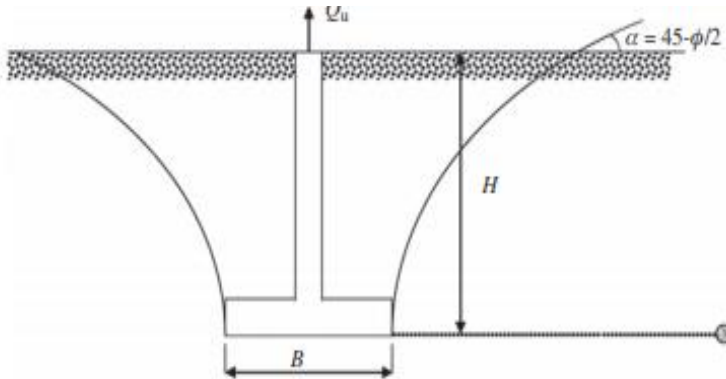
There are many structures such as transmission towers, seawalls, buried pipelines, retaining walls, and tunnels which are usually subjected to overturning moments and forces of a pullout that may threaten their stability. The use of anchor systems is considered as one of the effective techniques to enhance the foundation stability performance as demonstrated in Figure 1 (Niroumand and Kassim, 2016). Thus, the use of anchor plate systems has been recently increased and hence there has been increasing academic efforts to investigate their operational performance and the design parameters that might affect that performance .

Anchor plates can be installed in horizontal, vertical and inclined directions according to the direction of applied uplift loads. Also, they are made of several materials such as timber sheets, steel plates, cast and precast concrete slabs. In general, anchors work in a manner similar to other foundation systems, in that they earn their strength from the dead load of the soil mass surrounding them and also from the shear resistance developed along with the anchor. It is important to mention that anchor plates installation does not require heavy machinery (Choudhary and Dash., 2013).

[Figure \(1\) : Buried pipelines \(Niroumand and Kassim, 2016\)](#)

The current study aims to investigate the characteristics and operational performance of a horizontal plate anchor system model embedded in cohesionless soil. Parameters such as embedding length, effective soil diameter above the anchor plate and effect of

compaction have been examined. The soil sample has been taken from Al-Najaf Sea region in the Province of Al-Najaf.



Types of anchors and anchoring systems are being used widely all over the world. In Iraq, however, anchor foundations are of limited use and thus there is a lack of relevant studies. Previous studies have shown that the structural behaviour of the anchor system and the shape of surface of failure might greatly influence the failure loads and the load-deformation relationship. Figure 2 exhibits a typical failure surface for a horizontal anchor plate (Niroumand and Kassim ,2016).

[Figure \(2خطأ! لا يوجد نص من النمط المعين في المستند.\): Failure surface of horizontal anchor plate](#)

There have been several theories and approaches that have been produced to model the shape of failure surface of anchor plates and hence computing their uplift capacity more realistically (Das and Shukla, 2013). Some of these theories were based on laboratory works whereas the other were based on field tests. The most common ones are soil cone method (Mors, 1959), Downs and Chieurzzi (1966), Balla's Theory (1961), Vesic's approach (1971), Meyerhof and Adams (1968), and Saedy's Theory (1987). Accordingly, based on these theories lots of studies have been devoted to examine the factors that might be influential in the analysis of anchor plate systems and in

their uplift capacity. Typical examples of such parameters include type and shape of anchor, type and characteristics of soil, and the method adopted for analysis the anchor plate system. Following are a brief of only the studies that include investigating horizontal plates in cohesionless soils.

In Bangladesh, Ali (2001) studied the uplift behavior of horizontal anchor plates in sands. The experimental part included carrying out a series of anchor pull out test in the laboratory. From the test results, it has been observed that the load-displacement behavior of anchor plates is consistent with most of the similar investigations. Variations of breakout factor and displacement with embedment ratio also qualitatively satisfy most of the theoretical observations. El Sawwaf and Nazir (2006) investigated the effect of soil reinforcement on pullout resistance of an existing vertical anchor plate in sand. They adopted an empirical research methodology with small-scale model tests in which steel rods have been used as model piles. Steel rods of various diameters and lengths were installed vertically or with inclination angle. The results confirmed the viability of such soil reinforcement in modifying soil strength besides the pullout capacity of the anchor plates. The uplift response of strip anchors in cohesionless soil was also estimated by Dickin and Laman (2007). They confirmed that there is a positive proportional relationship between break out factors (highest resistances) and both sand packing and anchor embedment ratio. According to the PLAXIS modelling, the uplift performance at pre-peak conditions of strip anchors in sand can be modelled acceptably using the Hardening Soil Model.

Niroumand et al. (2010) performed an experimental studies of horizontal square anchor plates in cohesionless soil. They reviewed the results of several previous studies that tackled the pullout capacity of square-shape anchor plates buried in sand. A group of ten anchor plates that are of horizontal alignment, square shape, and with various

geometries and configurations were reviewed. Horizontal anchor plates have been found to effectively participate in maximizing soil stiffness. Depending on the reported results, several installing techniques and threshold values have been suggested. Any increase in the sand angle of friction or any increment in the embedment length may effectively rise the anchor's uplift resistance.

Liu et al. (2013) studied experimentally the pullout capacity of a strip plate anchor installed in three sand soil samples (loose, medium-dense and dense). The model plate anchor was with varying width (5 to 40) cm and with depth of embedment ranges from one plate width to 12 times plate width. The three densities of the dry sands were 1.65 g/cm³, 1.73 g/cm³, 1.85 g/cm³ (i.e, relative density, as 30%, 55%, 80%) with three angles of friction, ϕ , 34°, 38° and 43°, respectively. The analysis results showed how the load-displacement curves for loose sand are dissimilar from those for medium and dense sand. In the case of loose soil, there is a quick growth to reach the maximum uplift resistance and then starts going down steadily until the uplift strength attains its steady state. Niroumand et al. (2013) explored the influence of soil reinforcement on the uplift response of symmetrical anchor plate embedded in sand. In this part of their research series regarding the performance of anchors under pullout forces, Niroumand et al. (2013) interrogated the uplift capacity of symmetrical anchor plates. The effect of reinforcing the soil with geogrid and grid fixed reinforced (GFR) has been examined. Design parameters of the scale model included sand relative density, anchor embedment length, and the influential characteristics of geogrid and GFR reinforcement such as number of layers, size, and the nearness of the layer to the anchor plate. Choudhary and Dash, (2013) estimated the uplift behavior of horizontal plate anchors embedded in geocell-reinforced sand. In their empirical study, they explored the potential increase in the pullout capacity for plate anchors buried in sand soil

that is improved by using geocell reinforcement. The tests results proved the evident impact of geocell reinforcement in maximizing the uplift resistance ability of plate anchors; in numbers, about 1.7 times higher than the case with no soil reinforcement. Johnson and Sandeep (2016) estimated the ground improvement by using granular pile anchor foundation. The tests showed that as the relative density for a 5cm pile was improved from 50 to 70%, a 35% rise in the anchor uplift capacity was achieved. Similar behavior was obtained for pile's diameter, as the pile's diameter increases an enhancement in granular pile anchor's uplift capacity was gained. The same rise in the percentage of pull resistance (35%) was gained when the pile's diameter increased from 3cm to 5cm at a soil relative density of about 70%. Finally, the results confirmed that when the pile is encased, greatest enhancement of just over 13% in the ultimate uplift capacity was obtained for a 3cm pile.

Giampa (2017) performed an experimental study of Plate anchor-soil interaction in sand for the development of a novel anchor. As the depth of water increase, floating substructures would be the most adequate means for installing wind turbines inside the sea and as a result good anchoring system becomes a necessity. Choudhary and Dash (2018) examined the pull-out behavior of vertical plate anchor in granular soil. In their recent work they examined the pull-out capacity of plate anchor with vertical alignment embedded in cohesionless soil. According to their results, failure displacement and load-carrying capacity of plate anchors depends largely on design parameters such as soil density and depth of embedment. In the case where the anchor is embedded at shallow distance from the surface the failure would be obvious and its plane may reach the ground surface. In contrast, when the anchor installed further far from the surface the soil would experience constrained plastic deformation that will result a localized failure around the vertical plate anchor. Their analysis results showed

that the critical embedment ranged between (7h) when the soil is dense to (5h) when the soil with medium density or loose, where h represents the anchor plate height. A mathematical model has been created to estimate the load-carrying capacity of vertical plate anchors subjected to pull-out loading condition.

A very recent study was carried out by Srinivasan et al. (2020) whereby the researchers have investigated the interaction effect regarding circular plate anchors that are closely spaced and installed at shallow depth in sandy soil that is layered and homogenous. A group of large-scale model tests were carried out. The field findings illustrated that group anchors with the effect of interaction endure larger displacement in line with major decline in the uplift resistance at closer spacing. As with the case of individual anchors, the pullout resistance of group of interacted anchors rises as the embedment depth rises.

2. Experimental work

To examine the pullout capacity of horizontal plate anchor in sandy soil several design parameters have been investigated, these are anchor plate depth, anchor plate diameter and soil characteristics. In the developed laboratory model, the anchor was embedded in three different depths represented as ratios of the plate depth from ground surface level (h) to the total soil thickness (T), these depths are h/T (depth of plate to thickness of soil) = 0.1, 0.2 and 0.3. Also, three soil improvement diameter were tested which are equal to 1.0, 1.5 and 3.0 of the anchor plate's diameter. For the soil characteristics, the uplift capacity was computed for the original and treated soil, the compaction was adopted as the soil improvement technique. The treated soil was placed into a steel box model as a cylindrical column above the anchor plate.

2.1 Soil properties

The soil used in the model tests was sandy soil brought from Al-Najaf sea region in Al-Najaf province at a depth 0.25 m below ground surface level. The site characteristics of Al-Najaf soil were determined to be used in the laboratory model tests. These characteristics include physical and chemical properties of the soil and steel properties of the anchor plate. For the physical tests, the sieve analysis was performed according to the ASTM D422 on Al-Najaf sandy soil and the results are listed in Table (1). The soil was classified as poorly graded sandy soil.

Table (1): Sieve analysis results

D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Soil Classification
0.19	0.28	0.6	3.16	0.69	SP (Poorly Graded Sandy Soil)

Table 2 represents the values of the tests carried out on the soil sample in line with their corresponding standard specifications.

Table (2): Summary of soil sample properties

Soil property	Specification			
	ASTM D698	ASTM D 1556	ASTM D3080	BS 1377 (1975)
Maximum dry density (kN/m ³)	17.5			
Optimum moisture content (%)	10			
Field density (sand cone method) (kN/m ³)	15.51			
Water content (%)	2			
Cohesion (kN/m ²)	0			
Angle of internal friction (deg.)	31			

Gypsum (%)	6
Sulfate (%)	2.8
Organic materials (%)	5.7
Electric conductivity	7.1
PH	6.9

2.2 Model set up

The test container was made from a steel plate. The shape of the container was cube with dimensions (70 x 70 x 70) cm. Figure (3) exhibits the steel box along with the anchor plate model of the foundation which is a circular steel plate of 10 cm diameter. Three different sizes of steel cylinder were used to create the treated soil samples above the anchor plate, these are 10, 15, and 30 cm. The treated soil was spread inside the cylinder into many layers until reaching the ground surface level. The compacted (treated) soil was formed with unit weight and water content similar to those in the situ; unit weight of (15.5 kN/m^3) and natural water content of (2%). The anchor plate was placed at three depths (6, 12, and 18 cm), then the compaction process continued until reaching the bed of the soil level. The dimensions of the soil sample for each model are 60 cm in height and 70 cm in both width and length.

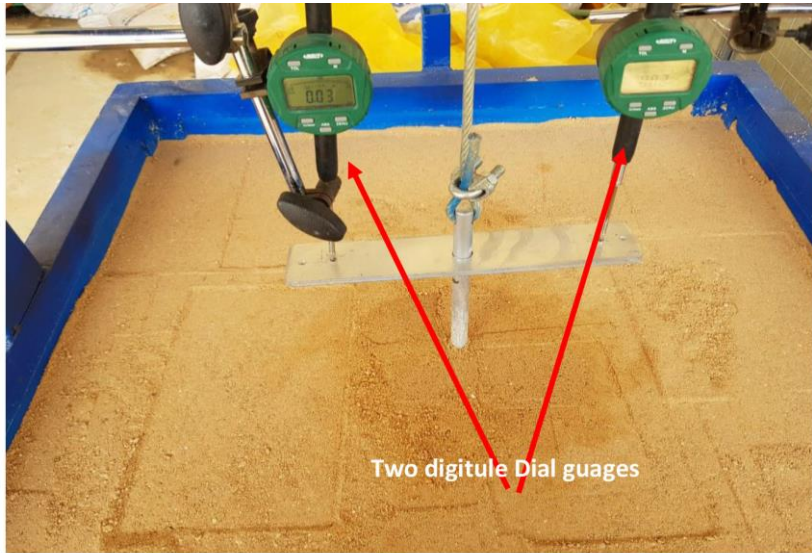


Figure (3): Steel cylinder



Figure (4): Fixed two dial gauges

Figure (4) shows the two electronic dial gauges with a sensitivity of (0.01) mm that were installed to measure the upward displacement occurred due to the uplift load. The container is provided with a steel arm used to support the steel wire required for generating the uplift load through two pulleys by a certain dead weight as (see Figures 4

and 5). For each load increment, the dead weight was maintained for 5 min. time period to allow displacement readings to stabilize with no movement. Anchor plate was embedded into the soil to constant depths ($h/T= 0.1, 0.2$ and 0.3). Figure (6) shows a schematic illustration for model set up.

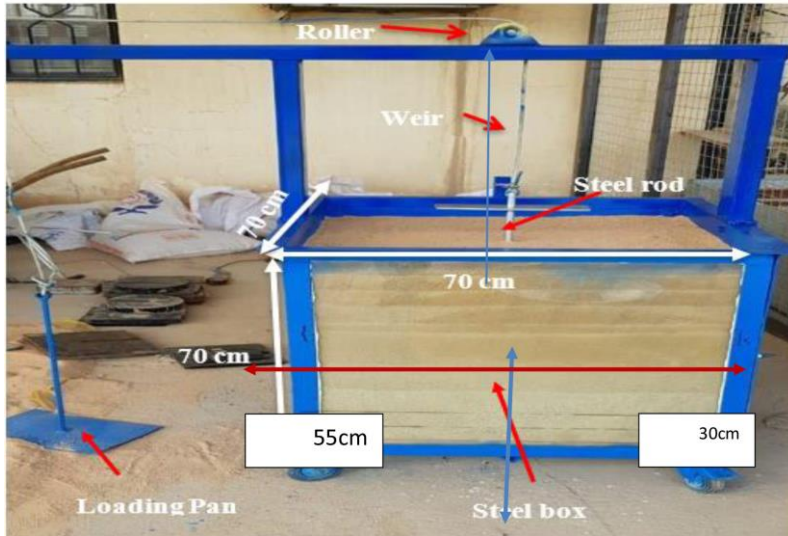


Figure (5): Experimental set-up

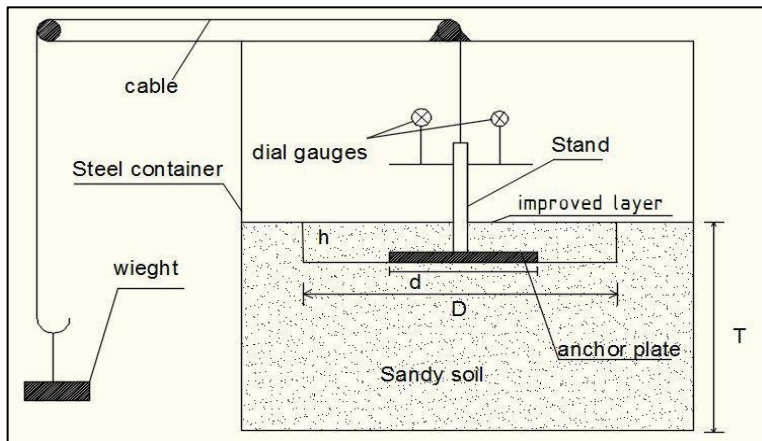


Figure (6): Schematic of anchor plate set up (خطأ! لا يوجد نص من النمط المعين في المستند).

3. Experimental results

3.1 Model tests for natural soil (Untreated Soil)

Figure (7) represents the load-displacement behavior of the circular anchor plater having different embedment ratios (h/T); 0.1, 0.2 and 0.3. Each curve shows the effect of the incremental loads applied on the displacement values of the plate before reaching its capacity. It is obvious that the embedment depth of the plate can affect the pullout response as well as the shape of the failure surface. For the model test with shallow depth of the anchor plate ($h/T=0.1$), the uplift load reached its capacity at the lowest load application among all the three cases (90 N) (Displacement small compared with $h/T = 0.2$ and 0.3). The plate at an embedment depth of 0.2 has a different response to the load application but eventually reached failure at a load of 137 N. The test with a depth ratio of 0.3 required the highest load application (215 N) to reach failure.

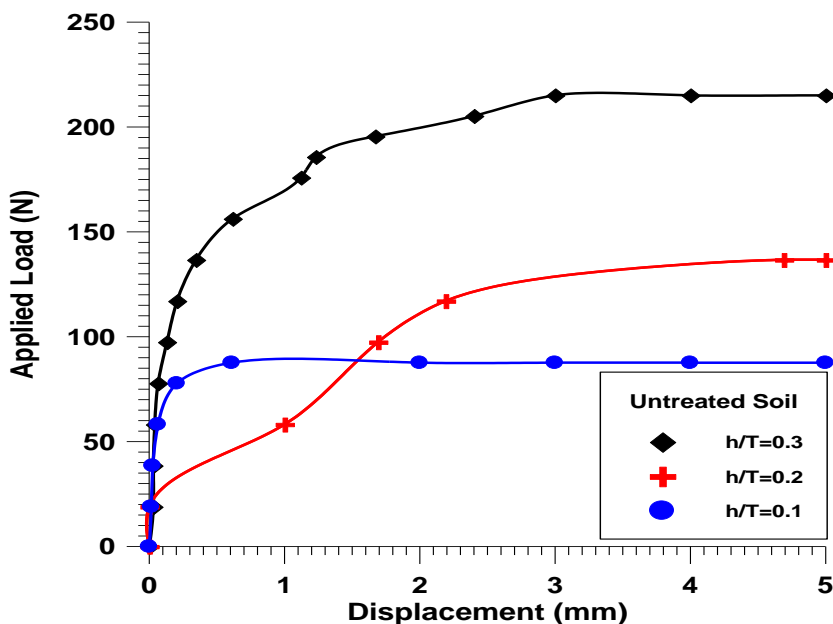


Figure (7): Applied load versus displacement for untreated soil

Figure (8) depicts images of the untreated soil tests at failure state. The failure state can be noted in any model test. The significant loss of shear strength and continuous upward displacement of the ground surface increase with no further increase in uplift load increment. Only one crack was generated on the ground surface of the soil as a circle shape with diameter equals to the anchor diameter and the failure wedge shape is similar to a cylindrical shape for model tests with shallow anchor plate ≤ 0.2 . When the $h/T=0.3$, the diameter of circular crack on the ground surface level is greater than that of the diameter plate. The failure wedge shape is like a truncated cone. The results of the present experimental work in terms of the pull out capacity of anchor plate of model test with depth $h/T=0.3$ for the untreated soil were compared with many common theories such as Mors (1959), Balla (1961), Ireland (1963), Vesic (1965), Downs and Chieurizzi (1966), Meyerhof and Adams (1968), Veesaert and Clemence (1977), and Saeedy (1987). The comparison showed a fairly

good matching with Mors (1959) and Veesaert and Clemence (1977). The discrepancy might due to the different terminology used in defining the stress at failure and soil type.

3.2 Load-displacement relationships for the treated soil.

1.1.1 3.2.1 Model Tests with Mixing Soil with Cement percent CR=1%

Figure .9 represents the curves for the load-displacement relationship for a deep plate anchor $h/T=0.3$ embedded into soil treated with low percent of cement 1%. The addition of cement with 1% to the treated soil has caused a reduction in the pullout capacity of the plate anchor to values below that of the plates in untreated soil when the area of the soil treated above the anchor plate is small $D/d \leq 1.5$. However, for a large area of soil improvement above the anchor plate $D/d=3$, the cement percent 1% is effective in increasing the plate capacity and decreasing the upward displacement



a. $\frac{h}{T} = 0.1$



b. $\frac{h}{T} = 0.2$



c. $\frac{h}{T} = 0.3$

Figure (8): Failure mode of anchor plate for untreated soil

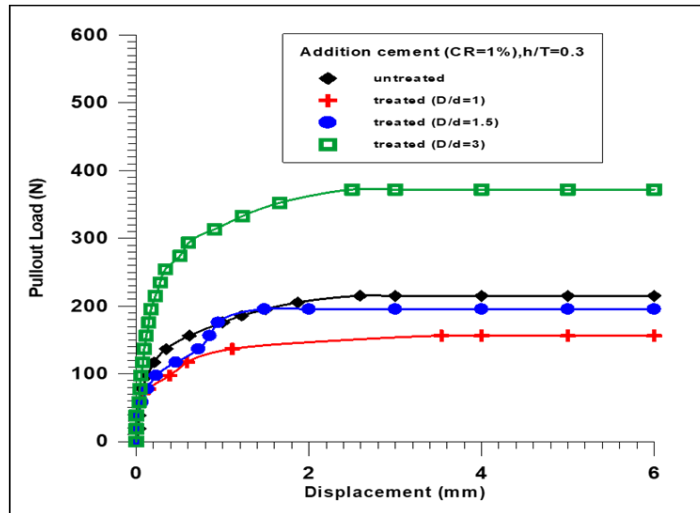


Figure (9): Load-displacement curves for untreated and treated soils with different D/d ratios, with CR=1%, and h/T=0.3. (9 خطأ! لا يوجد نص من النمط المعين في المستند.)

We can say that soil treated with cement can improve the capacity of the plate and reduce the displacement for the same load only if the diameter of the soil is large enough, in other cases the cement will be a factor negatively affecting the strength of the soil to resist the load application, and it reduces the pullout capacity can be observed in plate. (10)

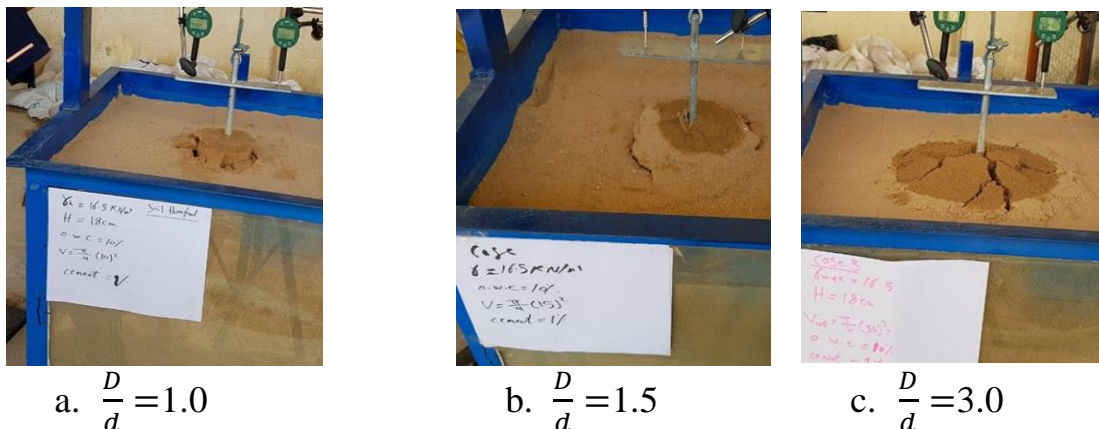


Figure (10): Images of the model tests at failure state with CR=1%, h/T=0.3 and for different D/d values

2.2 Model Tests with Mixing Soil with Cement percent CR=3% ٢, ٢٣

The variation between the uplift load with vertical displacement is plotted in figure ١١ when the adding percent of the cement to the soil increases to 3%. It can be noted from the figure, a very low upward displacement is generated at a small applied uplift load values \square 100 N, after that the displacements are increased with applied load. When the soil treated above the anchor plate, the pullout capacity of the plate increased from 215 N for untreated model tests to 460 N and 255 N for model tests with soil treated in diameter equal D/d=3 and D/d=1.5 times of the anchor plate diameter respectively. For model tests with the soil treated diameter is equals to the anchor diameter D/d=1, the cement will be a factor negatively affecting the strength of the soil to resist the load application, and it reduces the pullout capacity. It can be concluded that the capacity of the plate increase and the displacement reduce if the diameter of the treated soil with cement is large enough.

Plate 12 shows a failure mode for soil treated with CR=3% and it is similar to that of the case of soil treated with CR=1%. A radial fracture is generated in the ground surface level with increasing applied pullout loads.

Model Tests with Mixing Soil with Cement percent CR=6% ٢, ٣, ٣

In this category, a three model tests are performed of anchor plate at a depth ($h/T=0.3$) embedded into soil treated with cement percent 6% as shown in figure 4.11. It can be seen from this figure, the resistance of the anchor plate increases with increasing the area of the soil treated D/d . At working pullout load of 210 N, the corresponding upward displacements of anchor plate is decreased from 2.5 mm for untreated soil condition to 1.1 mm, 1.22 mm and 2.2 mm for the model tests with $D/d=1, 1.5$ and 3.0 respectively.

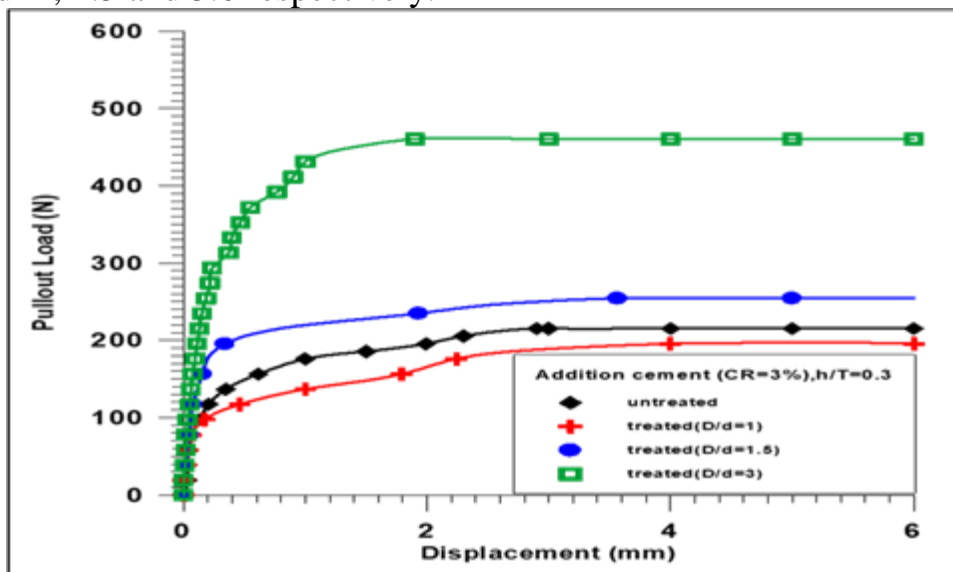
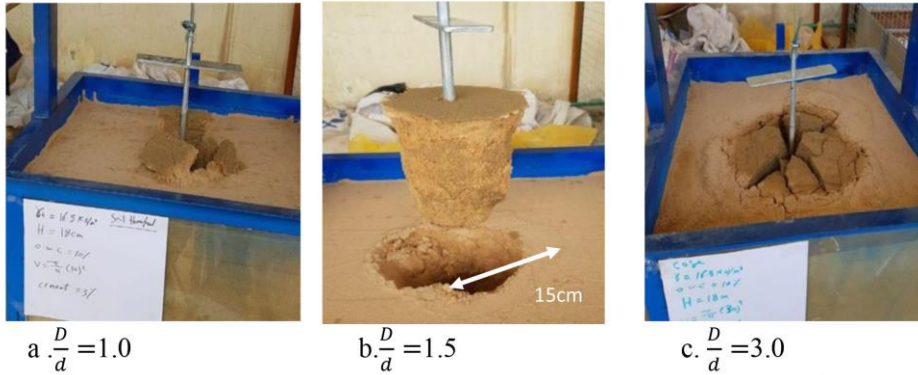


Figure (11): Load-displacement curves for untreated and treated soils with different D/d ratios, with CR=3%, and h/T=0.3



12: Failure surface for treated soil with CR=3%, h/T=0.3 and for different D/d values (خطاً! لا يوجد نص من النمط المعين في المستند). plate

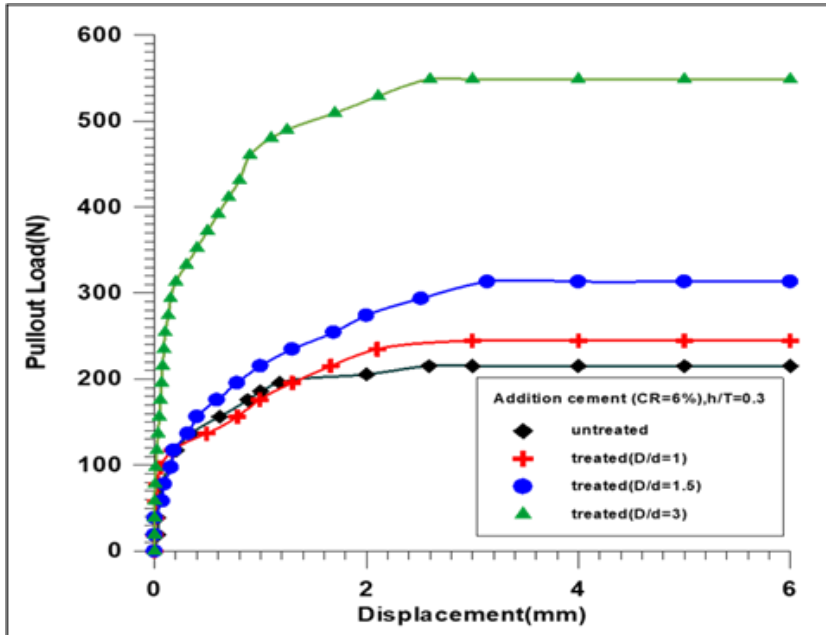


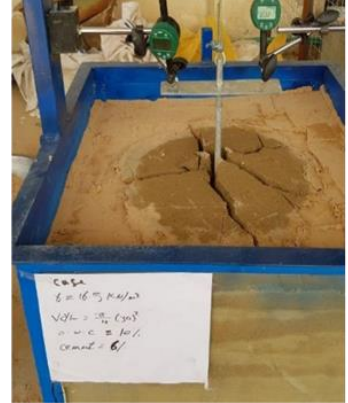
Figure (12): Results of model tests for depth ratio ($h/T=0.3$) for untreated and treated soils with different D/d ratios, with $CR=6\%$



a. $\frac{D}{d} = 1.0$



b. $\frac{D}{d} = 1.5$



c. $\frac{D}{d} = 3.0$

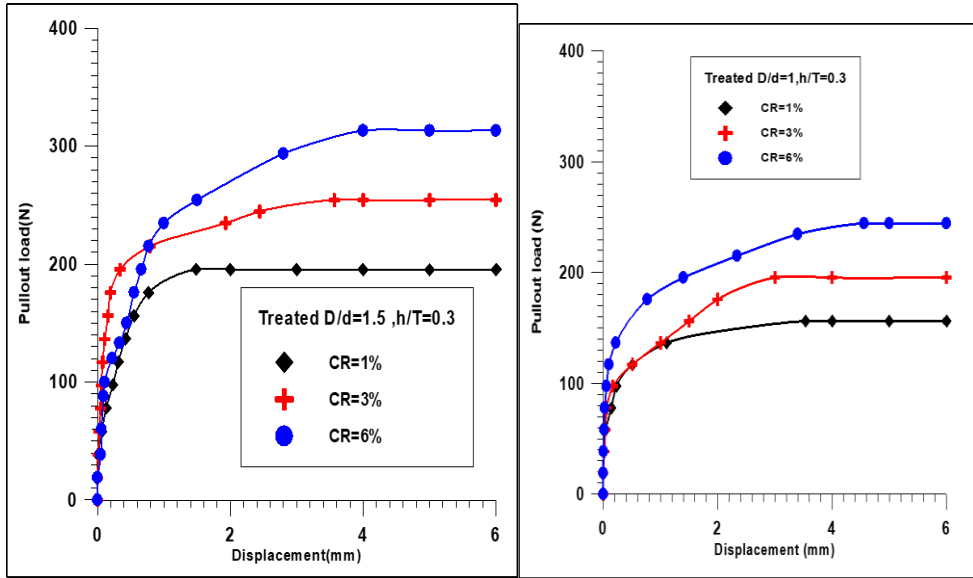
Figure (13): Deformations of model tests for treated soil with CR=6%, h/T=0.3 and for different D/d values

3.3 Effect of the

adding of different cement percentages to the soil above an anchor plate at a various the area of treated soil.

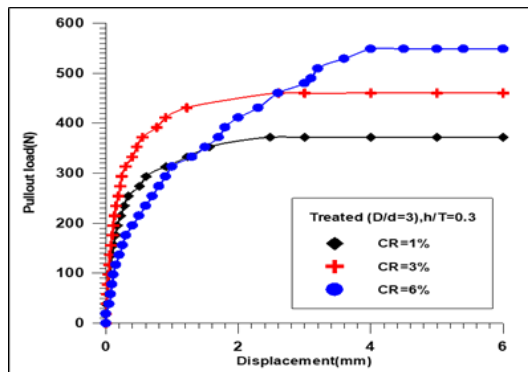
Figure 4.12 show the variation of the applied pullout load with the corresponding upward displacement at different values of cement percent's CR and diameter of the treated soil D/d. It can be noted that all three curves have a linear shape at small values of the applied pullout loads.

At a constant value of the treated area of the soil, the magnitudes of the anchor plate capacity increase with increasing the percent's of the adding cement to the soil located above the anchor plate. In general, at a high cement ratio with a larger treated soil diameter D/d lead to a highly increases in the pullout capacity and reduces the displacement of the anchor plate. In conclusion, a higher improvement diameter increased the peak capacity and a doubled cement ratio in the treated soil has increased the pullout capacity of the plate by 20-25% and generated higher displacements for the same loads applied and that is compatible with what was proven by Censoli et. al in (2013).



(a)

(b)



(c)

Figure ١٤: Relationship between Pullout load versus upward displacement at different D/d values for various cement percent's

٢.4 Anchored plate performance for soil mixing with cement

The ultimate pullout resistance of the plate in figures 4.13 and 4.14 is obtained from the pullout load – vertical displacements model tests as a last point in the load-displacement curve.

Figure 4.13 represents the variation in the pullout capacities ratios between untreated and treated soil with cement, for different values of the improvement diameter D/d. By inspection plate, it can be noticed that the curves are nearly linear. For any values of cement percent's, the ratios of P/P_o increase sharply with the increase in the area of the treated soil D/d.

The relationship between P/P_o and the adding cement percent's is plotted in figure 4.14. It is noticeable that a higher improvement diameter and a higher cement ratio in treated soils increase the pullout capacity of the anchor plate compared to that of the anchor plates embedded in untreated soils. However, the pullout capacity in treated soils in some cases is smaller than that for the untreated soil and the pullout ratios are thus smaller than 1

A mathematical equation by using a regression analysis by MS-statistics is presented in equation 4-2. Figure 4.15 illustrates the relation between predicted and observed P/P_o values. The coefficient of determination (R-squared), which is a statistical measure to

examine how close the data are to the fitted regression line of this equation, is equal to 0.99.

$$\frac{P}{P_o} = C_1 * \left(CR * \frac{D}{d} \right)^{C_2} + C_3 * \left(\frac{D}{d} \right)^{C_4} + C_5 \quad \dots\dots\dots (4-2)$$

Where the values of the coefficients in the equation are as the following:

C1=0.21

C2= 0.61

C3=0.13

C4=1.82

C5=0.38

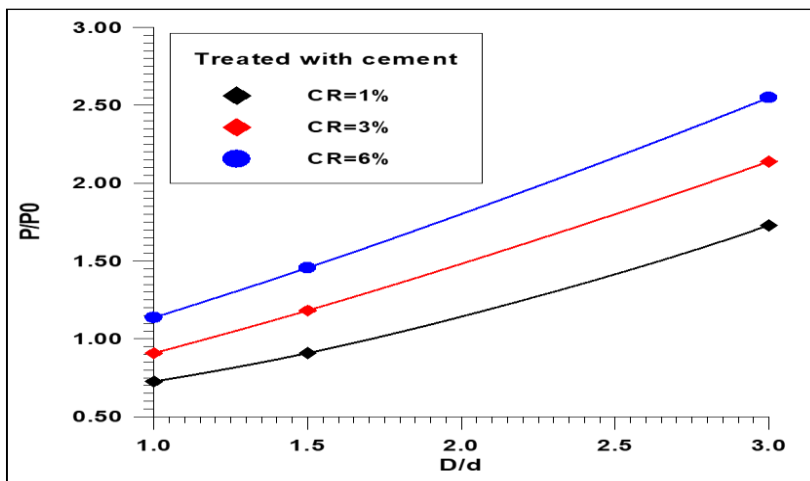


Figure 15 : Pullout capacity ratio for treated to untreated soil with cement for different values of D/d ratios and CR values

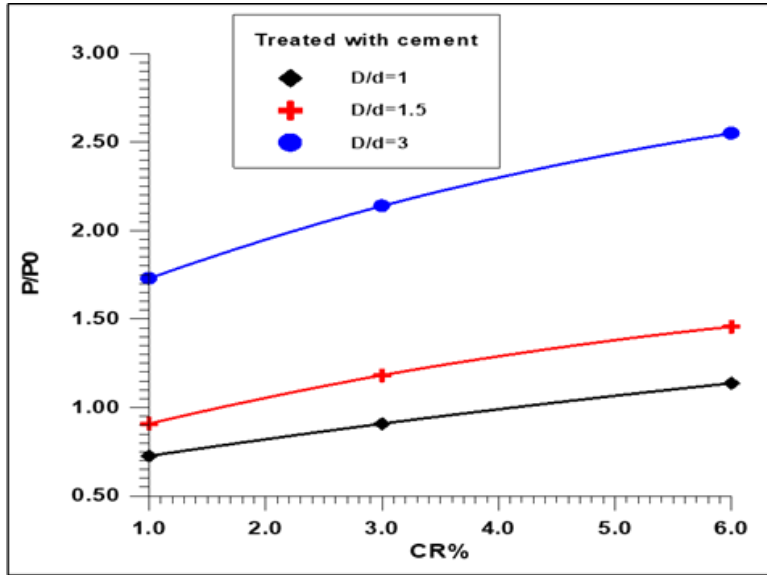


Figure 16: Pullout capacity ratio for treated to untreated soil with cement for different values of CR and D/d ratios

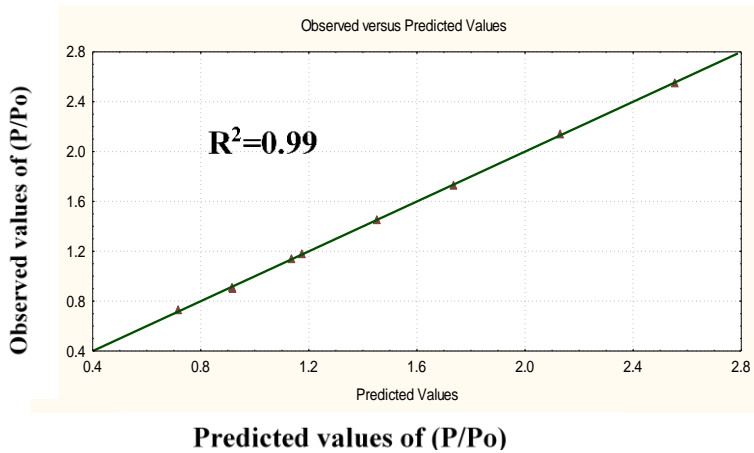


Figure ١٧: Predicted versus observed P/P₀

Technique cement								
D/d	h/T=0.3	h/T=0.3			h/T=0.3			
		CR=1%	CR=3	CR=6	LR=1%	LR=3	L R= 6	
1	225	157	195	245	145	165	19 8	
1.5	275	195	255	310	165	215	25 5	
3	345	372	460	545	272	315	41 0	
P/Po=1.72			P/Po=1.28					

5. Conclusions

Based on the obtained findings, the following main conclusions can be drawn:

- 1- High resistances of the anchor plate can be observed when the soil is improving with cement at 6%.
- 2- For all model treated or untreated tests, the ultimate pullout capacity of the anchor plate increases with increasing the embedded depth of the anchor plate with amount increase 150%.
- 3- At (D/d=3), the adding of the cement with any percentages is as a best technique in improving of the anchor plate.
- 4-
- 5- For the untreated soil tests and during the applied load, only one

crack was generated at the ground surface of the soil as a circle shape with diameter equals the anchor's diameter. The failure wedge shape is cylindrical for the tested model with shallow anchor plate ≤ 0.2 .

- 6- At failure state for the untreated model with anchor depth $h/T=0.3$, the diameter of circular crack on the ground surface level is greater than that of the diameter plate. The failure wedge shape is like a truncated cone.
- 7- When the ratios of the diameter of the soil treated to the anchor plate diameter are small ($D/d \leq 1.5$), no effect of the adding cement or lime of the soil with percent (1%), but with increasing (D/d) to 3.0, the ratio of the improving becomes ($P/P_o=1.72$ and 1.28) for improvement with cement and lime respectively
- 8- For model test with improvement cement or lime with percent (3%) above the anchor plate ($D/d=1$), Negative effects can be selected on the behavior of the anchor plate and can be observed. With increasing the ratios (D/d), the improvement becomes effective.
- 1- . High resistances of the anchor plate can be observed when the soil is improving with cement at 6%.
- 9-
- 10- At low percentages of cement or lime ($\leq 1\%$) and ($D/d \leq 1.5$), only the compaction technique must be used to increase the ultimate capacity of the anchor plate.

- 11- At any values of D/d , the adding of the cement with 6% to the soil above the anchor plate is better than that adding the lime with 6% and compaction method to increasing the resistance and decreasing the displacement of the anchor plate

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Prediction of the compressive strength of high performance concrete using random forest algorithm with training-testing dataset sizes

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ABSTRACT.

The accurate prediction of Compressive strength (Cs) of High Performance Concrete (HPC) is a very important element for concrete industry and the society of civil engineering. In this research we propose a method for prediction compressive strength of concrete by using a random forest algorithm with using different train-test dataset sizes. Our goal was to obtain the best performance prediction model that can give us a better performance than the traditionally linear regression model. We split our dataset into four different sizes. Our best performance model obtained when the dataset divided into 70% for training and 30% of testing. The best performance achieved a much better performance than linear regression for testing dataset with (R-correlation = 0.967, MAE=3.241, RMSE=4.345) while linear regression model achieved (R-correlation =0.7742, MAE=8.4341, RMSE=10.7531). The second step of this research is to confirm the validation of our predictive model with newly published data. For this reason, we studied the behavior of HPC containing blast furnace slag in term of Cs with different age. When compared to the findings of actual concrete Cs tests, our model produced a very close results.

1.Introduction.

In the past few years, the use of high performance concrete (HPC) has spread significantly in the construction industry (Lim et al., 2004). It is clear that the use of HPC has multiple benefits such as increased durability, sufficient workability and excellent high strength. In order to make HPC, we have to use chemical additives and auxiliary cement materials such as blast furnace slag, fly ash, silica fume, and

superplasticizer. This added some challenge to the process of accurately predicting the compressive strength (Cs) of HPC.

High performance concrete's compressive strength (HPCCs) can be determined using standard compression testing. However, determining the HPCCs is a time-consuming, inconvenient, and costly procedure. Various regression coefficients are introduced into the empirical model to represent the impacts of various additional materials. As a result, the empirical formula's capacity to predict is questioned, because the relationship between the Cs of HPC and its constituents is very nonlinear.

New machine learning approaches offer the possibility of precisely predicting the HPCCs. Artificial neural networks (Sebastiá et al., 2003), support vector machines (Safarzadegan Gilan et al., 2012) decision trees (Cheng et al., 2014), and ensemble algorithms (Erdal et al., 2013) have all been utilized to forecast the Cs of HPC in the previous two decades. These researches revealed that models relying on machine learning algorithms can make better estimates than models depending on regression analysis, and that models built on an ensemble method perform best when the basic predictors are properly picked (Chou et al., 2014).

in this research we will use one of most powerful ensemble machine learning algorithm which is random forest (RF) to predict the Cs of HPC. RF has attractive characteristics. These characteristics are (VIMs) variable importance measures (VIMs), utilizing a few model parameters, and strong resistance to overfitting (Auret & Aldrich, 2012). Even with default parameter settings, RF models can produce

satisfactory results (Svetnik et al., 2004). The number of choices of base variables and parameter settings can be decreased to one when using RF. RF has been used in a variety of domains, including ecology (Svetnik et al., 2004) and bioinformatics (Schwarz et al., 2010).

In this research we utilized RF algorithm to predict the Cs of HPC at early and late stages. First, to improve the performance of our model we used different Train-Test Split dataset sizes. Four different Train-Test Split dataset sizes were created which are 1) Train: 50% and Test: 50%, 2) Train: 60% and Test: 40%, 3) Train: 70% and Test: 30%, and 4) Train: 80% and Test: 20%. Second we compared our optimal prediction performance model for test dataset with linear regression model. Third, we took this research one step further by investigating the validity of our model with new experimental dataset.

2. Methods.

2.1 Random forest.

It is a machine learning algorithm developed based on a set of decision trees. This algorithm is used for classification, regression and other tasks. RF algorithm usually has better accuracy compared to decision tree. The first person to create the RF algorithm was Tim Ho in 1995. This algorithm was improved by Leo Breiman (Breiman, 2001). To generate a RF, the data must be divided into multiple random subsets. Then a tree is trained for each subset. Each tree will have its own prediction for each new example coming. The final prediction of the model will be determined by voting. A RF algorithm can rank variables based on their importance. The basic formula for evaluating significance is the same as that of a decision tree (eg

entropy or Gini coefficient). The only difference is that the importance scores for different trees will be averaged.

2.2 Split train-test procedure.

When machine learning algorithms are used to make predictions on data that was not used to train the model, the train-test split process is used to measure their performance. To find the best model that predict the Cs of HPC, we trained RF on four different sizes of training and testing datasets which are: 1) Train: 50% and Test: 50%, 2) Train: 60% and Test: 40%, 3) Train: 70% and Test: 30%, and 4) Train: 80% and Test: 20%. We evaluated the performance of our optimal using evaluation metrics. We also compare the performance of our best RF model with linear regression. The full mythology for this research is described in Fig 1.

2.3 Performance evaluation

Four commonly used performance indicators were chosen.

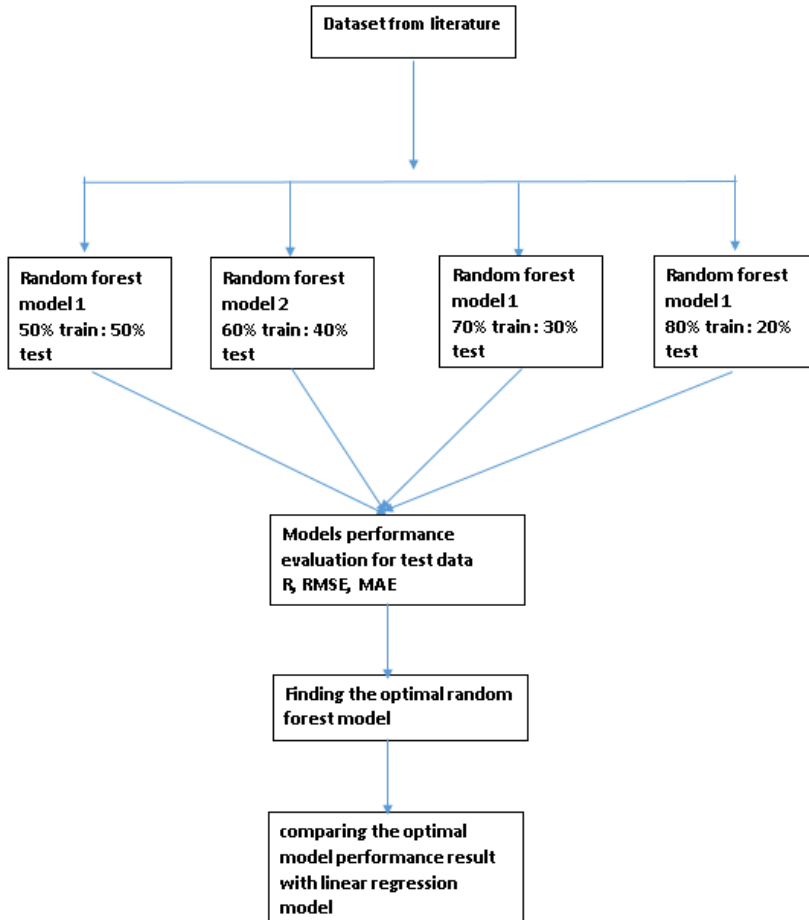
2.3.1 Linear correlation coefficient

$$R = \frac{n\sum y \cdot y' - (\sum y)(\sum y')}{\sqrt{n(\sum y^2) - (\sum y)^2} \sqrt{n(\sum y'^2) - (\sum y')^2}}$$

where y represents the actual response, y' represents the forecast response, and n represents the number of observations in the testing set

2.3.2 Mean absolute error

$$\text{MAE} = \frac{1}{n} \sum |y - y'|$$



2.3.3 Root mean squared error

$$\text{RMSE} = \sqrt{\frac{1}{n} \sum |y - y'|^2}$$

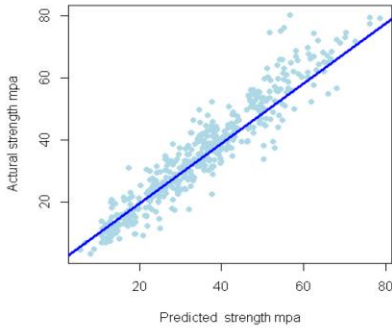
Fig 1. Research methodology

2.3.4 Dataset

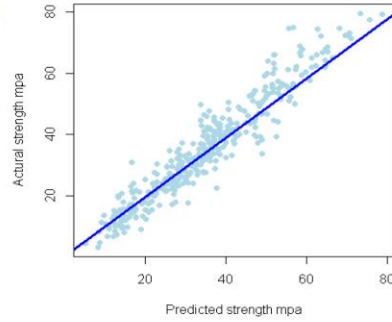
Yeh's original dataset included 1030 samples built with regular Portland cement and cured under typical conditions (Yeh, 1998), which he gathered from 17 different sources. The UCI machine learning repository has this dataset available for download. Accepted approaches were used to convert all of the specimen types into 15 cm cylinders. Many studies have utilized this dataset to explore HPCs, and it has proven to be reliable (Yeh, 1998)(Chou & Tsai, 2012) (Chou et al., 2011). Cement (C), blast furnace slag (BFS), water (W), fly ash (Fa), superplasticizer (SP), age (Age), coarse aggregate (CA), and fine aggregate (FA), and concrete compressive strength (CCS) are the variables in the original dataset (CCS). The CCS is the response variable, while the other seven variables are independent input components Table 1 summarize the HPC components and CSS.

Table 1 HPC attributes

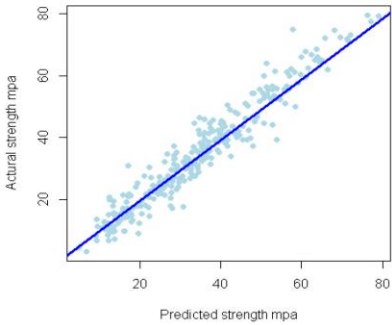
Concrete components.	Min.	Max.	Avg.	Standard deviation.
Cement(kg/m3)	102	540	281.1679	104.5064
Waster (kg/m3)	0	359.4	73.89583	86.27934
superplasticizer(kg/m3)	0	200.1	54.18835	63.997
blast furnace slag	121.8	247	181.5673	21.35422
fly ash(kg/m3)	0	32.2	6.20466	5.973841
coarse aggregate(kg/m3)	801	1145	972.9189	77.75395
fine aggregate(kg/m3)	594	992.6	773.5805	80.17598
Age(Days)	1	365	45.66214	63.16991
Compressive Strength(Mpa)	2.33	82.6	35.81796	16.70574



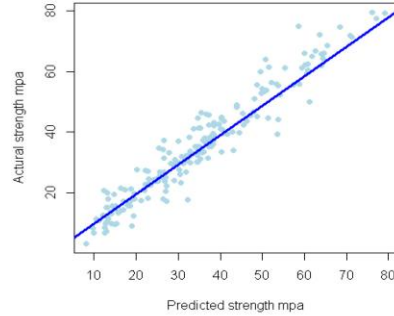
d) 50% train:50% test



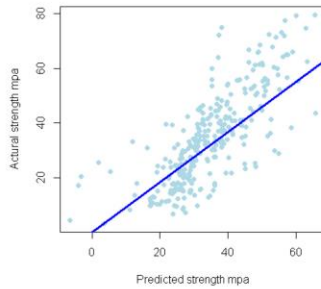
c) 60% train:40% test



a) 70% train:30% test



b) 80% train:20% test



3. Results and Findings.

The performance measures for models generated with various training-testing dataset sizes are summarized in Table 2. Each performance measure's best outcome is shown in bold text. The best performance model can be seen in 70% train:30 test dataset size. We can also notice that the other three prediction models give up a good prediction accuracy which mean RF is a robust algorithm in term of prediction Cs of HPC. We also compare our best prediction accuracy model obtained by the above procedure with linear regression. We discovered that our model outperformed linear regression in terms of prediction accuracy. For each of the four RF models and linear regression model, Fig. 2 provides a comparison between predicted and actual values. The predicted values are quite close to the actual values for RF models.

Table 2 Comparison of performance measurements for models

Model	R	MAE	RMSE	Number of train observations	Number of test observations
50% train: 50% test	0.9531	3.8415	5.2098	516	515
60% train: 40% test	0.9599	3.6572	4.8952	619	412
70% train: 30% test	0.967	3.241	4.345	722	309
80% train: 20% test	0.9654	3.3575	4.5952	825	206
Linear regression	0.7742	8.4341	10.7531	825	206

4. Validation of the models suggested

Our purpose of this step is to validate the result obtained from our model with new published data. The experimental work used to validate our result was implemented in Belgium (Gruyaert et al., 2013) . The purpose of this experimental work was to study the effect of blast furnace slag on behavior of HPC with different age (28,90,180) days. the percentage of GGBFS ranging between 0%, 50%, 70%, and 85% of cement mass. Table 3 shows that the experimental values and the RF forecast are in good agreement. Given that all of the values in the “Experimental/RF” column is near to 1, it is safe to conclude that the proposed RF model is accurate enough to predict Cs of HPC using this dataset.

Table 3. validation of our model with unseen data.

S. No.	Experimental value (Mpa)	prediction (Mpa)	Experimental/RF prediction
1	39.96	51	0.783538532
2	38.42	44	0.873150106
3	34.72	38	0.913616891
4	35.64	32	1.113662791
5	52.17	53	0.984313295
6	55.40	54	1.025990525
7	46.42	46	1.009049545
8	48.63	40	1.215784884
9	50.89	52	0.978711986
10	56.50	54	1.046382429
11	48.91	51	0.959005928

12	50.67	40	1.266627907
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5. Conclusion

In this research we propose a method find the optimal model that predict Cs of HPC using RF. Our method was based on dividing the dataset into four different training-testing sizes. Even with default parameter settings, our four RF models exhibit a great performance for HPCCs prediction with the optimal model obtained by 70% train: 30% test. This was confirmed by comparing our best model with linear regression model. Our best model outperforms linear regression model. Moreover, we validate our model with unseen experimental data. most values of experimental test/RF were near 1.

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Robot-assisted for medical surgery: a literature review

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Abstract

Robotic surgery has become one of the necessary techniques in many surgeries, including gynecological surgeries, urology, prostate, cardiac operations, catheters, arteries, and brain surgeries. The research problem is small wounds that, in the past, required a high level of expertise and an absolute focus to perform them. The robot helps the surgeon in surgeries that require working through tiny incisions; the robot can fix the telescope without movement or fatigue. The doctor was able to control its movements very accurately. Robots today assist the surgeon in many surgical interventions; minimally, the robot supports the surgeon with excellent vision, image, and precision to perform accurate surgeries with minimal surgical intervention. In this research, a general systematic literature review was performed in surgery robots.

Keyword: - surgery, robots, orthodontic, computerized, PUMA 560 robot

Introduction

There have been many movies simulating the robotics industry, describing the Three Laws

- 1- Robots may not harm a person, nor do they allow anyone to harm them.
- 2- Robots must implement all human commands without contradicting the first law.

3- Robots must protect people, provided that they do not oppose the first and second laws.

As the robot's developments in surgery, but despite the rapid development in the field of robotics, it did not reach what is found in movies and science fiction. The robot can be defined as a human-controlled and programmable device. It is a mechanical device controlled by a computer, just as there are very few robots that mimic human behavior in terms of movement and thinking. In 1980 they used the robot for surgery with the PUMA 560 robot[1][2]. The same robot was then used later to perform a transurethral resection of the prostate. The PUMA 560 robot was used after that for prostate surgery. For this, the robot was developed the PROBOT, and design of the prostate surgery [3].In the same years, the ROBODOC was a design and developed for Knee replacement surgery, and at the final, the robotic was approved by Food and Drug Administration (FDA).In a few years, robotics has developed and spread widely, especially in surgery. The benefits of robotic surgery are to increase the range of motion and stability, and it is instrumental in working in limited settings, unlike conventional surgery [4][5]. The American health care system had become more interesting in robotics surgery, and in 2017, the American hospitals investing in 2800 the robots in his hospitals. Nearly three billion dollars are produced from the surgical robotics industry in proceeds per year. Furthermore, they will be increasing 2022, approximately 15%[6]. For years, the Intuitive Company invested the robotic-assisted systems; it was the controller of the technology [7].Despite the great development in the robotic surgery industry, robotic surgery is often costly for the government's health

system and small hospitals. Besides, the doctors noticed some weaknesses in the technology, lack of response quickly, and weak transmission[8][9]. A comparison between the robot and humans in strength and weakness between[10][11][12] , as shown in the table 1

	Robotic Surgery	Traditional Surgeries
Shorter operating time	✓	
Shorter post op stay	✓	
Shorter recovery time	✓	
blood loss	✓	
Less post op painless scarring	✓	
Less complications	✓	
Less infection risk	✓	
Less transfusion requirement	✓	
Less fatigue (surgeon)		✓
Less expensive equipment		✓
Small incisions	✓	
Less anesthesia required	✓	✓
Fewer doctors	✓	
Improved dexterity Fulcrum effect	✓	✓
Longer setup time	✓	
Significant haptic-feedback	✓	✓

Literature review

[13]The number of hernia injuries in the world has increased, so the robot has been used in operations, but the details of the great benefits of using robots have not been aforementioned; the study aims to summarize the results of using robots in hernia operations. The study included 15 cases. Side effects after hernia surgery were significantly reduced with robotics. The patient's presence was reduced to three days with robot-assisted comparison without using a robot. Although

using a robot takes a longer time in surgery, but using a robot may be a good option.

[14]in orthodontic treatment, there is always a need to improve the efficacy and efficiency of appliances. Improvement of the orthodontic appliances would improve general dental treatment, thus changing the standards of oral health. This study aimed to compare the traditional wire bending in fixed orthodontic appliances with the robotic made wire, see figure 3. Also, to check if robot wire bending is superior and has better results than traditional wire bending. It was found that the use of a robot to bend an archwire in the process of making a fixed appliance increases the treatment accuracy, efficacy and efficiency. Also, it decreases the treatment time and patient discomfort, thus improving the orthodontic treatment in general. This study has found that the treatment time is improved significantly with better diagnoses when archwire bending involves specialized robots. However, this is probably true for simple cases. The study was not performed on severe malocclusion cases but involved only mild cases.

[15] The robotic Described for the first time in 2003, pancreatic surgery, shows exciting results. The study was on 50 patients with a malignant and benign pancreatic disease, and all data were saved for future use. The data used in the study indicate that robot-assisted rest can provide many benefits, including reducing blood bleeding and recovering from the operation quickly.

[16] In this study, robots were used to perform brain operations in children with tumors located inside the brain stem. This study was not monitored by IDEAL for surgical safety. After searching a two-year

database of children undergoing the operation using robots and re-evaluating the operation using magnetic resonance imaging, the results showed that the patient's stay in the hospital was less, and there were no complications after the operation. Brain stem using robotics in children is safer and less stressful.

[17] This study is to valuation the performance of the robot in kidney transplantation. The operation was performed on eight patients by taking a sample from a living giver kidney. The patients who underwent operation with the robots were collect the data to compare with the open surgery. There were no essential differences between the two operations. Still, it was found that by using the robot, the degree of pain decreases the fourth day after the operation, and there is a difference in the incision and length wound.

Taxonomy of robots

Computer surgery has entered the field of surgery as a new field under the name of robotic surgery. This field comes with a microprocessor, motion control, and sensitive data processing. Movement tracking is used to obtain an accurate measure of the robot's location and movement used in the field of surgery. It uses tools installed on the robot such as light-emitting diodes (LED), and cameras are considered optical-electronic tracking systems [18] [19]. There is another track called mechanical tracking. Sensors (encoders) are used, as shown in Figure 1. About the Venn diagram is to illustrate areas of surgery with computer assistance with robots.

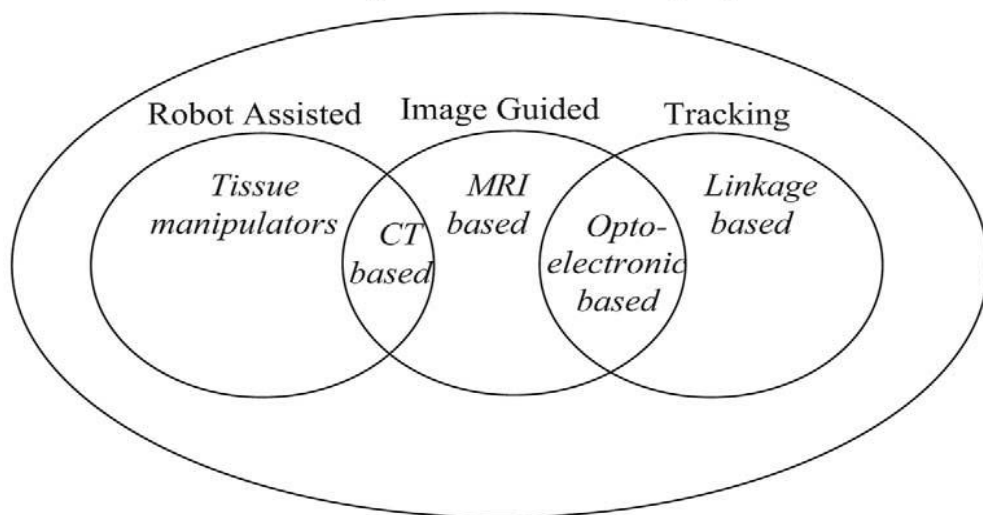


Figure 1: computer aided surgery with the robot assisted

Over the past twenty years, many surgical robots of various shapes and functions have been developed and implemented on a large scale. Many authors have dealt with the topic of the taxonomy of robots. Taylor relied on classifying robots according to technology, role, or use. He relied on the taxonomy of robots according to diseases such as Heart disease and urinary tract.

Robots are divided into three separate groups:

1. Passive role: The law is limited in size and scope. There are not many risks.
2. Restricted role: Robotics is responsible for many tasks with a powerful impact, but at the same time, they are restricted in use.
3. Active role: Robots bear a high responsibility in the procedures and significantly with various risks

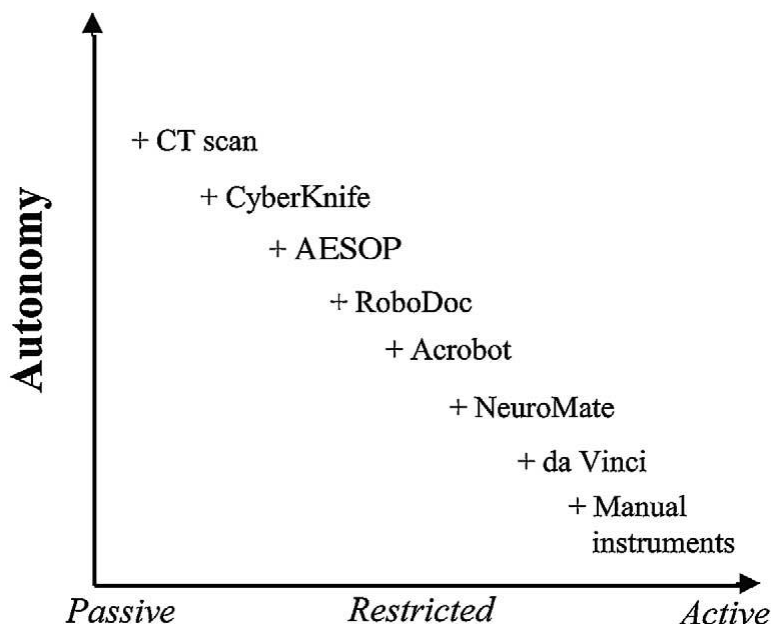


Figure 2 Robots Role

Of the three classifications, active roles are more appealing than the rest to a large extent; however, they are restricted due to artificial intelligence. For example, active roles play a large role in high and dangerous tasks and require human interaction and supervision, leading to surgeons' exhaustion and fatigue during the Process[20][21] As shown in Figure 2, all robots are described.

- *CT scan*

A computerized tomography (CT) scan combines a collection of X-ray photographs taken from particular angles around your body. It uses pc processing to create cross-sectional images (slices) of the bones, blood vessels, and gentle tissues internal to your body. CT scan images provide particular extra data than simple X-rays do. A CT scan

has many uses; however, it is especially well-suited to rapidly examine humans who can also have inside accidents from vehicle accidents or different kinds of trauma. A CT scan can visualize nearly all components of the body and is used to diagnose sickness or damage and plan medical, surgical, or radiation treatment [22]

- *CyberKnife*

Exactness (Sunnyvale, CA) has built up the first stereotactic picture guided gadget that performs continuous enrollment. Digital Blade can be utilized to emanate a scope of tumors, even in deformable organs, for example, the lungs, by checking the chest's activity and wavering the automated simultaneously. The restoring procedure begins with preoperative CT pictures of the tumor contribution to a course arranging calculation that creates the spatial heading for the direct quickening agent carried on the robot. It precisely enrolls the preoperative heading by connecting continuous radiographic pictures with the preoperative CT photographs to recognize and eliminate the patient's tumor. Digital Blade is absolutely independent through the methodology while it controls the straight quickening agent coordinated towards the tumor. Notwithstanding, before the system, the PC produced heading must be painstakingly evaluated and conceivably altered through the medical services proficient or radiotherapist, consequently reducing self-rule. Since the radiation phase is sufficient to demolish harmful cells, Digital Blade expects a more dynamic capacity than CT. While alluring in a gigantically loaded with live collaboration, the robot does not connect with the patient, so the extent of its association with the patient is as yet compelled. [23].

- *RoboDoc*

Robotics play an important and effective role in orthopedics because it is the hardness of the bones. RoboDoc is used in forestry, where the bones' section is imaged before surgery, and the appropriate tools are chosen for the operation. The robot determines the path for cutting the bones so that the surgeon tracks this path for cutting[24]. Preoperative preparation and the operation of imaging and selecting tools reduce the surgeon's independence. Bone grinding is a lot and complex, so the role of robots in orthopedics is very restricted.

- *Acrobot*

Acrobot Active Constraint Robotics (Acrobot Company Limited, London, England) developed for technically whole knee replacement. It is a motorized bone drill device to avoid its moves to an area described through pre-operative images. This "hands-on" method approves the health care professional to feel the cutting forces directly. However, it ensures that unique areas are included in drilling. This is a decreased level of autonomy of the robot. Its performance is similar to that of RoboDoc; however, because it uses small motors, and because the health care professional has direct control, the system is inherently more secure. He is viewed to have an active position[25]

- *NeuroMate*

The stereotaxic needle placement was the first to be recorded. The Dating back of surgical robots returned to 1985. NeuroMate (Integrated Surgical Systems, Inc.) is the model for stereotaxic neurosurgery. It is some other image Guided machine the use of anatomical landmarks for the information Register. NeuroMate's job is

to choose the entry site for a drill, probe, or electrode. About images before surgery. Then region the machine in the right place of insertion, lock the joints, and Act as information to enable the health care professional to operate Action. Although the robotic does no longer feed like Instruments brought in surgery, it severely restricts the surgeon's movement. Therefore, it can be viewed that NeuroMate has a slight Level of autonomy [26].

- *da Vinci*

It is a system done through remote control where the surgeon is in his room and scientifically in another place. The surgeon is given a visual image of the operation; the arms and the probes are controlled with the surgeon's movement because the robots simulate the surgeon's movement and actions in these minor procedures such as heart, abdomen, and urinary tract operations. The da Vinci machine is used. Robotics work in constant contact with the patient's tissues and use tools such as forceps and others. The Da Vinci Robot considers that it will be used in the coming years of its importance in surgery [27] .

- *Manual instruments*

Typical surgical equipment do not have Independence (they are not actual robots). Because the operator has whole manage over the equipment and can use them for most necessary dealing with tasks. Manual surgery Tools are used in very active roles in nearly everything Surgical procedures [28].

Conclusion and Discussion:

Electronic surgery or robotic-assisted surgery allows doctors to perform many complex operations with greater precision, quality, and greater control over tools than conventional surgery. Robotic surgery is used in operations that use small longing, and it is often not possible in conventional surgery. The benefits of surgery include robots as in the following points:

- Expansive area for movement and control
- Pictures are in high resolution during the operation.
- Better access to the surgery area
- A shorter time for the patient to stay in the hospital
- Less blood loss during the operation.
- Less pain before and after the operation

On the other hand, robotic surgery requires risks, which can be related to those caused by traditional surgeries, so while the limited risk of disease or other mistakes that need further studies and analysis. However, robotic surgery is considered one of the latest medical techniques, which will replace human surgery at a time that is not far away.

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Spatial Parallelism on FPGA to Design and Implementation image processing functional Unit for better throughput

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ABSTRACT

According to the importance of using hardware implementation for digital image processing to gain performance with high quality; this paper produces some basic techniques to enhance images with their hardware implementation and results using the VHDL and megaCore modules. The paper focuses on exploring the parallelism features on FPGA to perform image enhancement in the spatial parallelism, by applying spatial parallelism to design and build embedded real time system. The FPGAs reconfigurable make them very suitable choice for real-time image processing to implement many enhancement algorithms to get fast computation. It utilizes of parallel on-chip registers and memory enhanced the processing time of implemented algorithms. An FPGA development Board DE2-115 is used as vehicle project. The results of implemented design show that the throughput is increased in term of coarse-grain scale and reduce the power consumption. Also, the operating frequency is increased to 1GHz by configuring Phase-Locked Loop (PLL).As well as the possibility to implement several algorithms using the same Hardwar, only reconfigurable it.

Keywords: Embedded System Design, FPGA System Design, Image Enhancement, Spatial Parallelism, and Digital Image Processing.

INTRODUCTION

Image enhancement is a method which is used to improve image vision and makes the image adapt to be processed by a computer. Processes of image enhancement comprise a collection of techniques to improve the appearance of image visual or the image conversion to a form better suited for analysis by machine or human [1].

Different ways and a variety of types of processing to enhance the images have been used. In the early stages, a sequential processing was used for image enhancement. This type of processing consumes a lot of time since the images have massive data. Thus, it's necessity to use parallel processing to speed up the implementation of operations on the images.

Image processing applications are suitable for using the parallelism in algorithm with high degree, since the same operations can be used for each pixel in a portion of an image or the whole image, and this will lead to a significant decreasing in the consuming of time for large image processing [2].

Many ways are used for parallel processing using software or hardware. The implementations make the use of parallel functional unit to invest the parallelism by execution the instructions in parallel in spatial domain Thus, the implementation will take less time consuming for the enhancement processing [3].

The implementation of applications with specific hardware (embedded system) provides better speed than implementation of applications with specific software. In hardware technology design, there are two classes: full custom hardware, known as Application Specific Integrated Circuits (ASIC) which its design cannot change, and semi-custom hardware design techniques like pipeline and parallelism can be developed using (FPGA) that are not possible in designing the dedicated (DSP). The FPGA has good features like; configurable, low power consumption, work in real-time, minimize the product cost, and able to perform complex algorithms. [4].

FPGAs are often used to implement platforms for real-time image processing applications because their structure can exploit spatial and temporal parallelism.

The FPGA platforms have been joined in order to bring the benefits of these schemes to improve an optimized design by having the full advantage of the hardware features such as execution, robustness, and

accuracy, and to eliminate the undesired features like inflexibility. The FPGA software, in turn, has the reusability and re- configurability features.

This work provides an implementation of different image enhancement algorithms such on FPGA. The development and education board (DE2_115) will used to implement proposed system for image enhancements. The VHDL is used to programme the software

RELATED WORK

Many embedded system to perform image enhancement are proposed with different levels of performance, each one has its benefit and limitations.

The paper in [3], present a designing that utilizing from VHDL code and execute it on Cyclone EPIC6Q240C8, this device is currently not available with Quartus II version 13.0. In [5] Tsuboi produced FPGA based vision system that was developed depending on using the Xilinx Virtex2E mounted on the board of FPGA. Three algorithms of image processing were implemented for finding the image gravity centre and object oriented detection by using Hough transform in addition to radial projection. C/C++ was used to code the algorithms into the HDL language Cycle C using System Compiler. Cycle C can be converted into VHDL and Verilog. A [6], present a designing that utilizing a VHDL code and image which send by mobile to FPGA and show it on VGA.

In paper [7] suggest an implementation of interface of VGA port that available on FPGA board to produce the character(s) from ASCII text characters. Paper in [8] introduces the Time comparison between multiple image processing algorithms implemented in CPU and CPU+GPU is presented; they achieved a speedup of almost 100 times when using the GPU like a coprocessor.

According to [9] a comparison between FPGA, GPU and CPU performances is presented for different image processing algorithms (stereo vision and two-dimensional _litters). In paper [10] present Image enhancement and DE noising process using brightness manipulation, threshold operation in FPGA with On board reconfiguration and partial dynamic reconfiguration, in addition to median filtering operation to increase the performance of FPGA and decreases the resource requirement

Parallel Processing Platforms Comparison

Different platforms were presented and used today worldwide to design embedded system for different image processing applications. They differ in the requirements such as cost, availability of the tools. The success of any one depends on the application which is used. Selecting the right platform is a significant step in the design of any embedded system [11]. This section shall present the strength and weakness of different parallel platforms by giving a comparing between different hardware platforms.

1. FPGA vs. ASIC

An ASIC is a device specialized to implement applications of specific tasks and it builds with ICs during the production. In an ASIC, the architecture is designed using a Hardware Description Language (HDL), and its function cannot be modified. The main limitation of an ASIC is its price and the time to market, market but it has low power consumption coupled with high performance.

On other hand, FPGAs are reconfigurable device that can be reprogrammed several times based on design and logic gates and memory bits.

An ASIC requires less material in comparing with FPGA, so it spends low recurring costs. While FPGA is better than an ASIC when building low volume production circuits. Choosing ASIC or FPGA

system is based on the cost and the need to reprogram or not. Table 1 shows a comparison between FPGA and ASIC. [17]

2. FPGA vs. DSP

DSPs are a processor system that contain a specialized architecture that permit instruction level parallelism processing, known SIMD (Single Instruction Multiple Data). From the programmer point of view, a special assembler instructions included in the C program is used to run the parallel instructions. DSP has cheap digital storage.

Digital processing is not always working in real time DPS has fixed connection and hardware structure, so the operations are predefined. Whereas, the FPGA hardware structure and interconnection can be defined by the user. Therefore, the FPGA operations are not predefined.

3. FPGA vs. GPU

Another utilized platform in embedded system design is the Graphic Processing Unit (GPU). This platform consists of hundreds of small cores that can be used for graphics applications or high-performance computing. GPUs use programming models like CUDA and Open CL, based on high-level languages like C, C++ or Fortran. When working with GPUs, threading is handled automatically by the hardware thread manager. The programmer does not have direct control of the processors of the GPU; everything is done through Application Programming Interfaces (API) [17].

One of the main disadvantages of GPU's are related to cooling and energy, which are also large components, which are complicated to install in small places. GPU's are intended to be used like a co-processor, so it always works in parallel with a CPU, which limits their use in some embedded systems [8].

Time comparison between multiple image processing algorithms implemented in CPU and CPU+GPU is presented; they achieved a speedup of almost 100 times when using the GPU like a coprocessor. In addition to energy efficient, as shown in table 1. According to [9] a comparison between FPGA and GPU, FPGAs are considered the best in the design of Image processing unit

Field Programmable Gate Array (FPGA) with Image Processing

The system performance, power consumption, and cost are considered the key to the success or failure of any system. Increasing the system performance is a relative issue since that it can be done via multiple mechanisms and approaches [12].

The FPGAs are considered one of the solutions that increase the system performance since they have the ability to be programmed and even re-programmed for the sake of keeping up with new functionalities of the design.

Field Programmable Gate Arrays (FPGA), massively parallel architectures can be developed to accelerate the execution speed of several image processing algorithms" [13]. All FPGA components can be electrically programmed by the user after manufacturing and implemented. FPGA features propose using it in implementing many complex digital circuits [14].

FPGAs have always trying to cover all the drawbacks of other schemes such as Programmable Logic Devices (PLD) or Application Specific Integrated Circuit (ASIC). Although the reprogrammable silicon has the same software flexibility running on processor-based system, it is constrained by the processing core number that is available. In comparison of FPGAs with the other processors, FPGAs have parallel nature truly. Therefore, the processing operations don't compete for the same resources. Each independent processing task is assigned to a dedicated section of the chip, and can function autonomously without any influence from other logic blocks

[15]Every dedicated section of the chip is handle an independent processing task without any influence from other logic blocks, that it can function autonomously As a result, when you use more processing, the performance of the application is not affected [16].

SYSTEM SPECIFICATIONS

We took in our consideration during designing our system to reduce the power consumption, work in real-time, minimize the product cost, and able to perform complex algorithms. Figure 1 illustrates the top-level design of the system

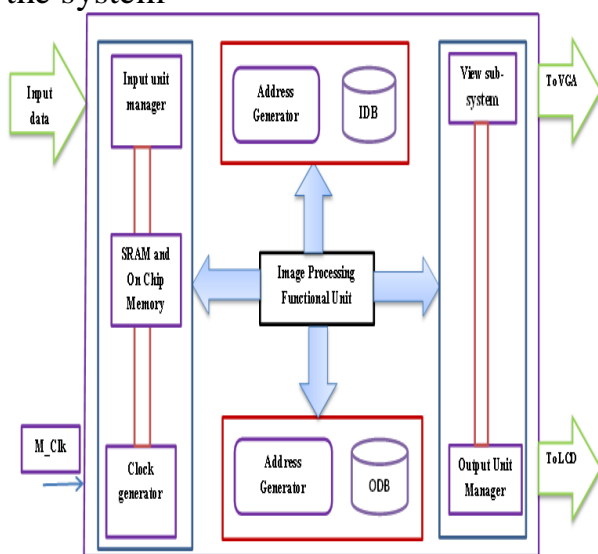


Figure-2.System Top Level Designs

The top-level design of the system.it consists of main unit. The Input Unit Manager is used to organize the data entry process, which can be organized by many sources .SRAM and On-Chip Memory, as” units of memory” which are used for data storing in order to read it by the input unit manager.

The clock generator can generate a clock signal reaches up to 1 GHz by using the PLL in this design. Addresses for the input data that stored on the SRAM and on-chip memory will generate by the I/P address generation and then will be stored as an array inside the Input Data Buffer (IDB).

The presented design was used spatial parallelism technique for processing many blocks of the input data. The Output Data Buffer (ODB) is used to store the processed data in the form of an array. The responsibility of generating many addresses for this data will be the function of the O/P address generator. The function of output unit manager will be processing the data exit through using a special file for introducing the data to the VGA

Image Processing Functional Unit

In order to present the Image processing functional unit, which is the core of system top level designs, it includes the algorithms that can be used to enhancement the image that stored in the memory through the distribution which can execute the spatial parallelism functional units synchronously and display the image enhancement on the LCD monitor.

The paper manipulates many algorithms to enhance the image: manipulation of contrast, manipulation of brightness, images inverting and operations of threshold [12].

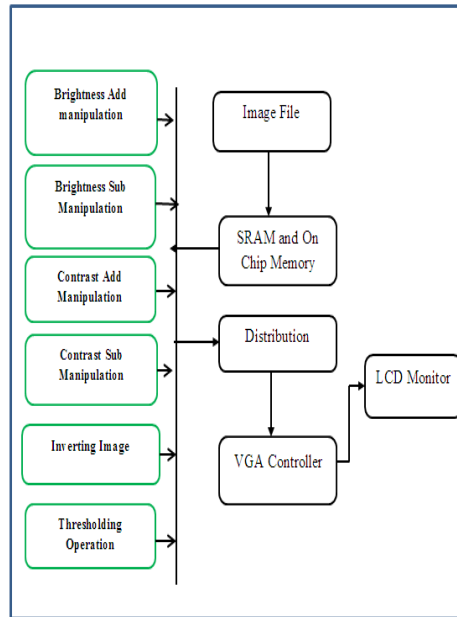


Figure-3. Image Processing Functional Unit

A. Manipulation of Contrast

This way to expand the range of contrast in manipulated image through transfer the brightest pixel value to white, while the darkest pixel value to black

B. Manipulation of brightness

Point operation is executed to increasing and decreasing the image brightness. Dark region in an image might get to be brighter after performing this operation. The VHDL code is used to increase or decrease the value of the picture pixel values

C. Images Inverting

Doing the reverse of all the range of contrast is supporting the equivalent of a photographic negative. In point operation, the ordering of pixel values are reversed by multiplying each value with -1 and

adds a constant, is known as inverting an intensity image. This method transforms the pixel value to the accepted range again [13].

D. Operations of threshold

Operations of threshold are especially interesting method for image segmentation which allows separating object of interest from its background. Thresholding an image will separate all pixels value in one of two values only. The thresholding is done using specific threshold value that select by operator

RESULT

This section highlights the performance of the system implementation (Enhance Implementation of Image Processing Functional unit using Special Parallelism on FPGA). The experimental results are obtained after implementing the proposed embedded system by using VHDL in quartus II with different input images.

In CAD tool is programmed to consists six logarithms on one block: Brightness Add manipulation, Brightness Sub Manipulation, Contrast Add Manipulation, Contrast Sub Manipulation, Inverting Image and Threshold Operation. The block will be send the project to the Field Programming Gate Array board (DE2-115), Then FPGA board is connected to the VGA. At this stage, the project is ready for operation.

The outputs obtained from the board testing will be displayed on VGA, after implementing using DE2_115 board.

After executing the project, the results will be displayed on the VGA. At this time, the researcher has to take the decision to changing its value until get the appropriate image depend on the quality of the obtained image from the execution.

Figure 4 shows the result of execution the brightness algorithm. It appears that the dark region in images become brighter. So, the point operations are used to brightness increasing.

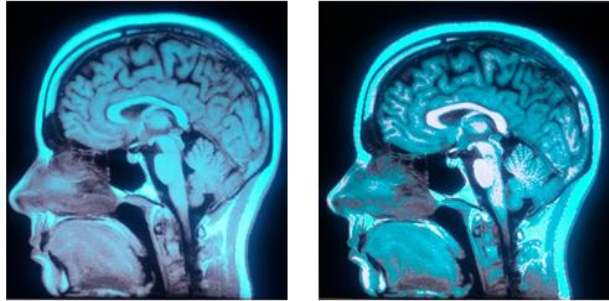


Figure-4.Original Image, Brightness image

Figure 5 shows the highlighted and dimmed region very clearly. It can be very beneficial for architects and civil engineers at the time of designing and building. The benefit can be taken from the threshold algorithm when selecting construction field. For instance, to determine how much light is important for constructing a building



Figure.5: Original Image and Threshold Image.

Figure-6 shows the contrast image through the distribution. It can be observed that the new image become clearer than the original image. This result prove the visibility of features in the image which are

obtained after assigning the darkest pixel value to black, as well as the brightest value to white.

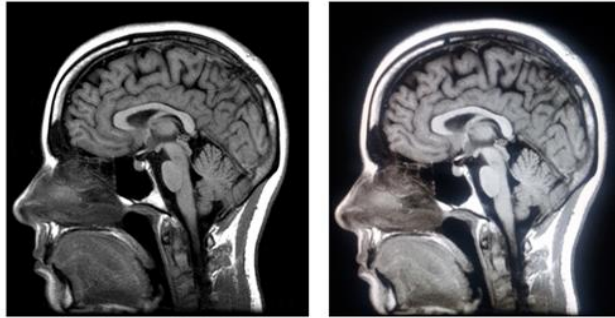


Figure-6.Original Image, Contrast Image.

One of the applications of the invert image logarithm is to take image under the X-Ray type and apply the invert image logarithm on it. Thus, the result will be obtained which gives accurate details of many medical aspects

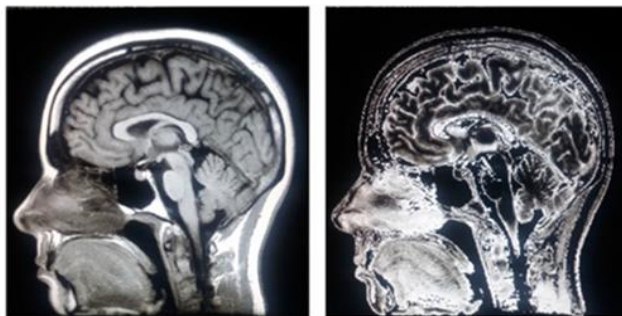


Figure-7: Showing Effect of Invert Operation.

It's very important to point out that the efficient capacity of the used board, through highlighting the amount of the used logic elements and compare it with that available logic element on the board. Table 3 shows that despite FPGA resource consumption and the design complexity that will demand large amount of logic

elements; the DE2-115 board was enough for yield the design with the needed resource. Also, Table 4 shows the total logic element and max.

Operating frequency utilized by proposed design.

Name	Brightness add	Brightness sub	Contrast add	Contrast sub	Invert	Threshold
Total logic element	1134/114.480 (1%)	1036/114.480 / (< 1%)	1011/114.480 / (< 1%)	983/114.480 (< 1%)	961/114.480 (< 1%)	925/114.480 (< 1%)
Total combinational functions	852/114.480 (< 1%)	633/ 114.480 (< 1%)	621/114.480 (< 1%)	611/114.480 (< 1%)	609/114.480 (< 1%)	597/114.480 (< 1%)
Dedicated logic registers	467/114.480 (< 1%)	428/114.480 (< 1%)	413/114.480 (< 1%)	411/114.480 (< 1%)	407/114.480 (< 1%)	456/114.480 (< 1%)
Total registers	467	428	413	411	407	456
Total pins	75/529(16%)	75/529(16%)	75/529(16%)	75/529(16)	75/529(16)	75/529(16%)
Embedded memory bits	3.673.600 / 3.981.312 (92%)					
Embedded Multiplier 9-bit elements	0/532 (0%)	0/532 (0%)	0/532 (0%)	0/532 (0%)	0/532 (0%)	0/532 (0%)
Total PLLs	1/4 (25%)					

Total logic element		6050/114.480(5%)
Freq.Max		1 GHz

Table-3. FPGA Resources Consumption

Conclusion

The implementation results of the designed system show the system ability to perform enhancement image processing functional unit in spatial parallelism. It has full benefits of the FPGA chip both in terms of the ability to reconfigure the system as well as increasing the throughput. The implementation of applications with specific hardware (embedded system) provides better speed than the implementation of applications with specific software. Also, it shows

the benefits of using the on-chip PPL to control clock cycle which increases the operating frequency to 1GHZ. These results are obtained for image size 640 *480. However, the approach discussed in this study can be used for images of any size.

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THE EFFECT OF INTEGRATION AND EFFECTIVENESS OF ARTIFICIAL NEURAL NETWORKS ON INFORMATION SECURITY TASKS

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Annotation. Issues related to information security are among the most urgent and priority in the modern world, which is caused by the widespread introduction and use of information and computing tools. One of the urgent tasks related to the field of information security is to improve the efficiency and efficiency of its systems. Thus, today a rather relevant and interesting problem is the problem related to improving the efficiency of information security systems, one of the solutions of which, related to the integration of intellectual tools and methods, will be studied in this paper. The paper pursues the goal of studying neural network technology as an innovative means of developing the information security segment. The paper examines the main information, relevance and effectiveness related to the research topic. works through the use of statistical data and information, as well as empirical and theoretical research methods. For a more complete disclosure of the topic and obtaining reliable data, in paper uses publications and materials from domestic and foreign sources. A significant part of the article is devoted to the use of neural networks in solving problems related to information security.

INTRODUCTION

In the modern world, the number of information archives, money transfers and communications is increasing continuously and with incredibly high speed, resulting in an independent type of asset, called information. Equivalent to other values, information is attacked by various hacker and fraudulent attacks. In the aggregate of these factors, today there are a number of risks relating to the field of information security. In turn, ignoring and inaction with emerging issues can lead to loss of competitiveness of organizations at various levels. In addition to modern enterprises and organizations,

conventional people who use gadgets and other communications means are suffering from the risks of information security [1]. In fig. 1 presents the main factors through which the contemporary environment in modern enterprises is updated in the modern world:

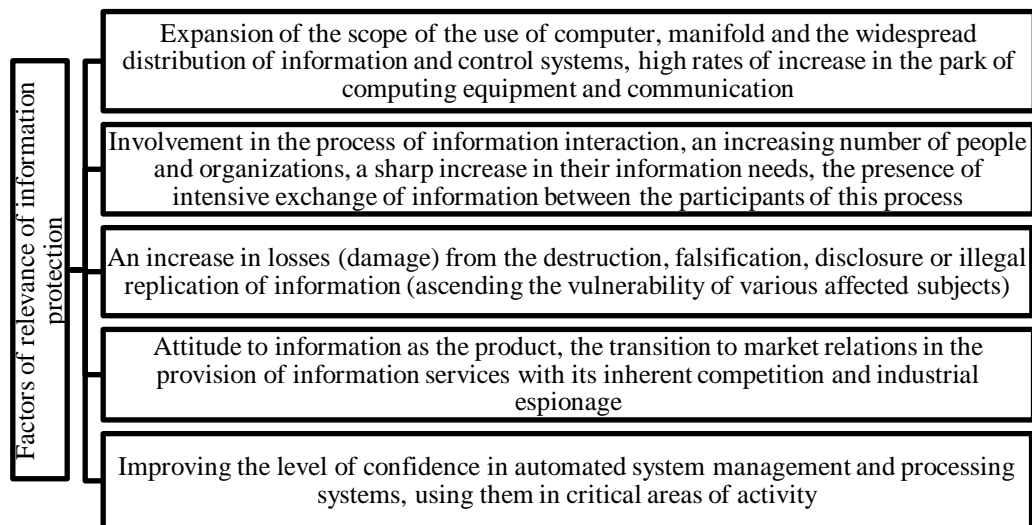


Figure 1. The main factors determining the relevance of information protection

THE RELEVANCE OF THE INTEGRATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN INFORMATION SECURITY TASKS

One of the most pressing technologies actively developing and tested in information security tasks in modern enterprises is intellectual means. One of the main technologies relating to the IT sphere, as well as having a tremendous influence in many processes occurring in the modern world, is artificial intelligence. The relevance of the use of artificial intelligence (AI) is high in the modern world. It is through these technologies that today are solved alone of the largest

and difficult-computable tasks. Artificial intelligence finds applications not only in solving mathematical and other engineering tasks for the adoption of optimal solutions, this technology is successfully applied in the field of information protection [2]. Key technology based on which artificial intelligence is based, is the ability to "self-education", as well as the use of accumulated data in order to predict the future. The main distinguishing feature in the AI relatively conventional digital solutions is that, when performing tasks, artificial intelligence is not based on logic schemes specified earlier by programmers, and independently configure integrated making mechanisms based on those data and tasks that were initially supplied by programmers.

ANALYSIS OF MACHINE AND DEEP LEARNING METHODS USED IN CYBERSECURITY

Trends last:

- controlled training, task managed approach. First of all, you must mark data, for example, by filling the model with examples of executable files and stating that this file is malicious or not. Based on these marked data, the model can make decisions about new data. The disadvantage is the limitation of marked data.

- Assembler training. This expansion of controlled learning, while at the same time mixing various simple models to solve the problem.

There are different ways to combine simple models.

Current trends

- Learning unattended. Data management approach. The approach can be used when there is no marked data, and the model should somehow mark them yourself, based on properties. It is usually designed to search for anomalies in data and is considered more powerful as a whole, since it is almost impossible to mark all the data.

Currently, it works less accurately than controlled approaches.

- semi-controlled learning. As follows from the name, semi-constrained training is trying to combine the advantages of both controlled and uncontrollable approaches when there are some marked data.

Future trends (well, probably)

- Strengthening training, an approach based on the medium can be used when behavior should somehow respond to changing the medium. It is like a child who studies medium by samples and errors.
- Active study, it is more like a subclass of learning under reinforcement, which is likely to grow into a separate class. Active learning resembles a teacher who can help correct errors and behavior in addition to changes in the environment.

WORK OF ARTIFICIAL NEURAL NETWORKS IN CYBERSECURITY

One of the directions for the development of artificial intelligence, which is actively used in solving the tasks of information security, are artificial neural networks. Neural networks that have similar in meaning of the name of artificial neural networks (ANN) or neural networks act as a mathematical model that has software and hardware implementation. ANN are built on the principal base of biological networks, namely, on the principle of networks of nerve cells of living beings. This concept was developed as a result of studying and attempting to model the processes occurring in the brain in a biological creature. One of the first attempts from this area of study were neural networks of W. Maccalok and W. Pitza. In the future, neural networks have found their application in almost all tasks of the modern world, for example, the tasks of forecasting, recognition of images, management, information protection and other. In fig. 2 shows a simple neural network diagram [3]:

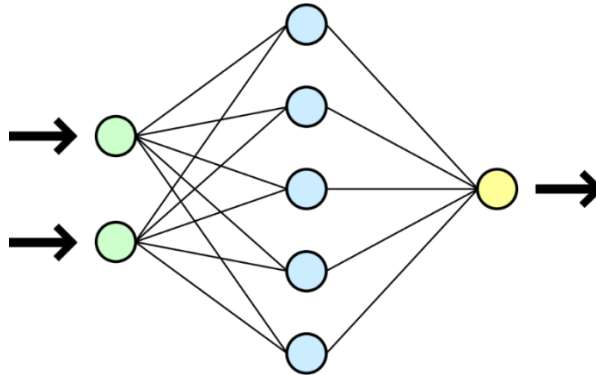


Figure 2. Scheme of simple neural network: Green - input neurons; Blue - hidden neurons; Yellow - Output Neuron

In mathematical interpretation, artificial neuron is presented in the form of a nonlinear function. Under W is characterized by bonds, by means of which signals from some neurons come to the input signals of other neurons. Each of the neuron ANNpection includes a single output called synaps. It should be noted that each neuron yield is connected (or may be connected) with an unlimited number of outputs of other neurons (Fig. 3). For understanding, we write down the following mathematical model of artificial neuron [4]:

$$y = f(\sum_{i=1}^n (w_i \cdot x_i + b_i)), \quad (1)$$

Where: w_i – represent the weights of the corresponding inputs;
 x_i – represent signals at the inputs of the neuron;
 b_i – bios of the displacement neuron.

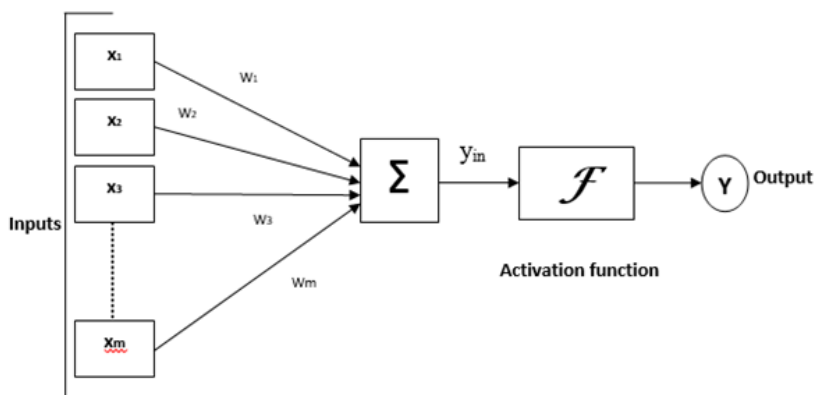


Figure 3. Scheme of artificial neuron

ANN is strong enough to enter into the life of a modern man when solving various types of tasks, as well as used where primitive algorithms are ineffective or at all the impossible tool. In a number of tasks, the solution of which is based on the use of neural networks, there are: text recognition, contextual advertising on sites, spam filtering, monitoring of suspicious operations in the banking system, image restoration and many others [5].

DIRECTIONS FOR THE DEVELOPMENT OF ARTIFICIAL NEURAL NETWORKS IN THE INFORMATION SECURITY SEGMENT

The use of neural networks is one of the actual directions in the modern world. Technologies of artificial neural networks have a strong tool to solve some of the most difficult and difficult-to-computable tasks, including the area of information security of modern enterprises. Thus, today there is a tendency associated with the dissemination and widespread introduction of the ANN in almost all household and professional spheres of the life of modern person. This factor is due to the high efficiency and rationality of using neural networks in solving problems of various kinds [6-7].

We define the main directions in which artificial neural networks are integrated from the information security segment at modern enterprises (Fig. 4):

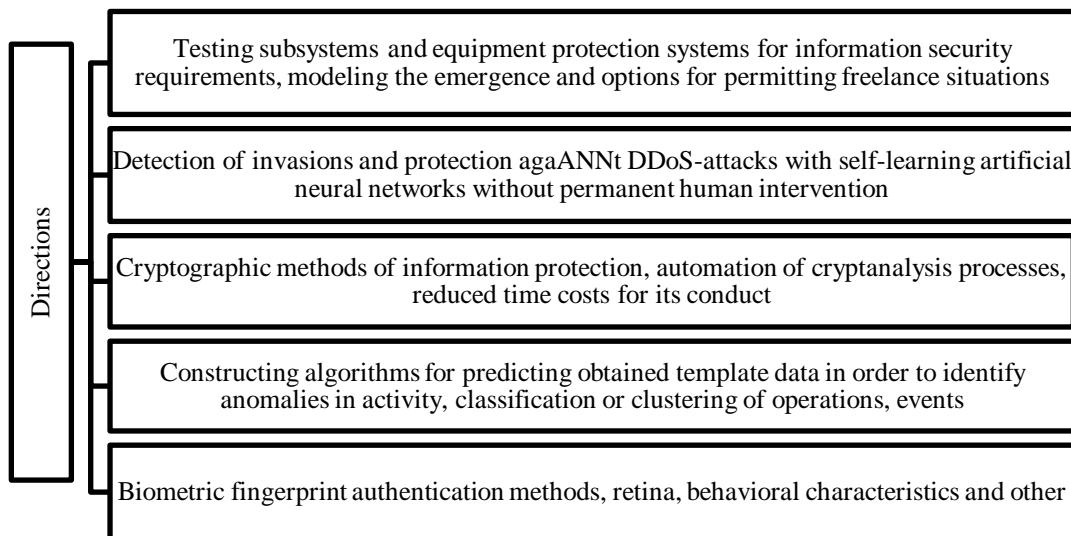


Figure 4. Inject integration ANN in the information security segment

We define the main advantages of ANN integration in the information security system of modern enterprises (Fig. 5) [8]

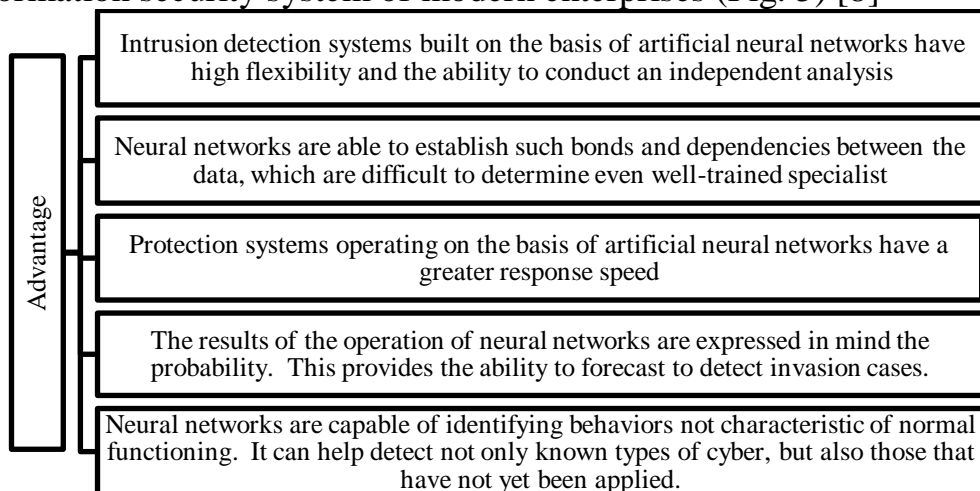


Figure 5. Advantages of ANN integration in the information security segment

EVALUATION OF THE EFFECTIVENESS OF ARTIFICIAL NEURAL NETWORKS IN THE INFORMATION SECURITY SEGMENT

Modern enterprises that introduce artificial intelligence technologies and, in particular, the ANN in the information security systems receive enhancing the effectiveness of attacking the attacks on information resources, as well as reducing the response time and costs for organizing information security. In fig. 6 is a distribution of information security products using artificial intelligence technologies for use scenarios [9]:

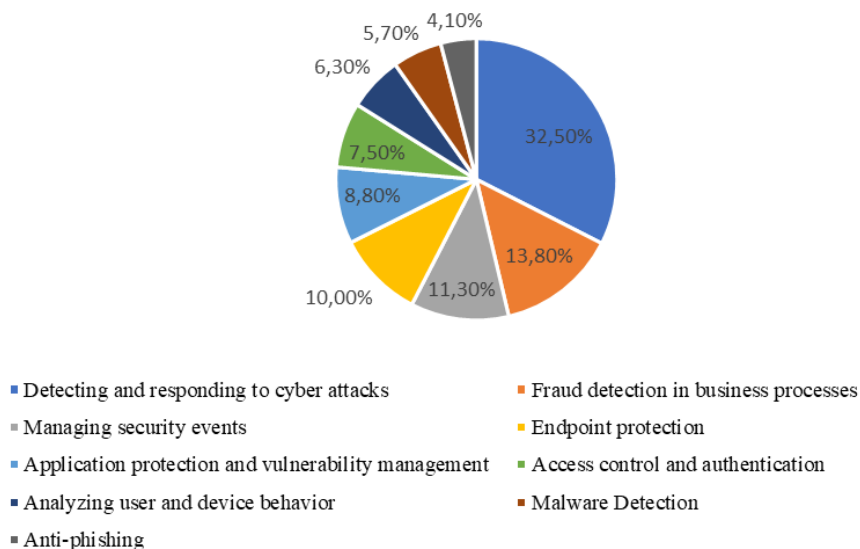


Figure 6. Distribution of products with the use of technologies ANN on use scenarios

Having examined the relevance of the use of intellectual systems, in particular, artificial neural networks in information protection tasks, it

is necessary to focus in more detail on the aspect of the integration of network data integration into the area studied.

It should be noted that according to SANS data, about 30% of information security experts are convinced that artificial intelligence technologies are able to increase the efficiency of detecting unknown threats [6].

Consider in the percentage relative to the standard methods of information security metrics, improved by integrating artificial neural networks (Fig. 7):

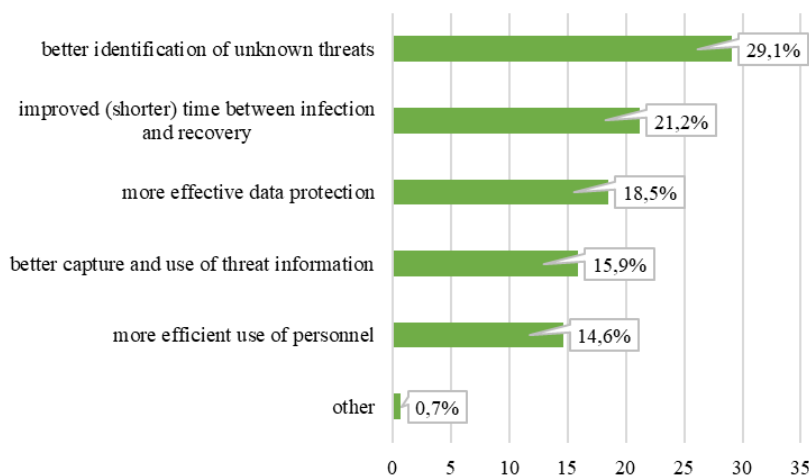


Figure 7. Information security metrics, improved by the use of ANN

Most companies actively using ANN in order to improve the efficiency of information protection systems confirm that intelligent technologies increase the effectiveness in investigating incidents, a decrease in the response time to threats, increase the efficiency of personnel management, etc. Also many representatives of the companies are confirmed by the fact of reducing false responses as a result. Integrating neural networks in information security systems.

Consider statistics to improve the performance of information security systems as a result of the integration of artificial neural networks (Table 1):

Table 1. Comparison of the effectiveness of organizations using applications and not using ANN in information protection systems

Benefits	All Orgs	Orgs w\max of 10% ANN	Orgs w\>10% ANN
ANN makes investigation of alerts faster	60 %	49 %	69 %
ANN improves the efficiency of our security staff	60 %	46 %	70 %
Automatic initial triage	49 %	41 %	54 %
Optimize threat identification	47 %	41 %	51 %
ANN speeds the remediation of threats	44 %	33 %	53 %
ANN helps to reduce false positives	38 %	28 %	47 %
Automatic remediation or isolation	23 %	17 %	28 %

Based on the above data, it is clear that the technologies of ANN make a colossal contribution to the fight against modern information threats. In the overwhelming majority of cases, intelligent technologies reduce the operation time to identify problems and subsequent response to incidents, and also reduce the cost of managing personnel. Inc companies operating in their systems note a significant increase in the efficiency of detecting unknown threats, as well as an increase in the speed of analyzing and detecting malicious activity on servers.

CONCLUSION

An overview of the state of artificial intelligence segment in information security allows you to make the following conclusions:

Artificial intelligence makes a noticeable contribution to the fight against modern information threats. In particular, in most cases, the

introduction of II technologies in the organization's information security reduces the time to identify problems and respond to incidents, as well as expenses for personnel management. Operators note an increase in the effectiveness of detecting unknown threats, as well as the speed of analysis and detecting malicious activity at endpoints and in applications.

Total investments in companies that create information security products using AI technologies are \$ 3749 million at the end of 2019. At the same time, the global market for information security products using technology AI will reach \$ 30 billion in 2025 with an annual increase in 23%.

Thus, artificial intelligence and, in particular, ANN are the science and technology of creating intelligent machines, the overwhelming majority of which are intelligent computer programs. The technologies of AI in a broad sense involve the software that is able to perform tasks by using human cognitive abilities, for example, speech recognition, interpretation of visual images, analysis of logical operations, the creation of models of the future based on accumulated data, etc., which is the most effective tool In solving the tasks of information security at modern enterprises [10].

Thus, it can be seen that ANN technologies are among the most innovative and breakthrough achievements of science today. These funds are widely introduced in almost all spheres of life of a modern person, ranging from domestic ones, and ending with professional. In this paper, issues related to the integration of artificial neural networks in the information security systems of modern enterprises were in more detail. As a result of the work, the main information relating to the AI were identified; Factors that determine the relevance of information protection; Scheme of a simple neural network; scheme of artificial neuron; Directions of ANN integration in the information security segment; Advantages of ANN integration in the information security segment, etc.

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The use of chemical compounds as shielding medical containers for gamma rays

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Abstract:

The manufacture of protective shields against ionizing nuclear and atomic rays requires continuous tests to maintain the quality of the materials used in manufacturing in accordance with international conditions from sparing the contents of containers and vessels that are used for various purposes, including medical or community service, against most radiation, especially carcinogenic, as these compounds may contain Materials whose qualities and properties change during manufacture. This study used a CS-137 nuclear source and a powder of lead in medical glass bottles for several gm's masses (0.1,0.2,,0.3,0.4,0.5,0.6, ,0.7,0.8,0.9,1) with the same masses of barium sulfate powder to the glass of the bottles of the same weights. The use of the nuclear source used in examining the models with the appropriate radiative activity has been adopted in the study of the intensity dependence and the accumulation factor for their experimental significance, which are two main factors for a study on the hardness of the models. The study clearly showed that the weight ratios for both functions of the two materials used are inversely proportional to the accumulation factor.

Introduction

The amount of radiation exposure increases with the time of exposure, and the distance as the amount of radiation exposure decreases with the increase of the distance between the person and the radioactive source, and the protective shield, the radiation exposure decreases according to the type of shield material and the increase in the thickness of the shield according to the type and energy of the radiation [1,2].

In order to achieve a safe level of radiation exposure, the radioactive materials must be masked with protective shields (which is anything that creates a barrier between a person and the source of radiation) that prevents the danger resulting from the radiation emitted from these materials, whether they are high or low-potency [3]. For the

importance of glasses, it has been used for a long time in measuring radiation dosage, and many researches developments have taken place in these fields through glass composites, components, and mixtures. Better results from these studies have been reached. Japanese concluded with a new type (GD-450), which is a type of phosphate glass tinged with silver and is used to detect gamma rays within the range (10 keV.-10 MeV.) with homogeneous set of polymers metal mixtures and blending's filters [4].

Theory:

Beer–Lambert law expressed in terms of attenuation coefficient, but in this case is better called Lambert's law since amount concentration, from Beer's law, is hidden inside the attenuation coefficient [5]. The (Napierian) attenuation coefficient μ and the decadic attenuation coefficient $\mu_{10} = \mu/\ln 10$ of a material sample are related to its number densities and amount concentrations. In many cases, the attenuation coefficient does not vary with z , in which case one does not have to perform an integral and can express the law as[6]:

$$I(z) = I_0 e^{-\mu z} \quad (1)$$

where I, I_0 are The intensity of radiation after reaction with the medium and the original radiation respectively.

μ absorption coefficients.

Z absorber of thickness.

Source emits its symmetrical radiations so this properties leads to what is known as build up, the radiation comes out from the source in all directions and absorbs a proportion of it into the shield according to the law of exponential attenuation (Lambert - Pierre equation) the intensity of the window through the shield of thickness z . The original intensity before the shield broke through. The fact that the

accumulation factor is a necessary factor is included in the calculations of designing reactor shields and in the field of medical physics, as well as shielding some research laboratories that require the use of radioactive sources with high energies and great radiation effectiveness. Therefore, the study of the accumulation factor is important in correcting the calculations related to adequate shielding of gamma rays [7]. The buildup factor is measured based on the relation between the incoming gamma rays and gamma rays passing through the materials. If the initial intensity of gamma rays is I_0 , the buildup factor B is calculated according to the following standard equations:

$$B = ((I_t / I_0) / ((I_{uc} / I_{oc}))) \quad (2)$$

whereas:

I_{uc} : beam intensity with shield and socket (good geometry).

I_{oc} : beam intensity with only the pointer (good engineering arrangement).

I_t : the overall strength of the beam in the presence of the shield (poor geometry).

I_0 : total beam strength (poor geometry).

, where I is the measured detector count with the absorber of thickness x (cm), and I_0 is measured count without the absorber [8].

Material and experimental methods:

Preparation of Samples

A-Method for preparing lead-mixed glass samples:

1- Weighed (4.5gm) of glass powder and 4.5gm of di-Lithiumtetraborat

for the purpose of weighing, a four-degree sensitive scale.

2. Weighed (0.2gm) of lead and added over the glass powder and di-Lithiumtetraborat powder and mix it manually in a special container until it is completely homogeneous.

3- A porcelain eyelid was used for the purpose of melting the mixture. It was found that it requires high temperatures and a long time inside the oven in addition to its high cost because it breaks until the sample is extracted .for solving this problem by using a platinum eyelid, which allows it to be used more than once, in addition to the shortage of time spent in the melting process, as melting can occur in 30 minutes compared to hours in a ceramic eyelid.

4- A small amount of Lithiumbromid powder was placed over the mixture in the platinum jar without weight, and the jar was placed inside it in a special oven under a temperature of (1000CO) for a period of half an hour until the mixture melted well.

5- Gradually opening the oven, then the ladle was extracted from the oven with a mask and placed in an endothermic container for a short period until the sample cooled and separated from the lid, then the sample was extracted with a thickness of (2mm).

6-The repeating manners used the same steps for four samples with changing the lead masses each time as follows (0.4,0.6,0.8,1) gm.

B- Method for preparing glass samples mixed with barium sulfate:

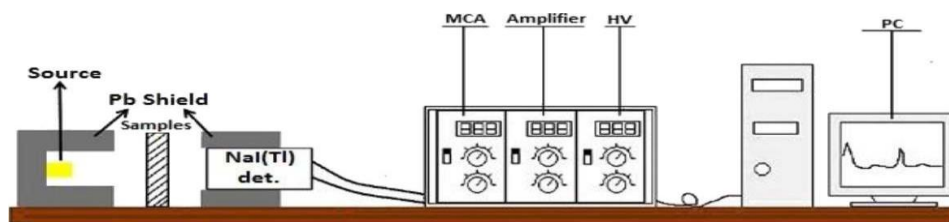
The repetition of previous method for preparing lead-mixed glass samples.

Experimental details and Testing samples:

1- The electronic counting system has been prepared and it consists of a primary amplifier, a prime amplifier and a voltage amplifier, and a multi-channel analyzer linked to the thallium-activated sodium iodide flash detector. The system is connected to a computer for the purpose of operating it and reading its measurements, and placing the radioactive source inside the lead box, which is a rectangular tunnel of lead material. To calculate the buildup factor by uses the weight of each sample were measured. The samples which were prepared tested against gamma-rays by using gamma spectrometer. The buildup factor and linear attenuation coefficient of the samples were measured for gamma rays of three different energies: 0.511,

0.662, and 1.275 MeV. These gamma rays were obtained using ^{22}Na and ^{137}Cs sources. For each the buildup factor was measured based on the relation between incoming gamma rays and gamma rays penetrated through the material.

Figure (1) shows a schematic description of the spectrometer used in the research.



Schematic view of the experimental setup Fig. 1.

2- The system prepared the good engineering arrangement (with the payer) at the beginning and took the reading without a sample and represents the initial intensity of the source in the case of the good engineering arrangement (with the payer).

3- The first sample was placed after the pointer from the near end of the source and at a distance of (0 cm.), and the reading was taken in the presence of the payer.

4-The payments in front of the detector and the source were raised, the bad engineering arrangement was prepared, and the reading was taken without a sample for the order and the source represented the initial intensity (by raising the payment).

5- The first sample was placed from the near end of the source and at a distance of (0 cm.), and the reading was taken by raising the pointer.

6- Steps (5, 3) were repeated for the rest of the samples of different concentrations and samples of different thicknesses.

7- The accumulation factor was calculated from equation (2).

Results and discussion:

The effect of adding lead powder to glass bottles studied in terms of intensity, accumulation factor, and the effect of adding barium sulfate to glass bottles with respect to severity and accumulation factor as two main factors to judge the durability of shields.

Table 1: The effect of add lead powder for the intensity and the buildup factor.

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Table 1: The effect of add lead powder for the intensity and the buildup factor.

Concentration %	Intensity(counts)	Intensity(counts)
0.0	20000	8500
0.1	18000	8200
0.2	14000	8100
0.3	13800	8000
0.4	13500	7800
0.5	13300	7600
0.6	13100	7500
0.7	13000	7400
0.8	12900	7300
0.9	12500	7100
1	11000	7000

Figure (2) represents the intensity values as a function of increasing the weight ratios of bullets, and in the cases of the bad engineering arrangement (no sear) and good (in the case of the sear), where the right side represents the intensity (count) in the case of the good engineering arrangement and the left side represents the intensity (count) in the case of the poor geometric arrangement, Table (2) represents the concentration and the buildup factor.

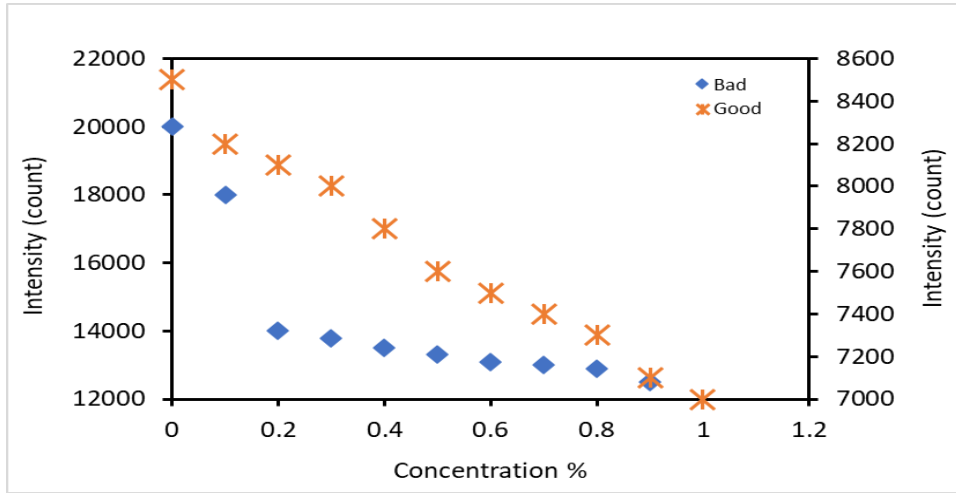


Figure (2): values of intensity as a function of increasing the weight ratios of lead.

Table (2): Represents the concentration and the buildup factor.

Concentration%	Buildup factor
0.1	
0.2	0.75
0.4	0.74
0.6	0.735
0.8	0.73
0.9	0.73
1	0.725

. figure (3) represents the values of the accumulation factor as a function of increasing the weight ratios of lead.

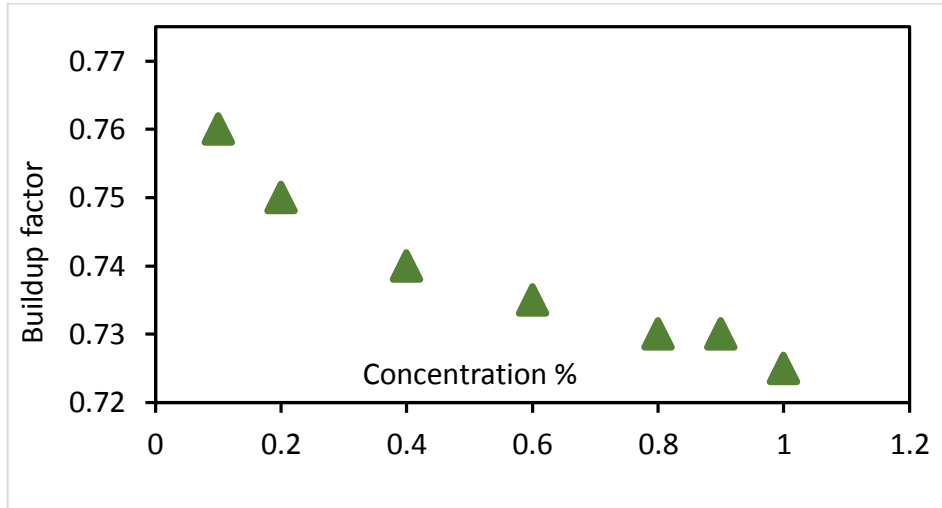
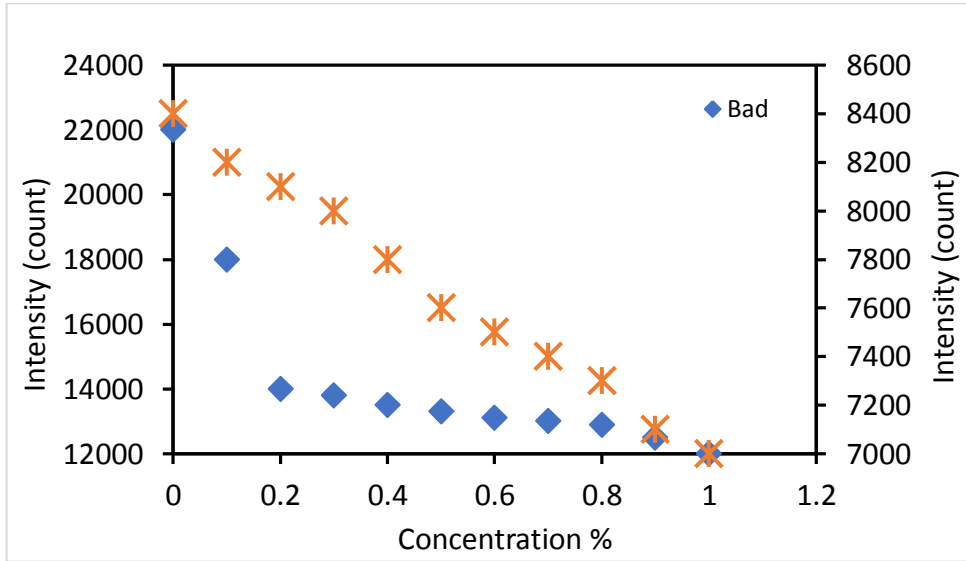


Figure (3) :The accumulation factor as a function of increasing the weight ratios of lead.

Table 3: Intensity values as a function of increasing the weight ratios of barium sulfate.

Concentration %	Intensity(counts)	Intensity(counts)
0.0	22000	8400
0.1	18000	8200
0.2	14000	8100
0.3	13800	8000
0.4	13500	7800
0.5	13300	7600
0.6	13100	7500
0.7	13000	7400
0.8	12900	7300
0.9	12500	7100
1	12000	7000



(Figure 4), intensity values as a function of increasing the weight ratios of barium sulfate.

Table.4: represents the aggregation factor values as a function of the weight ratios of barium sulfate.

Concentration%	Buildup Factor
0.1	0.79
0.2	0.76
0.4	0.75
0.6	0.74
0.8	0.735
0.9	0.73
1	0.72

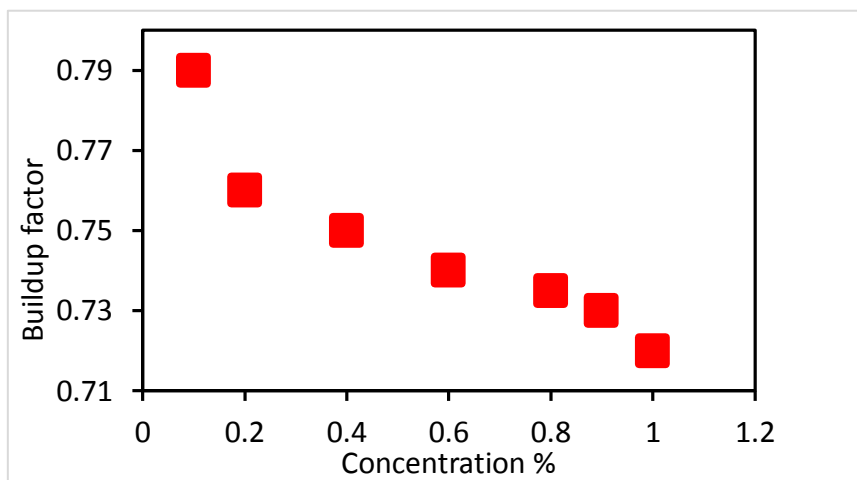


Figure (4) :represents the aggregation factor values as a function of the weight ratios of barium sulfate.

FC (2) and Figure (4) that when the first sample (0%) (which means a sample of panel glass without addition), the intensity values take the highest possible value for the source of cesium-137, and the high value of the intensity represents the transparency of the glass with respect to the gamma rays. Therefore, we can consider glass R not suitable for use as a shield alone, but for the subsequent samples (samples with added lead or added to barium sulfate in increasing concentrations) the intensity begins to decrease at the first ratio of lead powder or barium sulfate powder, which can be attributed to a change The properties of the materials used and the properties of the superimposed material are evident and thus the superposed material becomes good in its use as a shield, and since lead has a large atomic number and a high mass density, as the large atomic number helps to reduce the intensity of the beam of rays transmitted through the shield

by the interaction of the photons of this beam with the absorbent medium, and the density of lead helps to reduce the ability of radiation to penetrate through the shield, and although the barium density is not high, it has a very large atomic number that helps in absorbing the radiation in a form. It is larger than the compounds with smaller nuclei, and the higher atomic number helps reduce the intensity of the transmitted beam [9].

Figures (5) and (3) that the highest value of the accumulation factor is at the first sample (0%). As for the subsequent samples (samples to which lead or barium sulfate have been added in increasing rates), we notice that the accumulation factor decreases significantly at the first rate and then The difference in the value of the accumulation factor between ascending and descending, with different proportions, although the intensity decreases in each case, but the percentage of decrease in the case of the good engineering arrangement differs from the percentage of the decrease in the case of the bad engineering arrangement, where in the latter case a large part of the induced and secondary photons reach the detector, either In the case of a good geometry arrangement, the receiver prevents the scattered photons at a small angle from reaching the detector [10,11]. Measurements show the buildup factor values increases as increasing concentrations at a given gamma energy, the decreasing associating clearly with respect to the increasing gamma energy at a given concentrations weighting of material.

Conclusion

From the above, we can give some important conclusions drawn from this study

1- A gradual decrease in the effective intensity of the supported samples with different weight ratios for the powders used (lead, barium sulfate), as the lead powder or barium sulfate shows the same behavior in terms of decreased strength.

2- Behavior of the accumulation factor is similar for both the lead and barium sulfate powders.

3- Results of the current study showed that lead can be replaced with barium sulfate, with the same effectiveness as a protective shield from rays in medicine bottles.

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Thermoanalytical Examinations of *Si – Na₂S₂O₈* and *Si – K₂S₂O₈* Binary Systems.

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Abstract

The non- Isothermal thermoanalytical curves (temperature $[T]$), thermogravimetric $[TG]$, derivative thermogravimetric $[DTG]$ and differential thermal analysis $[DTA]$ of various molar ratios of binary mixtures of ($Si - Na_2S_2O_8$ and $Si - K_2S_2O_8$) have been examined by derivatograph technique: Silicon can catalytically lower the T_i values of both persulfates by about $(15- 20^\circ C)$, and that of the corresponding pyrosulfates by $10^\circ C$. No solid – state reaction has been observed between Si and the two peroxosalts or their pyrosulfates but their by-products, (K_2SO_4 and Na_2SO_4) reacted and yielded the respective mixed oxides, $Na_2Si_3O_7$ and $K_2Si_2O_5$ gaseous SO_3 and SO_2 . Intermediate and final products are identified by X- ray diffraction. Silicon powder is not oxidized in static air even at temperatures as high as $1050^\circ C$.

Key words: solid- state reaction, T, TG and DTA silicon powder, persulfates.

INTRODUCTION

thermo gravimetric analysis (TG, DTG and DTA) are performed by gradually raising the temperature, and the weight measured by analytical balance⁽¹⁾. Si has been used in the presence of dopants as a p- or n- type semiconductor. It is the most commonly used semiconductor and today constitutes about 92% of the electronic industry for manufacturing transistors and integrated circuits. Silicone greases and oils are used for vacuum lines. Thermo gravimetric analysis (TG), mass loss is observed the rate of material weight changes upon heating⁽¹⁾. TG curves is plotted the relationships, between temperature and the weight of sample or the ratio between dm over dt (dm/dt) but DTG is measure the ratio dm (weight changes) loss and dt (min) or dT (temperature) The DTG peak height at any time

or temperature gives the rate of mass loss (dm/dt) in (mg/min) unit the TG, DTG and DTA analysis were performed on semiconductor chalcogenides⁽³⁾. The chemical literature lacks data on the derivatographic thermoanalytical behavior of pure Si, alone or in mixtures with peroxosalts, and their solid thermal decomposition products⁽⁴⁾. In the present paper we aim to determine the thermal stability, catalytic activity and types of compounds formed during non- isothermal solid- state reactions between Si and other^(5,6). The area under a (DTA) Peak is the enthalpy change and is not affected by the heat capacity of the sample. DTA is the oldest thermoanalytical method^(7,8).

EXPERIMENTAL.

All of the molar ratio binary mixtures were prepared from analytical grade reagent.

Si (0.08 μ_m mesh) was puriss grade from Fluke. α - Alumina Al_2O_3 was interference material heated to 1300 c° the compounds persulfates were formed BDH

Apparatus

1. Thermogravimetric analysis Technique (Shimadzu).
2. X- ray diffraction made in Philips.
3. platinum crucible standard (sigma- Aldrich).

x-ray diffraction aphenomenon in which the atoms of a crystal, by virtue of their uniform spacing. Cause an interference pattern of the waves Present in an incident beam of x- ray.

The sample (2-4 mg) were synthesis and thermal degradation DTA follows the temperature difference between sample ($Na_2S_2O_8$ or $K_2S_2O_8$) and the reference (Al_2O_3). In (TG) technique in which the mass of sample is subjected to controlled temperature program. Derivative thermogravimetric. (DTG) measurement the

weight change ratio and the heating (C°) (dm/dt or dm/dT). Note. (T: temp., t: min.).

In DTA technique measure the difference of temperature between the sample and the reference.

Results and Discussion

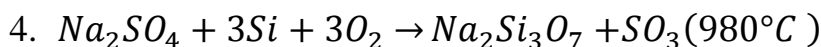
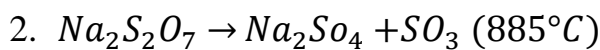
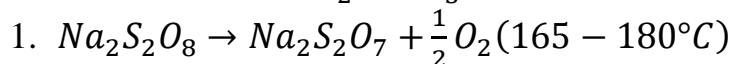
The derivatograms of various $Si - Na_2S_2O_8$ molar ratio are depicted in Fig (1), from which no detectable reaction could be seen between Si and $Na_2S_2O_8$. Nevertheless, the former could catalytically lower the T_i of the latter from 180 to 165 C° (for the ratios 1: 4 and 1:1), and to 160 C° (for the ratios 1:2 and 2:1) Table (1) indicates that the practical and calculated values of the liberated oxygen are almost the same. The melting temperature of $Na_2S_2O_7$ also lowered (from 385 to 375 C°), i.e- by 10 C° for the ratios 1:4 and 1:2, and from 385 to 365 C° i.e by 20 C° for the ratios 1:1 and 2:1. Careful examination of the TG curve of the 1:4 mixture reveals a small plateau between 215 and 260 C° which may be due to an unstable intermediate adduct of Si pyrosulfate, which is so far unknown. Other ratios do not show this plateau. After melting the pyrosulfate follows the usual route of a two-step decomposition.

The exotherms appearing around 885 C° all ratios proved to pertain to redox solid- state reaction between Si and the by product Na_2SO_4 the areas under these exotherms increase as the proportion of Si increases. The disappearance of the melting endotherms of Na_2SO_4 for the ratios 1:1 and 2:1 is due to thermal neutrality, brought about by exo and endo transformations occurring in the same region- XRD patterns for samples heated to 890 C° confirm the presence of the mixed oxides $Na_2Si_3O_7$ (Table 2) in addition to those of unreacted Na_2SO_4 and Si (7). Identical bright d- lines were obtained for the final products at 1050 C° which ratify that $Na_2S_2O_7$ is thermally stable to beyond the ceiling temperature of the programme. It could be concluded from the above that Si actually reacts with molten Na_2SO_4 , therefore several runs for various Si: Na_2SO_4 ratios were similarly conducted. The 3:1

mixture of Si Na_2SO_4 was found to be the stoichiometric ratio for which the stoichiometric reaction is given as $Na_2Si_3O_7$.

A mechanism for this reaction may be proposed. In the presence of excess Si powder, molten Na_2SO_4 is catalytically disproportionated to form Na_2O_2 and SO_2 (SO_2 gas has been detected experimentally) and in the presence of air or oxygen, a compositional oxidation of Si occurs with Na_2O_2 to yield $Na_2Si_3O_7$ ($Na_2SiO_3 - 2 Si O_2$), meanwhile SO_2 is instantaneously oxidised by a secondary process to SO_3 with the liberation of excess heat which is indicated by the sharp overlapping exotherms around 870 °C (in the case of the 1:1 ratio) on the DTA derivatogram in fig. 1.

The small weight increase between 840 and 870 °C is personally due to the oxidation of SO_2 to SO_3 .



Thermoanalysis of the Si

No signs of physical or chemical changes are observed for Si samples subjected to heating from ambient to the ceiling temperature of the programme (the derivatograms are not shown for the sake of brevity). this is contrary its group IV congeners (Ge, Sn, and Pb) which show some transformations on heating static air atmosphere.

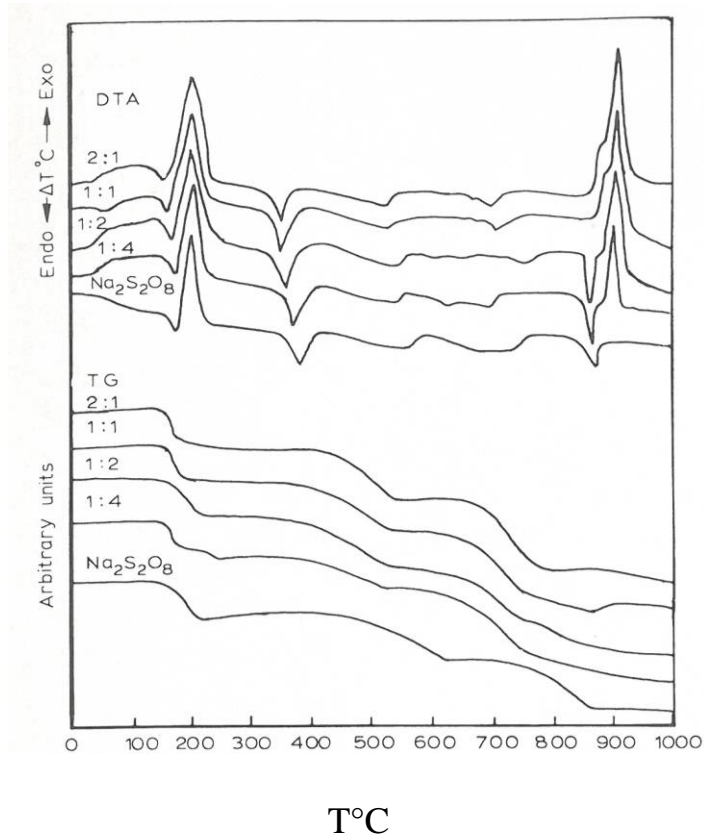


Fig. 1. TG and DTA Curves for various molar ratios of the Si- [Na]₂ S₂ O₈ binary system.

Table 1 : Preparation of standard molar ratios and TG result of $Si - Na_2S_2O_8$ binary mixtures.

Molaratio $Si: Na_2S_2O_8$	Si(mg)	$Na_2S_2O_8$ (mg)	Lost O_2 from $Na_2S_2O_8$				SO_3 Lost from $Na_2S_2O_7$ decomp.				$NaSO_4$ reacted WL%
			Theor (mg)	Exp (mg)	$T_i^\circ C$	$T_f^\circ C$	Theor (mg)	Exp (mg)	$T_i^\circ C$	$T_f^\circ C$	
1:4	5.70	194.30	12.4	12.2	165	230	62	60	380	750	8.3
1:2	11.11	188.89	12.10	12.0	165	230	60.5	57	380	750	16.6
1:1	21.05	178.95	11.40	11.0	160	230	67.2	56	380	750	33.1
2:1	38.09	161.91	10.32	10.3	160	230	51.6	51	380	750	65.2

Table 2 : d. Spacing* versus intensities of bright lines the (1:1) mixture of $Si: Na_2S_2O_8$ heated to $1050^\circ C$.

D(A°)	4.7	3.46	3.41	2.79	2.54	2.2
1/10	70	100	100	35	38	25

*Typical for $Na_2Si_3O_7$

Thermoanalysis of the $Si - K_2S_2O_8$ System

From the derivatograms of the various molar ratios prepared (Table 3) and subjected to the heating programme (Fig. 2.) it seems that, although no reaction occur between $K_2S_2O_8$ or its by- product $K_2S_2O_7$ and Si can catalytically lower their T_i values by 10 and 20 °C respectively. For instance the α to β phase transition (see DTA curve for the 1:4 ratio of $K_2S_2O_7$ is catalytically shifted from 330 to 310 °C, this causes the melting and decomposition endotherms of $K_2S_2O_7$ to overlap forming a wide, Combined endotherm that extends between 330 and 480 °C. Beyond 870 °C the usual two- step endotherm of K_2SO_4 phase change disappears and instead a wide exothermic hump (1:4 ratio) appears. As the ratio becomes 1:2 it splits into two exo-peaks representing two consecutive reactions. The first due to the

formation of $K_2Si_2O_5$ and SO_2 and the oxidation of the latter, and the second, at $940^\circ C$, due to the phase crystallization of the former which is accompanied by its oxidation. With more Si (2:1 ratio) the reaction with K_2SO_4 becomes more vigorous and the exo- peak, representing the oxidation of SO_2 sharpens and becomes steeper near $870^\circ C$. Between 870 and $985^\circ C$ a small weight- gain, probably due to oxidation or polymerization of $K_2Si_2O_5$ is observed, this is indicated by the small exotherm appearing at $940^\circ C$. The next smaller exotherm at $985^\circ C$ may belong to crystallization process. Very intense and bright d- lines (Table 4) as well as calculations from TG curves (fig .2) reveal that 91.2 (wt%) of $K_2S_2O_8$ indirectly reacts with Si (Table 3), this convinces us that (2:1) is the stoichiometric molar ratio and therefore the stoichiometric reaction is:

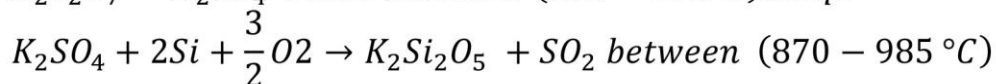
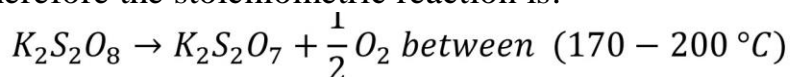


Table 3 : Preparation of standard molar ratios of the $Si - K_2S_2O_8$ binary mixtures.

Molar ratio $Si: K_2S_2O_8$	Si (mg)	Mg $K_2S_2O_8$	O_2 Lost from $K_2S_2O_8$				SO_3 Lost from $K_2S_2O_7$ decomp.				K_2SO_4 reacted Wt. %
			The or (mg)	Exp (mg)	$T_i^\circ C$	$T_f^\circ C$	The or (mg)	Exp (mg)	$T_i^\circ C$	$T_f^\circ C$	
1:4	5.07	194.93	11.4	11.2	17.5	20.0	57	56	38.5	87.0	12.8
1:2	9.85	190.15	11.2	11.1	17.5	20.0	56	52	38.0	87.0	24.8
1:1	18.90	181.10	11.0	10.9	17.0	20.0	55	52	38.5	88.0	50.4
2:1	36.10	163.90	9.6	9.5	17.0	20.0	48	45	38.0	88.0	91.2

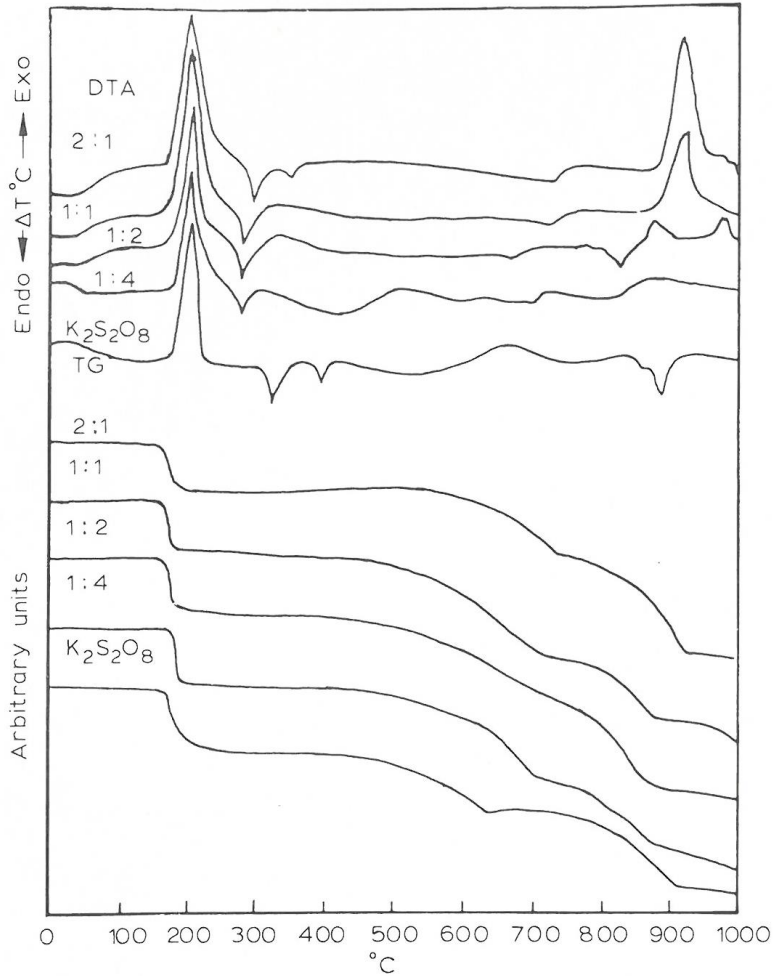


Fig. 2. TG and DTA Curves for various molar ration of the Si- $K_2S_2O_8$ binary system.

Table (4)
d- spacing versus intensities of bright lines for 2:1 mixture of
Si: $K_2S_2O_8$ heated to 1050 °C

D(Å)	3.80	3.13	3.10	2.96	2.78	2.43
1\10	90	50	30	60	40	60

Conclusion

Under astatic air atmosphere Si powder was found to be thermally stable up to the end of the heating programme (1050 °C) It acts as asemicondutive catalyst to lower the Ti values for the thermal decomposition of persulfates or phase transformations of pyrosulfates. At higher temperatures it reacts with solid Na_2SO_4 or K_2SO_4 to form the mixed $K_2Si_2O_5$ whose identities were checked by x- ray diffradion. The stoichiometric equations for these solid- state reactions have been established.

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water treatment of zeolite catalyst (Pd-MOR catalyst)

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Abstract: In this paper, the catalytic activity of Pd/mordenite zeolite is clearly modified by the use of H₂O vapor, the water treatment of Pd/H-MOR & Pd/Na-MOR makes several catalytic and chemical effects ,but it also have a slight negative effect . High temperature calcination (510 C°) is used for the metal reduction (Pd) that is to form aqua complexes .

1- Introduction

Many previous studies have shown that by exposing the catalyst to H₂O vapor during a period of time after calcination and before reduction, the catalytic efficiency of metal / zeolite catalysts can be modified. From predominant oxygenate production to primarily higher hydrocarbon production for bimetallic PdCo/Na Y catalysts used for CO hydrogenation, the selectivity was altered. This water treatment has been reported to boost the behavior of alkane isomerization for Pt / H – mordenite catalysts. While it is certain that Lewis sites are transformed by reaction with H₂O into Bronsted sites, the catalyst activity is most affected when water is added after calcination, when ligand-free ions are present in the noble metal. This discovery led to the hypothesis that the observed results may be instrumental in the complexation of transition metal ions with water.

The formation of metal-ligand complex ions in zeolites containing cages, such as Y-zeolite, appears to promote their migration from small to big cages. However, it is not clear if the hydration of transition metal ions will increase or decrease their reducibility in cagless zeolites, such as mordenite zeolites, A priori, and whether it will eventually lead to greater or less dispersion of metal. Research has therefore been undertaken to clarify these issues. Using methylcyclopentane (MCP) as a probe reaction, palladium

assisted in H-mordenite (Pd/HMor) or Na-mordenite (Pd/Na-Mor) was tested; In order to describe, The results of sample water treatment, temperature-programmed decrease (TPR), temperature-programmed desorption (TPD) and extended fine structure X-ray absorption (EXAFS) spectroscopies were used.

2- Experimental work

The catalysts were prepared by ion exchange of Pd (${}^4\text{NH}_3$) $^{2+}$ (NH_3) $^{2+}$ ions into either NH Mor (Si / Al = 9.3) or Na Mor (Si / Al = 5.4) as described previously . Catalysts with two different weight loadings were prepared.

A sample of 3 % Pd for characterization and 0.3 % Pd for the reaction studies . All samples were calcined in a high flow of UHP O₂ (1000 ml / min / g cat) from RT to 510 ° C at 0.5 ° C / min . This calcination decomposes the ammine complexes and transforms the NH-Mor into H-Mor . Water treatment (if desired) was accomplished by flowing UHP He (100 ml / min) through a water saturator maintained at 11.4 ° C (-10 Torr pressure) . All water was assumed to be absorbed by the catalyst bed , and the length of the water treatment was calculated by adding 12 wt % water to the catalyst sample . TPR , TPD , and EXAFS experiments were performed following the procedure in Refs . (8) and (9) , respectively . For the reaction studies , -100 mg of either 0.3 % Pd / H-Mor or 0.3 % Pd / Na-Mor was used All catalysts were first calcined at 510 ° C and reduced to 350 ° C . hydrogen flow rate was 20 ml / min , the vapor pressure of MCP in the reactor was 40 Torr , the total pressure was 1 atm , and the reaction temperature was 240 ° C . Figure 1 shows the reduction profiles for wet and dry Pd / H-Mor and Pd / Na-Mor.

1- Results

The differences are rather dramatic , a much higher temperature ($\sim 80^{\circ}\text{C}$ for Pd / Na-Mor and $\sim 120^{\circ}\text{C}$ for Pd / H-Mor) is required to reduce the samples that were exposed to H_2O . Also shown in Fig . 1 are reduction profiles for Pd / Mor that had been reduced to 250°C and subsequently exposed to O_2 at 100 or 500°C . From previous experience , it is known that PdO is formed at 100°C ; at 500°C , the oxide reacts with protons to form pd^{2+} ions and H_2O . Accordingly , the TPR profile after re-oxidation to 500°C resembles the one obtained directly after calcination . Because all treatments were performed in quartz reactors , it was possible to monitor the color changes of the samples . These color changes are summarized in Fig . 2. The pink color of the samples after calcination is assumed to be that of mordenite supported Pd^{2+} ions . The samples turn yellow if exposed to H_2O indicating the formation of an aquo- complex .

These color changes are consistent with changes in the TPR profiles in Fig . 1 , and they confirm that the PdO formed at low temperatures reacts with zeolite protons at higher temperatures to form Pd^{2+} and H_2O .

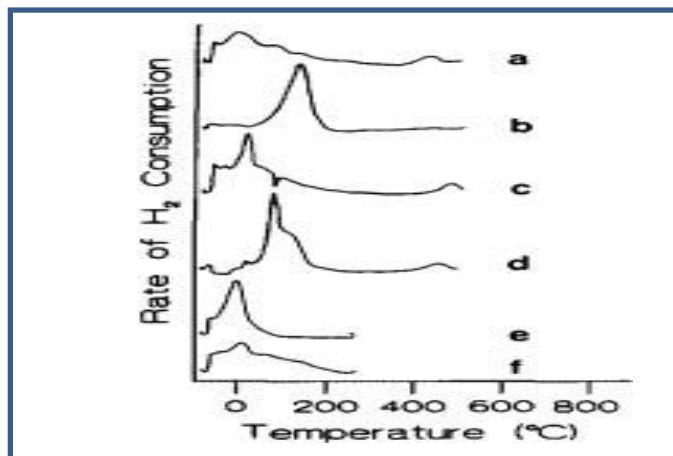


Fig . 1. TPR Profiles of (a) 3 % Pd / HMor - dry , (b) 3 % Pd / HMor - wet , (c) 3 % Pd / NaMor - dry , (d) 3 % Pd / NaMor - wet , (e) 3 % Pd / HMor after reduction to 250 ° C and oxidation to 100 ° C , and (f) 3 % Pd / HMor after re duction to 250 ° C and oxidation to 500° C.

TABLE 1

TPR .TPD , and EXAFS Data for Pd /
H Mor and Pa / Namor

Catalyst	ΔV	H / Pd	CN pd-pd	r pd-pd (Å)	σ^2
3% pd/ HMor Dry	1.78	1.1	2.11	2.70	0.0050
3% pd/ HMor Wet	2.00	0.81	6.19	2.73	0.0015
3% pd/ NaMor Dry	1.98	1.2	4.58	2.74	0.0043
3% pd/ NaMor Wet	1.96	0.87	6.15	2.74	0.0005

The crucial point with respect to the issue motivating the research is that exposure of the calcined sample to H₂O changes both the reduction profile and the color . The fact that H₂O is able to ligate to Pd⁺², but not justifies the conclusion to PdO that Pd⁺² are present in the sample after calcination . It is noteworthy that formation of an aquo-complex stabilizes the Pd⁺² ions significantly , so that a much higher temperature is required for their reduction . Apparently , the Pd (H₂O)⁺² coordination shell is more favourable than the coordination provided by the walls of the zeolite .

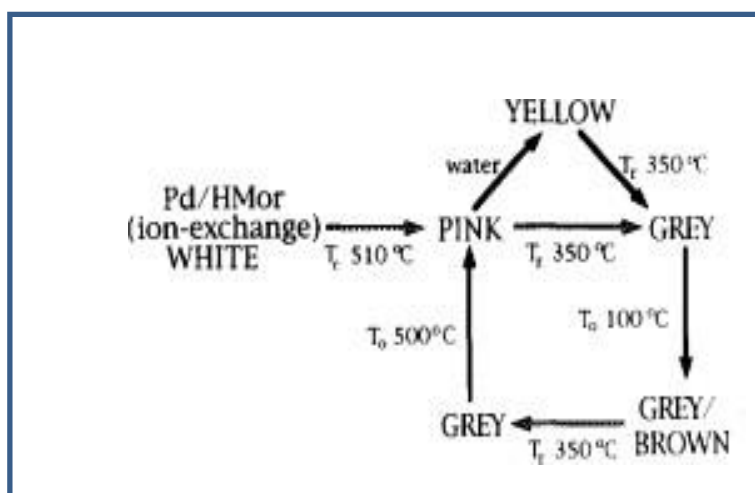


FIG . 2. Color changes of Pd / HMor after various treatments (T_c = calcination temperature , T_r = reduction temperature , and T_o = oxidation temperature)

TABLE 2

TPR ,TPD , and EXAFS Data for Pd /
H Mor and Pa / Namor

Catalyst	X(%) ^a	SCR(%) ^b	SRO(%) ^c	SRE(%) ^d
3% pd/ HMor-Dry	3.13	9.37	6.82	83.83
3% pd/ HMor-Wet	2.73	7.2	5.3	83.83
3% pd/ NaMor -Dry	0.08	0	51.3	48.7
3% pdNaMor-Wet	0.08	0	54.3	45.69

The area under the TPR profiles can be integrated and used to calculate the change in Pd valence , AV , during reduction . The values in Table I , were obtained by inte grating the profiles between (-40 and 500 ° C) with the exception of dry Pd / H-Mor and all AV values agree within experimental error (5 %) , with the expected value of 2.0 . It is notable that the Pd⁺² ions in dry Pd / H-Mor can not be fully reduced to Pd⁰ even at 500 ° C . Apparently , in the absence of H₂O , some Pd ⁺² are highly stabilized in the zeolite ; the side pockets are likely candidates . As the H-Mor used in this study contains ca , four Al⁺³ per unit cell , it is reasonable that some of the side pockets will carry two negative charges ; in these positions the Pd⁺² ion would be coordinated by zeolite oxygens in a distorted octahedron .

The metal dispersions measured by H₂-TPD as (H / Pd ratio) and EXAFS (as coordination number) are shown in Table 1 for samples that have been calcined to 510 ° C and reduced to 250 ° C . Both sets of data consistently show that the Pd particle size is

larger in samples that have been exposed to H₂O prior to reduction . In addition , the EXAFS data confirm that the protons in the H-Mor sample have an anchoring effect , i.e the Pd particles are smaller in H-Mor than in Na-Mor . The increase in particle size for the wet samples can most easily be explained by accepting that the mobility of the Pd (H₂O) + ion is larger than that of the bare Pd^{2 +} ion due to less interaction with the zeolite framework . A similar increase in mobility has been observed for Pd (NH₃) * in Y zeolite.

As a consequence of the higher mobility , the aquocomplex can more easily travel to a reduced Pd particle covered by chemisorbed H atoms . As always , the ultimate particle size is determined by the ratio of two rates : nucleation and growth . The growth rate of Pd nuclei is determined by the mobility of the Pd^{2 +} ions . Formation of the aquocomplex thus leads to larger Pd particles . Results of the catalytic MCP reaction study are shown in Table 2. Pd / Na-Mor (wet or dry) is hardly active for this reaction . This is in line with the very large size of the metal particles . The only chemical anchors in these samples are the protons that are produced by metal reduction .

As was shown previously , interaction of MCP with these protons induces growth of the Pd particles . For the Pd / H-Mor samples , the water treatment has a slight negative effect on the total activity of the sample , but also leads to an increased selectivity and yield towards ring enlargement products . As ring enlargement occurs via a bi-functional mechanism (15) , this selectivity correlates with the ability of the catalyst to isomerized paraffins . The increase in ring enlargement could be due to an increase in the acidity of the sample after water treatment , or a larger

concentration of Pd - proton adducts , which might act as " collapsed sites " in the bi-functional mechanism .

3- Conclusion

water treatment of Pd / H-Mor and Pd / Na-Mor after calcination , but before reduction results in several changes in the sample . Metal reduction requires a higher temperature due to the formation of aquocomplexes. The higher mobility of these complexes leads to larger metal particles . Although the water treatment has a slight negative effect on the catalytic activity of Pd / H-Mor (in stark contrast to Pt / H-Mor) , the yield of ring enlargement products increases . As observed previously for Pd in Y zeolite , no autoreduction of Pd (NH₃)⁺ occurs during programmed calcination , and re-dispersion of PdO by zeolite protons is effective . The reduced Pd particles are smaller in the H form of the zeolite than in the Na form . Finally , color changes during calcination and reduction provide detailed information about the chemical processes that occur.

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