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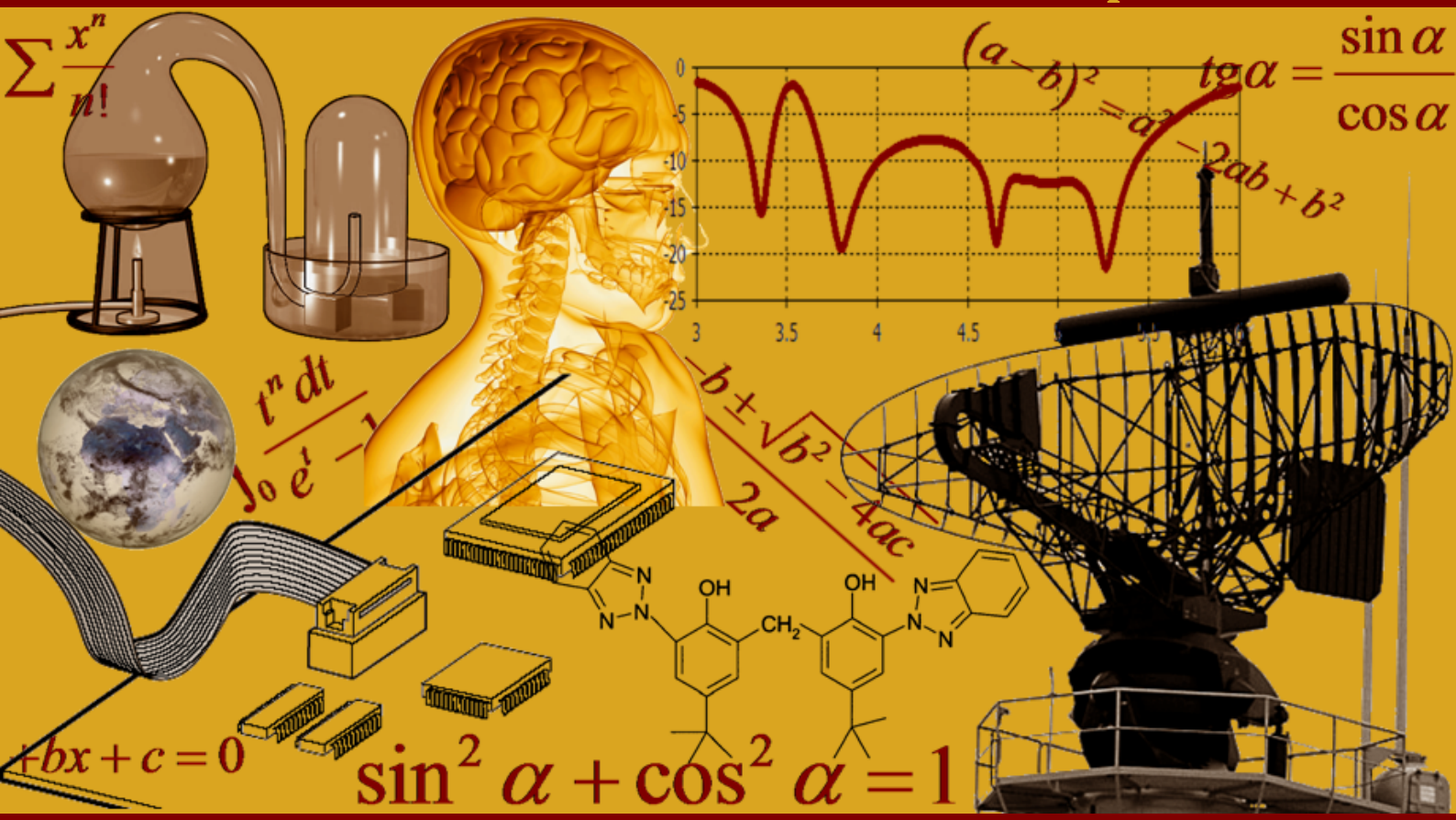

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Une cartographie de la résistance à l'adoption du M-Banking en Tunisie

[Mapping of resistance to the adoption of M-Banking in Tunisia]

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ABSTRACT: The mobile bank (M-Banking) is confronted to various kinds of resistances which can hind his adoption by the Tunisian customers. This study identifies three groups of non adopters of the technology M-Banking: postponers, opponents and detractors. This work is based on a cognitive approach which reconciles the qualitative and quantitative studies to reach the objectives of our research work.

The results of this study indicate that the non adopters groups differ in a significant way with regard to obstacles of use, the value and the image. Also, the barriers of risk and the tradition did not show statistical meaning, but, the barrier of the received risks is, generally, important. Significant relations between the barriers of use, risks and the image with the sex and the level of the education were relived.

Finally, our results show a clear mapping to let appear the cultural dimensions of the resistance in the adoption of resultant M-Banking of the study. These results are important for the future projects of M-Banking and E-Banking in Tunisia and in the other countries in development.

KEYWORDS: M-Banking, E-Banking, Résistance to the innovations, Kernel.

RESUME: La banque mobile (M-Banking) est confrontée à différents types de résistances qui peuvent entraver son adoption par les clients Tunisiens. Cette étude identifie trois groupes de non adoptants de la technologie M-Banking : les postponers, les opposants et les détracteurs.

Ce travail est basé sur une approche cognitive qui concilie les études qualitatives et quantitatives pour atteindre les objectifs de notre travail de recherche.

Les résultats de cette étude indiquent, d'une part, que les trois groupes non adoptants diffèrent de manière significative par rapport à des obstacles d'utilisation, la valeur et l'image.

D'autre part, les barrières de risque et de la tradition n'ont pas montré de signification statistique, mais, la barrière des risques reçus reste généralement importante.

Des relations significatives entre les barrières d'utilisation, des risques et de l'image avec le sexe et le niveau de l'éducation ont été notées.

Enfin, les résultats ont permis une cartographie claire pour laisser apparaitre les dimensions culturelles relatives à la résistance à l'adoption du M-Banking résultants de l'étude. Ces résultats peuvent servir les futurs projets de M-Banking et de E-Banking en Tunisie et dans les pays en voie de développement.

MOTS-CLEFS: M-Banking, E-Banking, résistance à l'innovation, Kernel.

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1 INTRODUCTION

Au cours des deux dernières décennies, le progrès de la technologie de l'information ont révolutionné les services bancaires. Le développement des services bancaires électroniques au moyen de multiples canaux électroniques tels qu'Internet et la téléphonie mobile a permis de fournir de nouveaux types de valeurs ajoutées pour les clients.
Les appareils mobiles deviennent un moyen populaire d'accéder à Internet, ils permettent aux utilisateurs d'accéder à toutes sortes d'informations à tout moment et depuis n'importe quel endroit en raison de la mise à niveau des appareils mobiles et de l'élargissement de la couverture de l'infrastructure de télécommunications (Shrestha, 2007). Ainsi le mobile payment est une variante du M-banking qui permet aux clients de payer au moyen d'une puce reconnue comme une carte de paiement tandis que le Mobile Banking regroupe tous les accès aux comptes bancaires et aux services liés à ces comptes directement sur terminal mobile. Le M-banking est une composante du commerce sur téléphone portable permettant d'interagir avec une banque sur internet par le biais d'un dispositif sans fil, pour effectuer des transactions ou accéder à des services financiers mobiles (Assadi et Cudi, 2011). Le M-Paiement est ainsi, un élément constitutif du M-Banking connu pour les achats sur Internet.

Aujourd'hui, il existe de nombreux facteurs de réussite dans tout ce qui concerne Internet et la technologie mobiles. Comme, par exemple, le taux de pénétration élevé des titulaires des lignes mobiles et des usagers d'Internet et la disponibilité des méthodes alternatives de paiement comme les cartes de crédit. Toutefois, et en dépit de ces nombreux avantages, l'utilisation des téléphones mobiles dans les transactions bancaires, est récente et source de scepticisme. Il semble y avoir certains inhibiteurs qui ralentissent l'utilisation des canaux mobiles dans les transactions bancaires.

Ainsi ce papier se propose de voir quels types de résistances est confrontée le M-Banking en Tunisie et comment entravent-ils son adoption par les clients ?
Afin de répondre à cette problématique, les auteurs se basent sur plusieurs modèles et différentes études sur le comportement des consommateurs envers l'innovation qui sera considéré pour analyser la résistance des consommateurs à l'adoption du M-Banking. Il sera aussi question de vérifier si cette résistance est causée par des barrières psychologiques, par des obstacles d'image et de tradition, ou encore par des obstacles relatifs aux barrières d'utilisations de la valeur et des risques à l'égard des produits existants (Szmigin et Foxall, 1998 ; Mirella et al., 2009). L'objectif de cette étude est d'explorer les différentes causes de résistance au M-Banking et de vérifier comment les différences entre les divers groupes de clients peuvent être interprétées afin que les réponses du marketing bancaire soient plus efficaces.

2 REVUE DE LA LITTÉRATURE ET DES TRAVAUX ANTÉRIEURS

A l'ère des technologies de l'information et de la communication, il y a grand intérêt à étudier en profondeur les différentes dimensions de l'adoption des services bancaires électroniques (Suoranta et Mattila, 2004 ; Laforet et Li, 2005; Sulaiman et al., 2007 ; Laukkane et al., 2008). De ce fait, certains auteurs se sont intéressées aux perceptions, aux attentes des consommateurs et à leur satisfaction (Laforet et Li, 2005 ; Lewis, 1991; Holmund et Kock, 1996). Dans d'autres travaux, des chercheurs se sont intéressés aux consommateurs quant à l'acceptation des services bancaires techno-base (Barczak et al., 1997). Ces études explorent les attitudes des consommateurs, les facilités recherchées dans les services bancaires en ligne (Machauer et Morgner, 2001). Pour Curran et Meuter (2005), l'importance des facteurs qui influent l'adoption de guichets automatiques, des services bancaires par téléphone et de l'Internet Banking serait sensiblement différente selon les canaux. En outre, les utilisateurs d'Internet Banking et M-Banking divergent au niveau de leurs caractéristiques démographiques. Alors que Karjaluoto et al. (2002) ont montré que les « adoptants » finlandais de **Bankingare Internet** sont très instruits, relativement jeunes, et disposent d'un revenu élevé, Laforet et Li (2005) ont montré que l'éducation n'affecte pas l'adoption de M-Banking en Chine. Par ailleurs, la moyenne d'âge des utilisateurs du M-Banking s'est révélée être beaucoup plus élevée que l'âge moyen des utilisateurs d'Internet Banking à l'intérieur de la Chine, ce qui converge avec les conclusions de l'étude Finlandaise de Suoranta et Mattila (2004). Toutefois, les utilisateurs du M-Banking ou encore les «M-Banking users» sont également différents dans leurs préférences d'attribut de canal, et dans leurs perceptions sur leurs activités bancaires (Laukkanen, 2007a, b).

2.1 TYPOLOGIE DE LA RÉSISTANCE À LA CONSOMMATION

De nombreux chercheurs ont remarqué que les consommateurs réagissent d'une manière moins enthousiaste, même pour le succès des produits nouveaux (Rogers, 1995). Ce manque d'enthousiasme peut être considéré comme une forme de résistance chez les consommateurs (Brod et Craig, 1982 ; Blackler et Colin, 1985 ; Murdock et al., 1983). La résistance conduit normalement la réponse des consommateurs envers l'une des trois formes : le rejet direct, le report ou l'opposition (Szmigin et Foxall, 1998 ; Mirella et al., 2009).

Le rejet direct est la forme la plus extrême de résistance (Mirella et al., 2009). Quand une masse de consommateurs rejette une innovation, les fabricants la changent ou la modifient avant de la réintroduire sur le marché. Le rejet peut se produire si l'innovation n'offre pas un avantage précieux, si son usage est perçu comme complexe ou risqué (Szmigin et Foxall, 1998). Le rejet peut être de deux types, le rejet passif et le rejet actif. Le rejet passif se produit lorsque l'innovation n'est jamais vraiment adoptée ou mise en œuvre alors que le rejet actif se produit lorsque l'innovation a été envisagée mais rejetée plus tard (Pousttchi et Schurig, 2004).

Le report se produit lorsque les consommateurs retardent l'adoption d'une innovation (Poon, 2008). Ce délai dépend de facteurs situationnels, comme l'attente du «bon moment» pour devenir suffisamment capable, ou pour s'assurer que le produit fonctionne efficacement. Le report peut prendre la forme de l'acceptation ou de rejet après une certaine période de temps (Szmigin et Foxall, 1998). L'opposition fait référence à une sorte de rejet, mais le consommateur est prêt à tester et à vérifier l'innovation avant de la rejeter. Toutefois, les causes de l'opposition peuvent varier. Cela peut être dû à la résistance aux facteurs situationnels, ou encore au style cognitif des consommateurs (Mirella et al., 2009; Poon, 2008). Les travaux antérieurs révèlent qu'il existe un continuum entre les postponers qui sont des hésitants et attentistes et les détracteurs hostiles capables d'argumenter, de faire campagne de résistance contre le service de M-Baking. Entre les deux se situent les opposants qui pensent et agissent pour eux-mêmes, sans faire connaître leurs hésitations ou inquiétudes.

2.2 RÉSISTANCE DES CONSOMMATEURS ET LA THÉORIE DE L'INNOVATION

La résistance des consommateurs aux innovations a été expliquée par différents obstacles. Ces obstacles sont essentiellement causés par les risques de valeur représentant des barrières fonctionnelles, alors que les obstacles de la tradition et de l'image se réfèrent à des barrières psychologiques. Les barrières fonctionnelles risquent de se poser si les consommateurs perçoivent des changements considérables pour l'adoption d'une innovation, alors que les barrières psychologiques sont souvent causées par le conflit avec les croyances des consommateurs (Ram et Sheth, 1989).

Les barrières d'utilisation deviennent plus claires lorsque l'innovation n'est pas compatible avec les pratiques, les habitudes ou le «*workflow*» des consommateurs existants. Ils sont principalement liés à la facilité d'utilisation, y compris la complexité ou la similarité au concept et la facilité d'utilisation associée à l'innovation du modèle d'acceptation de la technologie (TAM[1]), qui sont deux notions étroitement liées. En M-Banking, les consommateurs ont signalé les inconvénients liés à la petite taille du clavier et de l'affichage du dispositif minuscule (Teo et Pok, 2003 ; Gerrard et Cunningham, 2003). Les travaux de recherche antérieurs ont montré que la facilité d'utilisation a un effet positif sur l'attitude à l'égard de l'internet banking ainsi qu'elle influence positivement l'intention des non-utilisateurs à utiliser le service (Lai et Li, 2005). De même, ils ont suggéré que la convivialité perçue a un impact significatif sur la volonté d'utiliser l'internet banking (Liao et Cheung, 2002) et que la facilité d'utilisation perçue a une relation directe avec l'adoption (Yiu et al., 2007) et l'intention comportementale à utiliser le service (Wang et al., 2003). Sur cette base, il convient de supposer que :

H1. Il n'y a pas de différence significative entre «postponers» (ou «attentistes»), les opposants et les détracteurs par rapport à la barrière d'utilisation.

La notion de la valeur, est considérée, comme un concept global attaché au produit et au service pour le consommateur, issu de ses préférences économiques, ergonomiques, du plaisir, du bénéfice d'image qu'il compte se donner. Ainsi, la barrière valeur est étroitement liée à la notion de Rogers (Fain et Roberts, 1997) d'un avantage relatif, qui ressemble au concept de l'utilité perçue dérivé du modèle d'acceptation de la technologie TAM (Wu et Wang, 2005) et qui a mis en évidence les cinq causes de la non-adoption d'un nouveau produit ou service en online Banking à savoir l'avantage relative, la compatibilité, la complexité, la possibilité de faire des essais et l'observabilité. Il est se réfère selon Ram et Sheth (1989) à l'absence de valeur monétaire et de performance d'une innovation. Bien que le M-Banking puisse être perçu comme coûteux, il a été constaté que certains des services de M-Banking augmentent l'impression chez les clients de gérer, eux-mêmes leurs affaires financières (Gerrard et al., 2006). L'utilité perçue est l'un des facteurs qui expliquent l'utilisation réelle des services bancaires sur Internet (Pikkarainen et al., 2004). Elle est directement liée à l'adoption (Yiu et al., 2007) et l'intention d'utiliser (Cheng et al., 2006 ; Wang et al., 2003) des services bancaires par Internet. D'où l'hypothèse:

H2. Il n'y a pas de différence significative entre les «postponers», les opposants et les détracteurs par rapport à la barrière de la valeur.

[1] *Technology Acceptance Model*

Mettre en évidence la barrière des risques revient à mesurer le degré de risques potentiels d'une innovation. En effet, Gerrard et al. (2006) ont trouvé que le risque est le principal facteur qui explique la résistance des consommateurs à utiliser l'Internet Banking.

Tableau 1: Les types de risque selon Gerrard et al. (2006)

Type de risque	Explication
Physique	Des soucis corporels ou matériels qui peuvent être inhérents à l'innovation (Ram et Sheth, 1989)
Economique	Plus le coût d'une innovation est élevé, plus le risque perçu est économique (Ram et Sheth, 1989)
Fonctionnel	Ce type de risque est dû à l'incertitude des performances. Le client s'inquiète ainsi du fait que l'innovation peut ne pas être entièrement testée et que, par conséquent, il est possible qu'elle ne fonctionne pas correctement ou de manière fiable (Ram et Sheth, 1989; Kuisma et al., 2007)
Social	Les clients peuvent résister à une innovation, car ils estiment qu'ils devront faire face à l'ostracisme social ou au ridicule par leurs pairs quand ils l'adoptent (Ram et Sheth, 1989)

La littérature a montré que la précision perçue affecte significativement la volonté des consommateurs à utiliser l'Internet banking (Liao et Cheung, 2002). Yiu et al. (2007) ont prouvé qu'il existe une relation directe entre la perception des risques et l'adoption de services bancaires par Internet. De ce cadre, il est possible de proposer l'hypothèse selon laquelle:

H3.a. Il n'y a pas de différence significative entre « postponers » et les détracteurs par rapport à la barrière risque.

H3.b. Par contre les opposants réagissent autrement par rapport à la barrière risque.

Les barrières traditionnelles impliquent généralement des changements qui peuvent générer une innovation dans les routines quotidiennes, avec une préférence, observée dans le comportement des consommateurs, pour les produits existants par rapport aux nouveaux (Srijumpa et al., 2002). Le manque d'interaction humaine peut effectivement être une source d'insatisfaction dans les services financiers sur Internet (Srijumpa et al., 2007; Marr et Prendergast, 1993). Les clients préfèrent traiter avec les opérateurs humains plutôt que d'adopter les technologies de libre-service (Thornton et White, 2001). En outre, certains clients non-adoptant l'Internet banking préfèrent rester avec moins de services technologiques avancés ou avec des systèmes plus fermés, parce qu'ils perçoivent l'Internet comme une technologie ouverte avec des éléments d'incertitude Rotchanakitumnuai et Speece (2003). Ainsi, pas tous les clients ne voient pas nécessairement le besoin de nouveaux canaux de service car ils sont satisfaits de la façon dont ils mènent actuellement leurs opérations bancaires (Gerrard et al., 2006). En effet, le désir de contact personnel a un impact sur l'utilisation des services financiers tels que l'Internet bancaire et le paiement des factures de téléphone (Walker et Johnson, 2006). Par conséquent, dans ce travail il sera question de vérifier que:

H4.a. Il n'y a pas de différence significative entre les opposants et les détracteurs par rapport à la barrière de la tradition.

H4.b. Par contre les «postponers» réagissent autrement par rapport à la barrière de la tradition.

La barrière de l'image est associée à l'identité des innovations (depuis son origine) comme la catégorie de produit, la marque ou le pays d'origine (Ram et Sheth, 1989). En outre, cela est lié à différents types d'anxiété envers l'informatique (Meuter et al., 2000), ou de la technologie elle-même, en se référant à l'état de consommateurs à esprit négatif sur les outils de la technologie (Gold et Bela, 1981). Cela peut également être le cas pour le M-Banking, alors que certains consommateurs perçoivent la technologie mobile comme trop difficile à utiliser. Ainsi, se forme instantanément une image négative de la fonction liée à la technologie. Certains clients de service non-internet bancaires peuvent avoir une image négative à l'égard des nouvelles technologies et peuvent être opposés à la tendance des services mobiles sur internet (Kuisma et al., 2007). D'où :

H5.a. Il n'y a pas de différence significative entre les opposants et les détracteurs par rapport à la barrière de l'image.

H5.b. Les « postponers » réagissent autrement par rapport à la barrière de l'image.

2.3 M-BANKING EN TUNISIE

Selon *International Telecommunication Union*, le M-Banking se réfère à l'exécution de services financiers en utilisant des techniques de communication mobiles avec des appareils mobiles. À l'heure actuelle, les services M-Banking offrent beaucoup de prestations concernant des informations de compte, de transferts de paiement, d'investissement, de soutien et de services de contenu. Selon Tooma et Grosser (2005)[2], le nombre mondial d'utilisateurs de M-Banking et services connexes devrait croître de 55 millions de dollars en 2009 à un taux de croissance annuel composé (TCAC) de 59,2 pour cent pour atteindre 894 millions utilisateurs en 2015.

En Tunisie, un certain nombre de banques locales (succursales) ont lancé des services bancaires électroniques pour donner aux clients l'accès à des liquidités et leur permettre de mener des transactions financières nécessaires. Pourtant, les services bancaires en ligne n'ont pas décollé en Tunisie en raison des faibles taux d'«alphabétisation informatique» et de la mauvaise pénétration d'Internet. Par conséquent, il est évident qu'il y a une tendance à la hausse dans l'utilisation des mobiles. Toutefois, que le nombre de personnes qui utilisent les services bancaires mobiles en Tunisie est inexistant. Dans le monde bancaire, 200.000 banquiers croient qu'il y a un potentiel de croissance considérable (Hofstede, 2003). Le succès du M-Banking dans des pays comme l'Afrique du Sud, le Kenya et le Botswana (Bandyopadhyay, 2010) pourrait constituer de bonnes indications pour le M-Banking en Tunisie.

2.4 CULTURE ET DIMENSIONS DU M-BANKING EN TUNISIE

Traditionnellement, le terme «culture» défini par Hofstede (2003), comme «*la programmation collective de l'esprit qui distingue les membres d'un groupe ou d'une catégorie de personnes d'un autre groupe* ». Dans la définition de la culture par groupes ou catégories de personnes on désigne les personnes qui sont en contact les unes avec les autres ou qui ont quelque chose en commun, telles que la nationalité, le sexe, la religion et l'origine ethnique (Nunnally, 1967). Hofstede (2003) a identifié quatre dimensions principales qui forment un modèle des différences entre les cultures nationales. Ces dimensions sont la distance - hiérarchique, individualisme - collectivisme, féminisme - masculinité, et l'incertitude.

Tout d'abord, la distance hiérarchique, se réfère à la mesure avec laquelle les membres les moins puissants des organisations dans un pays s'attendent et acceptent que le pouvoir soit inégalement réparti. En Tunisie, il semble y avoir un degré élevé d'inégalité de pouvoir et de richesse dans la société (Hibou et al., 2011).

Une deuxième dimension est celle du collectivisme-individualisme, qui se réfère à des sociétés dans lesquelles les intérêts individuels priment sur les intérêts du groupe (Ben Hamadi et Chapellier, 2012).

La troisième dimension est la féminité-masculinité, où la masculinité est une société dans laquelle les rôles sociaux de sexe sont clairement distincts, tandis que, la féminité est une société dans laquelle les rôles sociaux de sexe se chevauchent (Sulaiman et al., 2007). Cette dimension en Tunisie est à peine plus élevée que la moyenne (In-Straw et Cawtar, 2010). Enfin, la quatrième dimension est l'évitement de l'incertitude, qui se réfère à la mesure dans laquelle les membres d'une culture se sentent menacés par des situations incertaines ou inconnues (Nunnally, 1967). La caractéristique d'évitement de l'incertitude telle que détaillée par Hofstede (2003) est considérée comme élevée en Tunisie ce qui justifie pourquoi les tunisiens respectent les règles de Hofstede afin d'éviter l'incertitude qui conduit une société à être réfractaire au risque (El Akremi et al., 2007).

3 MÉTHODOLOGIE DE RECHERCHE

3.1 EXPÉRIMENTATION ET PRÉSENTATION DE LA MÉTHODE DU KERNEL

Un ensemble d'affirmations structurées a été conçu pour étudier les cinq principaux obstacles à l'adoption du Mobile Banking qui ont été identifiés par le modèle de Ram et Sheth (1989) et leur impact sur chaque groupe de non-adoptants. Cette méthode utilisée est dite «Kernel®». Cette approche méthodologique de quantification des phénomènes qualitatifs ressentis s'appuie sur deux phases relatives à la collecte des données et leur traitement.

[2] *Une étude présentée par Berg Insight*

-a) La phase collecte s'articule sur trois piliers dont le socle est l'interclassement des préférences:

- un contenu qui procède des recherches les plus récentes relatives aux préférences cérébrales ;
- Une orientation fondée sur l'expérience des concepteurs relative aux exigences actuelles du management au sein des entreprises.
- une modalité de prise d'information innovatrice utilisant le dispositif de hiérarchisation développé par l'Analyse de Dominance® ; selon les processus de l'interclassements des préférences (Rebeillard et Kreweras, 2006).

-b) La phase analyse s'articule sur deux piliers dont le socle est la représentation multidimensionnel:

- Cette mise en oeuvre concerne l'analyse des tableaux de dissimilarité et d'analyser les proximités entre individus, ressemblances ou dissemblances résultant de l'observation des comportements à l'issue de l'expérimentation.
- À partir de la matrice des similarités ou dissimilarités interindividuelles ainsi obtenue, le positionnement multidimensionnel permet d'obtenir une représentation géométrique s'ajustant au mieux selon un critère donné à l'ensemble des proximités observées et d'en proposer une interprétation révélée par la structure du nuage des points représentant les stimuli projetés dans un espace euclidien.

Le principe de l'exercice est de pousser les consommateurs à choisir une position relative entre ces 30 à 60 affirmations en évitant qu'on puisse mettre toutes ou presque toutes les affirmations sur une même zone. Ce qui ne manquerait pas de se produire avec un exercice avec 20 affirmations. L'échantillon étant réduit, il faut que les consommateurs puissent interagir en permanence et interclasser leurs préférences.

3.2 ORGANISATION GÉNÉRALE DE L'APPROCHE: DU QUALITATIF AU QUANTITATIF

A partir des informations issues de l'approche qualitative (Annexe 3), 43 affirmations ont été créés figurant sur des cartes réelles à interclasser sur un tapis de jeu comportant 100 cases. Le critère de classement est le suivant : de la droite vers la gauche selon le classement par rapport à la phrase inductrice ainsi que de haut en bas dans chaque colonne. Ainsi la colonne la plus à droite est celle qui est la première dans l'ordre d'accord, tandis que les cases à l'intérieur de la colonne vont de la plus forte à la plus faible de la colonne elle-même et ainsi de suite en passant plus à gauche : la première en haut… Le tapis de jeu est organisé en 4 zones de 25 cases chacune, installées sur 5 colonnes de 5 cases. En l'espèce il n'y a que 43 cartes pour 100 cases et leur disposition peut s'effectuer sur un grand nombre de possibilités. Les cases blanches constituent des distances psychologiques correspondant implicitement au ressenti implicite de chacun (Graphique 7 de l'annexe 5). L'exercice d'interclassement aboutit à créer un «système» puisque toutes les cartes sont en rapport les unes avec les autres. C'est une grande différence avec les questionnaires classiques.

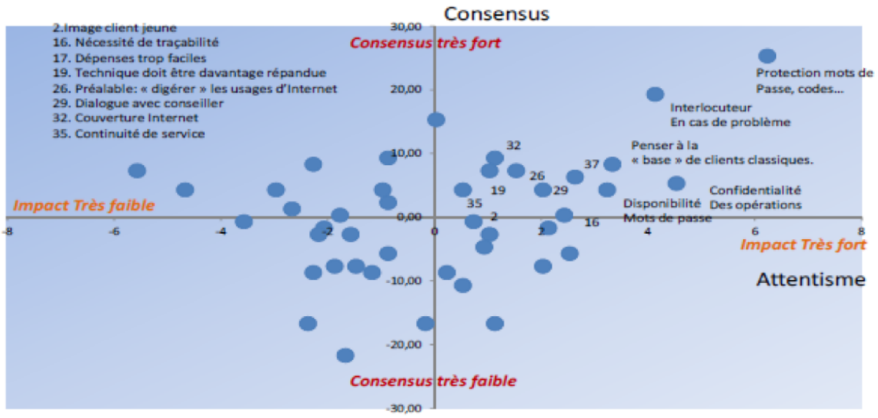
4 RÉSULTATS ET INTERPRÉTATION

4.1 ENSEMBLE DES CLASSEMENTS EFFECTUÉS

L'exercice d'interclassement est réalisé avec une population de 28 internautes, utilisateurs des réseaux sociaux. Il convient de distinguer par ordre de difficulté croissante les notions de :

Postponers (ou attentistes) ; Détracteur ou méfiant ; Opposant passif ou encore Opposants actifs par conviction. Cette notion concerne soit des avis sur certaines dispositions : *« je suis opposé à cela…* » ; Soit un auto-classement : « *je suis opposé au M.banking* ». Le Graphique ci-dessous permet de lire les affirmations les mieux placées pour agir afin de tenter de vaincre les résistances pour le passage au M.Banking**.** Ce sont des affirmations placées:

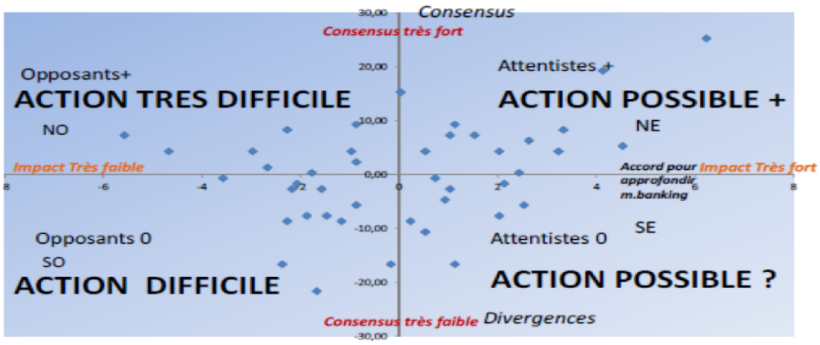
Graphique_2: Postponers (Attentistes) à convaincre
(quadrant NE)



1) sur **les risques** qui sont dans cette situation: protection des codes, mots de passe, confidentialité, accès aux codes et mots de passe, traçabilité, couverture Internet…

2) sur la **« tradition »** qui permettent d'envisager le changement : conserver interlocuteur, banque à base clients classiques, dialogue conseiller…

Graphique_1: De l'attentisme à l'opposition



Les graphes organisés par thème permettent de situer ces thèmes sur les quadrants stratégiques. Il existe donc deux catégories de prospects avec une dominance de positions pour les postponers/attentistes avec le risque et pour les opposants passifs avec la valeur.

Tableau 2: Types des usagers selon les barrières à l'utilisation de l'Internet Banking

	Opposants actifs	*Opposants passifs*	*Détracteurs*	*Postponers (hésitants)*
Valeur		XX		
Utilisation	X			
Tradition			X	
Risque				XX
Image	X		X	

Le tableau 2 montre que les opposants ont été scindés en deux trois groupes :

Le groupe des opposants actifs qui manifestent leur opposition plus particulièrement et d'une manière intense par rapport à la barrière utilisation et la barrière image.

Le groupe des opposants passifs, qui sont moins actifs que le premier groupe, marquent leur opposition plus particulièrement à la barrière valeur. Ces opposants sont moins actifs par rapport aux deux autres barrières à savoir tradition et risque.

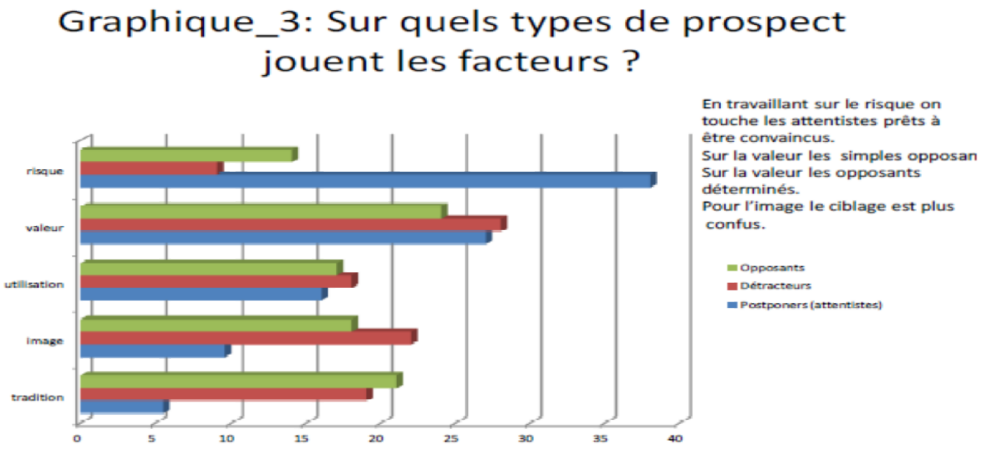
Le troisième groupe des résistants à savoir les détracteurs affirment leur résistance à la barrière limage à l'identique que les opposants passifs mais avec moins de souplesse et plus de compréhension. Les détracteurs affirment leur résistance par rapport à la barrière tradition contrairement aux postponers.

Ce même tableau montre que les postponers (hésitants) sont très attachés à la barrière risque qui constitue l'élément essentiel à leur résistance. Ils présentent une certaine souplesse de résistance par rapport aux d'autres barrières.

4.2 VALIDATION DES HYPOTHÈSES

H1. Il n'y a pas de différence significative entre les postponers, les opposants et les détracteurs par rapport à la barrière utilisation. En effet, il y a un consensus de résistance modérée à cette barrière lors de l'adoption du M-Banking (**Graphique 3**). L'histogramme met en évidence l'équivalence entre les 3 types de résistants par rapport à la barrière de l'utilisation.

H2. Il n'y a pas de différence significative entre les postponers, les opposants et les détracteurs par rapport à la barrière de la valeur. En effet, il y a un consensus de résistance élevée à cette barrière lors de l'adoption du M-Banking (**Graphique3**). L'histogramme met en évidence l'équivalence entre les 3 types de résistants par rapport à la barrière de la valeur.



H3. Il n'y a pas de différence significative entre les opposants et les détracteurs par rapport à la barrière risque, ces deux types de non adoptants réagissent faiblement à cette barrière. Par contre, la barrière risque provoque de fortes réaction à l'adoption du M-Banking chez les postponers (**Graphique 3**).

H4. Il n'y a pas de différence significative entre les opposants et les détracteurs par rapport à la barrière de la tradition. En effet, il y'a un consensus de résistance élevée, entre ces deux types de non-adoptants, par rapport à cette barrière. Par contre, les postponers réagissent faiblement à la barrière de la tradition lors de l'adoption de la technologie M-Banking (**Graphique 3**).

H5. Il n'y a pas de différence significative entre les opposants et les détracteurs par rapport à la barrière de l'image, il y'a un consensus de résistance moyennement élevée, entre ces deux types de non-adoptants, par rapport à cette barrière. Par contre, les postponers réagissent faiblement à la barrière de l'image lors de l'adoption du M-Banking (**Graphique 3**). La vérification effective de l'ensemble de nos hypothèses est expliquée par les graphiques (3 ;4 ; 5 et 6) de l'annexe 5.

5 DISCUSSIONS: DES PISTES EXISTENT POUR RÉDUIRE L'ATTENTISME VIS-À-VIS DU M-BANKING.

Les résultats montrent que les trois groupes des non-adoptants à savoir postponers, opposants et détracteurs diffèrent considérablement en ce qui concerne l'utilisation, la valeur et les barrières d'image, soutenant ainsi l'hypothèse 1de différenciation. Les barrières de risques et de la tradition n'ont pas montré les mêmes types de signification par rapport à la réaction des non-adoptants, cependant, les résultats indiquent un risque élevé de perceptions par rapport à la sécurité dans l'adoption du M-Banking. Par conséquent, les groupes devraient être abordés avec des stratégies différentes et des actions marketing différenciées et ciblées.

Les banques en Tunisie devraient mettre en évidence le fait que le service soit sécurisé et mentionner explicitement les techniques de sécurité. En outre, les banques peuvent promouvoir l'étude des services en offrant une démonstration gratuite pour la simulation, où ils peuvent essayer d'utiliser le système sans utiliser leurs comptes réels.

Pour les opposants qui ont l'intention d'adopter le M-Banking à l'avenir, mais ne sont pas encore décidé, il faudrait se concentrer toujours sur les mêmes aspects de risques liés aux postponers, tout en mettant l'accent sur la valeur obtenue lors de l'utilisation de ce service avec à la fois la publicité de masse et en face-à-face, ce qui permettrait aux marketeurs de communiquer avec des clients potentiels et de répondre à leurs besoins.

Enfin, les opposants qui n'ont aucune intention d'adopter le M-Banking sont les clients les plus difficiles à convaincre des avantages potentiels, et qui ont une résistance élevée en ce qui concerne toutes les barrières, a été signalée (cf. graphique 7 de l'Annexe 5). Le Mass Media Marketing peut aussi être utilisé, dans ce cas, pour afficher les avantages de ce service et pour réduire l'image négative perçue par les négateurs. Quant aux forts résistants, prosélytes qui affichent un refus catégorique au M-Banking, la rentabilité d'une action auprès de cette catégorie ne serait rentable que si le prosélytisme évité permettait de transformer suffisamment de prospects qui ne seraient pas influencés par les craintes.

5.1 LIMITES ET VOIES FUTURES DE RECHERCHES

Cette étude peut être étendue par une étude sur la dynamique qui sous-tend le processus d'adoption de l'innovation en l'enrichissant par la résistance des leaders d'opinions et les BAO (Bouche à Oreille) négatives à un modèle de croissance du marché. Les opposants actifs peuvent transmettre le BAO négatif ce qui pourrait réduire considérablement la taille du marché final. Leur existence pourrait même annuler totalement l'effet positif des leaders d'opinion. Ainsi, des études et des recherches en cours porteront sur :

-1/ L'impact du BAO négatif des leaders d'opinion sur la résistance face à l'adoption de nouveaux produits et leurs effets sur la taille de marché.

-2/ La contribution cruciale des leaders d'opinion par le BAO (positif et négatif) sur l'adoption de nouveaux produits.

-3/ L'effet de résistance des leaders à travers l'activation positive et directe des leaders d'opinion avant le lancement des efforts marketing et la mise en place de stratégies de persuasion publicitaires visant les opposants actifs.

6 CONCLUSION

Dans la littérature, les raisons qui empêchent ou retardent la diffusion d'une innovation, en général, semblent être négligée (Bradley et Stewart, 2002). Ainsi, la résistance à l'innovation dans les pays en développement tels que la Tunisie n'a pas été traité dans les recherches. Par conséquent, cette résistance à l'innovation persiste et retardent l'adoption de technologies diverses tels que le E-Banking ou encore M-Banking. L'objectif de ce travail est de comprendre les résistances des non adoptants du M-Banking. A cet effet, il a été question de classer les Tunisiens non-adoptants de la technologie M-Banking en trois types suivant leur forme de résistance à la technologie M-Banking.

Les enseignements portent sur deux points principaux à retenir «en stratégie» pour les banques tunisiennes :

- Les postponers (ou attentistes) sont dans l'expectative spécialement pour des raisons de risque, de craintes pour la sécurité des transactions. Ceci trace la voie d'une communication ciblée destinée à mieux apprivoiser les attentistes, prospects alors prêts à passer l'acte.

- Les opposants les plus hostiles sont allergiques aux aspects culturels et aux nouvelles valeurs d'une banque située du côté du virtuel plus que du contact client classique. L'effort d'adaptation à Internet, puis au smartphone pourrait être un frein. Nous relatons, que les gains en temps, en facilité d'utilisation ne constituent pas les bases d'une conquête de prospects hésitants.

Cette étude fournit aux concepteurs et aux marketeurs en Tunisie des informations utiles pouvant les aider à répondre aux besoins des clients et mieux cibler leurs compagnes marketing, sur le gain matériel que ces services permettent et sur les protocoles sécuritaires utilisés.

Toutefois, L'impact des opposants radicaux (prosélytes) ou encore la résistance des leaders d'opinons et les BAO (Bouche à Oreille) négatives n'ont pas pu être déterminé d'une façon claire, dans ce travail. Ceci pourrait être sujet à des approfondissements futurs dans le cadre des travaux de recherche sur la résistance des consommateurs moyennant la même méthode d'analyse des marchés.

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ANNEXES

ANNEXE 1 : LES AVANTAGES DE LA SÉMANTIQUE ET TROPES

La sémantique :

Elle est considérée en linguistique comme une discipline permettant d'étudier la signification accordée aux formes et expressions des langues naturelles. Cela est possible par l'intermédiaire de la connaissance des sens des mots dans un texte. Elle est définie selon Kreidler (1998) comme l'étude de comment les langues organisent et expriment des significations. L'analyse sémantique s'intéresse à la signification d'une phrase et des mots qui la compose par l'intermédiaire des calculs. Elle est là pour essayer de répondre à des questions relatives à la signification des mots. L'utilité de la sémantique est fonctionnelle et structurelle puisque la signification d'une phrase doit être calculée sur la base de la signification de ses mots le composant. De plus, les mots ne sont plus de simples dénominations mais plutôt comme des termes d'un système de relations lexicales à l'origine de leur valeurs et signification différentielle. Il serait intéressant d'utiliser l'analyse sémantique puisque elle nous renseigne sur des informations qui peuvent ne pas être explicitement dit mais pensé par exemple en connaissant la fréquence de répétions d'un mot. L'analyse sémantique permet aussi de se concentrer sur les termes employés et à leurs interrelations. Dans notre article on s'intéresse à connaitre la manière de penser et les préférences exprimées par les interviewés (unité sémantique) plutôt que l'étude du texte dans son intégralité. Les focus group vont permettre de collecter des idées par l'intermédiaire du langage des personnes qui est un type de comportement.

Tropes :

Tropes est un logiciel d'analyse sémantique de textes utilisé par de nombreux professionnels. Il existe et évolue depuis 1994. Il a été inventé par Pierre Molette et Agnès Landré, sur la base des travaux de Rodolphe Ghiglione.

C'est un logiciel performant en analyse de discours en langue française. Il permet de faire un traitement complexe visant à affecter tous les mots significatifs dans des catégories, procède à l'analyses de l'occurrence en sous catégories, à étudier leur ordre d'arrivée à la fois à l'intérieur des propositions, et sur l'intégralité du texte.

Tropes possède une très grande capacité à opérer une série d'analyses stylistiques, syntaxiques, sémantiques et a l'avantage de présenter les résultats sous la forme de chiffrages, de rapports ou de représentations graphiques permettant de mieux comprendre un texte et repérer tous les concepts.

ANNEXE 2 : CRÉATION DES AFFIRMATIONS À PARTIR DES ÉTUDES QUALITATIVE DE TROPES® ET DU SCENARIO AD-HOC

Le scénario est appliqué en tant que « grille d'analyse automatique » aux textes de l'écoute ouverte effectuée en mode « quali ». Voici par exemple quelques phrases rédigées directement par l'ordinateur, supposées être représentatives des propos spontanés :
Restitution « automatique » de Tropes ® issues directement de l'ordinateur après la sélection des critères relatifs à l'émission de « propositions remarquables », c'est-à-dire représentatives de la conjonction des textes qualitatifs et de la grille du scénario.
Le réglage porte sur le nombre de phrases remarquables pouvant servir de base pour un résumé naturel.
Les affirmations suivantes ont été produites par ce processus automatique consistant à faire extraire de l'application du scénario sur le texte les propositions permettant de résumer le contenu de façon significative, c'est-à-dire en fonction des axes du scénario lui-même.
Le nombre d'affirmations : Il s'agit d'un nombre réduit qui correspond à la taille assez faible du substrat qualitatif obtenu en amont. Le modèle sémantique arrive très rapidement à saturation.

ANNEXE 3 : LES SCENARIOS

L'absence de contacts physiques avec le M.Banking donnerait une image technicienne à ma banque.
L'absence de contact physique avec le M.Banking réduit la relation client à son minimum technicienne avec ma banque.
La relation à distance conduit à une société sédentaire, un "clic" remplaçant le contact au guichet, sans déplacement physique ni de conversation téléphonique.
Il faudrait que cette technique soit plus qu'un moyen réservé aux seuls jeunes très habiles sur Internet.
Il faut avoir confiance en cette technique.
Les risques de fraude peuvent être réduits et contrôlés sans crainte pour les usages sur Internet et pour ceux du M.Banking.
La fiabilité des applications et la technique sur Smartphone devraient empêcher les risques de fraude.
Il faut disposer à ma banque d'un interlocuteur responsable pouvant joignable facilement en cas de problèmes ou pour des explications.
La banque doit continuer à penser à sa base de clients classiques comme moi.
Le M.Banking est un moyen pour la banque d'abaisser ses coûts et d'abord ses coûts de personnel sans m'en faire aussi bénéficier.
Il me faudrait avoir accès à tout instant à mes codes et mots de passe que je devrais avoir avec moi.
Les codes et mots de passe doivent être correctement protégés.
Le M.Banking se doit d'assurer une totale confidentialité des opérations bancaires.
Les opérations de M.Banking doivent assurer une compréhension et une traçabilité de chaque phase pour le consommateur.
L'utilisation de la banque via le téléphone mobile, par sa facilité d'utilisation peut conduire à dépenser trop facilement son argent sans s'en rendre compte.
J'ai confiance dans les systèmes classiques de la banque: conseiller, caissier, relevés, bordereaux…

ANNEXE 4 : DÉTAILS DE L'APPLICATION DE LA MÉTHODE KERNEL ®

Pourquoi Kernel?

Pour comprendre un problème humain complexe en ne travaillant que sur de faibles échantillons, tout en restant fiable.

- Pour obliger les personnes à choisir, par interclassement, avec une méthode ludique globale et interactive respectant la liberté des personnes. Ceci constitue une grande différence avec les batteries de questions préparées par les directions marketing, ne tenant pas compte des risques de lassitude des consommateurs.

- Pour être certain que les affirmations soient "représentatives". Elles sont ici co-construites avec les membres des groupes de réseaux sociaux majeurs, ayant un rôle dans leur influence pour le choix des produits et marques, ainsi qu'avec des spécialistes marketing d'entreprise ou des formateurs.

- Dans le cas d'un problème humain complexe pour simuler les comportements cognitifs, tout en évitant des questionnaires linéaires de plusieurs centaines de questions. Avec des possibilités d'ajout de dimensions supplémentaires (de 1 à 5), ce qui évite de multiplier d'autant les questions. Elles utilisent une technique simple de marquage par des « jetons » virtuels ou réels sur les cartes du tapis de jeu. Alors que les sondages classiques sont linéaires et correspondent à des prédispositions analytiques des sondés, avec peu de possibilités d'interaction, notre mode d'approche ludique permet les différences de comportements suivantes, par exemple :

- « *Je suis d'un tempérament qui me pousse à apprécier le détail et j'apprécie les questionnaires complets, avec des questions qui se suivent au fur et à mesure. Je prends mon temps et j'ai tendance à ne pas respecter les durées et horaires* ».
- « *Par prédisposition naturelle ou travaillée, je suis poussé vers le global, la synthèse et j'apprécie de voir ou je vais. C'est pourquoi je n'aime pas les questionnaires que je trouve fastidieux qui ne me permet pas de saisir le sens général. J'ai besoin de situer la totalité des réponses les unes par rapport aux autres* ».

- Pour que les entreprises modernes, ouvertes sur leurs clients puissent travailler sur des bases quali/ quanti pour prendre des décisions en faisant évoluer leur style de management. Ce type d'enquête prend en compte la façon de réagir, le comportement des personnes, s'appuie sur leur liberté, ce qui rend le test encore plus représentatif et compatible avec un marketing qui prend sa source chez les clients eux-mêmes.

L'approche cognitive est celle qui représente au plus près le processus itératif de choix réalisé au sein de chaque cerveau de prospect ou consommateur. La communication interpersonnelle est l'objet d'une grande attention dans la psychologie sociale.
Cette ligne d'études a constamment démontré comment l'influence personnelle affecte les individus à effectuer des choix. Le pouvoir d'influence interpersonnelle à travers la communication de bouche à oreille a été bien reconnu dans la littérature des consommateurs (Arndt, 1967 ; King et Summers, 1970 ; Herr et al., 1991)

La méthode du Kernel

- Utilise les enseignements qualitatifs récoltés en amont au travers des entretiens préliminaires. Le marquage des affirmations placées permet de qualifier leur situation.
- Simule les comportements des personnes en les sollicitant pour interclasser et hiérarchiser un certain nombre de propositions issues de l'approche qualitative. A ce titre cette simulation peut reproduire dans une certaine mesure les fonctionnements cérébraux. La méthode est cognitive.
- Quantifie de fait les informations recueullies en attribuant une note aux placements effectués et en permettant les calculs spécifiques de moyennes, d'écarts, de niveau de consensus. Alors une présentation en quadrants stratégiques est possible.

C'est pourquoi pour toutes ces raisons cette méthode est incomparable dans son background scientifique : cognitive, qualitative et quantitative à la fois.
Les 28 internautes participant à l'enquête ont été recrutés parmi ceux que se refusaient à passer au M. Banking et les affirmations seraient interclassées pour être interprétées sur 4 quadrants stratégiques.
Les 28 participants ont eu à classer 43 affirmations sur la phrase inductrice (ou métaphrase) suivante :
"Comment réagissez-vous à la possibilité d'utiliser votre téléphone mobile pour vos opérations financières

avec votre banque ? Ceci est appelé le ""M.banking"": la banque sur mobile."

Avec les précisions suivantes :
« Les cartes sont placées de droite à gauche et de haut en bas sur des zones indicatrices avec un continuum de valeur entre 100 ""le plus"" au nord -est à 0 , le ""moins"" au sud ouest"
"Veuillez interclasser vos cartes qui représentent vos propres préférences (les espaces "blancs" représentent votre distance psychologique entre deux propositions."

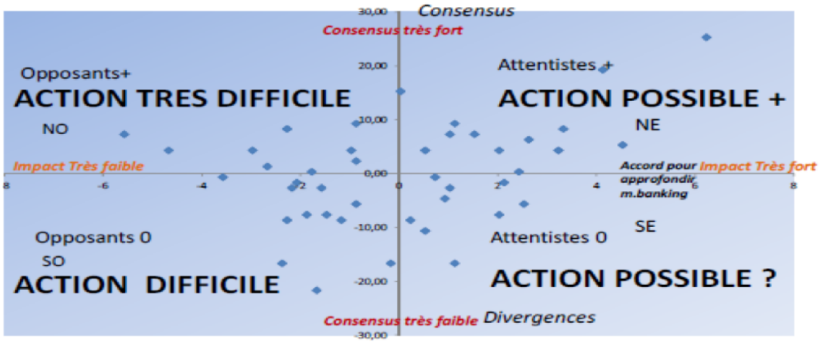
- *Complètement: je me reconnais dans ces avis et préoccupations*
- *Plutôt oui: je suis assez d'accord avec ces propos*
- *Relativement: dans une certaine mesure… sans plus*
- *Pas trop ou pas du tout ».*

L'exercice consiste à interclasser ses avis par niveau d'accord. L'exercice se pratique par tâtonnements successifs puisque les cartes se présentent au hasard avec les phrases qui y figurent et qui demandent une réflexion pour les classer les unes par rapport aux autres. - D'abord sur 4 grandes zones : accord total/ accord / accord relatif/ désaccord.
- Puis à l'intérieur de chaque zone de 25 positions, sur le tapis de jeu interclasser les cartes de droite à gauche puis de haut en bas. Si le nombre de cartes excède 25, le processus est repris plus à gauche

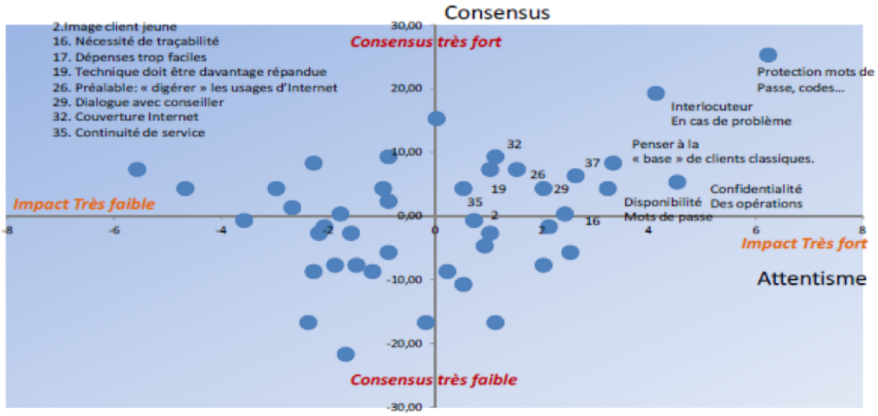
Les 28 internautes ont élé choisis de la façon suivante :
- 14 hommes, 14 femmes.
- 7 utilisateurs de Smartphones, 10 utilisateurs fréquents de téléphones portables classiques, 11utilisateurs occasionnels.
- 9 moins de 30 ans, 10 entre 30 et 45 ans, 9 au-delà
- 10 se déclarent hésitants pour passer au M-Banking, 10 assez peu favorables, 8 hostiles. Précisons qu'il s'agit d'une position a priori, déclarative qui n'anticipe pas sur les composantes détaillées de l'étude.

ANNEXE 5:

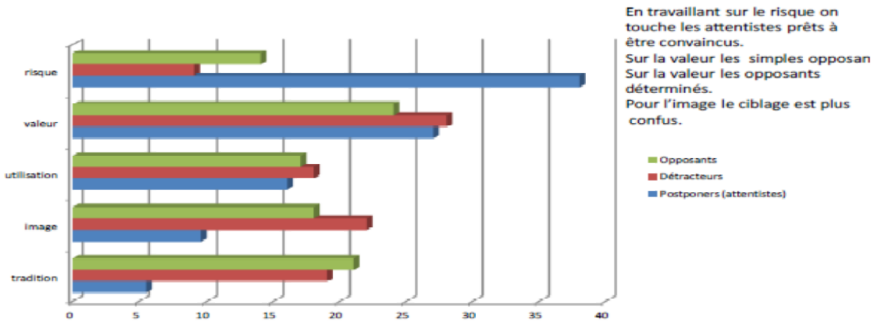
Graphique_1: De l'attentisme à l'opposition



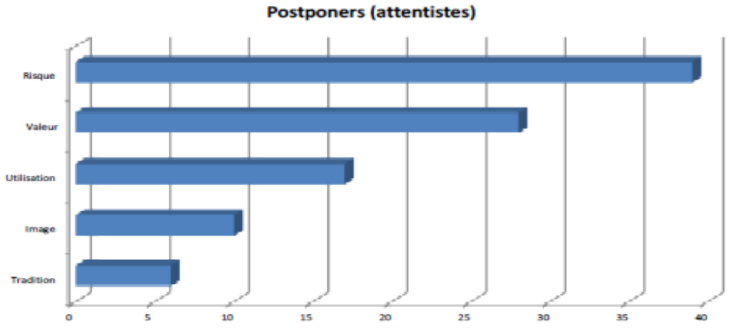
Graphique_2: Postponers (Attentistes) à convaincre (quadrant NE)



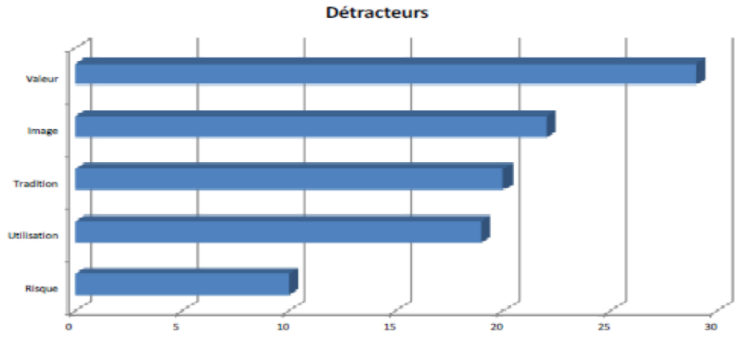
Graphique_3: Sur quels types de prospect jouent les facteurs ?



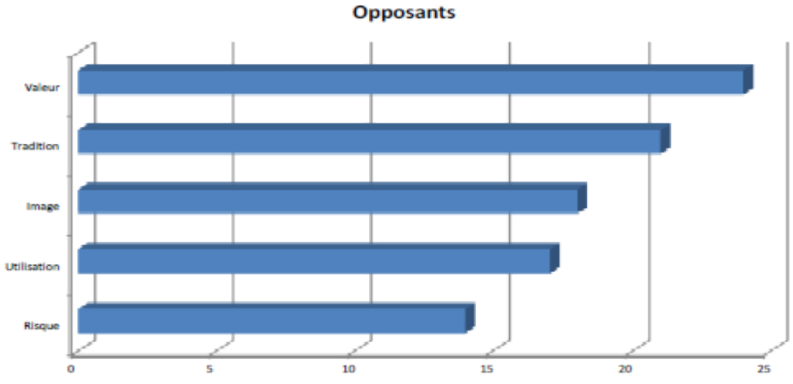
Graphique_4 Répartition des jetons des attentistes



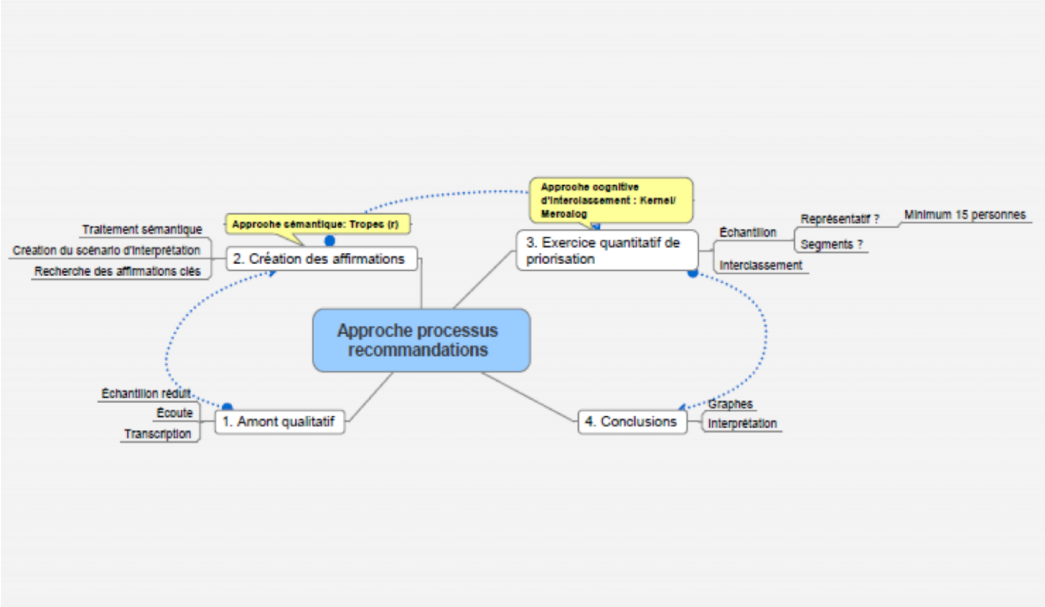
Graphique_5 Répartition des jetons des détracteurs.



Graphique_6 Répartition des jetons des opposants.



Graphique 7 : *Enchaînement d'une approche qualitative sémantique vers l'approche cognitive quantitative*



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Les effets du B.A.O négatif sur La résistance des consommateurs à l'adoption de l'innovation

[The effects of negative WOM on Consumer resistance to the adoption of innovation]

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ABSTRACT: In this study, we attempted to understand the dynamics underlying the process of adoption of the innovation by adding resistance opinion leaders and WOM Negatives to a model of market growth. We found that once the resistance was triggered, advertising gives only limited effect, and positive opinions of leaders have little impact on market growth. We have shown that not only the leaders of the resistance Hawking negative WOM reach significantly reduce the size of the end market, but their existence could even completely erase the positive effect of opinion leaders.

KEYWORDS: Word Of Mouth, Negative Word Of Mouth, consumer resistance, adoption of innovation.

RESUME: Dans cette étude, nous avons tenté de comprendre la dynamique qui sous-tend le processus d'adoption de l'innovation en ajoutant une résistance des leaders d'opinions et les B.A.O Négatifs à un modèle de croissance du marché. Nous avons constaté qu'une fois que la résistance a été déclenchée, la publicité ne donne qu'un effet limité, et les opinions positives des leaders n'ont qu'un faible impact sur la croissance du marché. Nous avons démontré que non seulement les chefs de la résistance colportant du B.A.O négatif arrivent à réduire considérablement la taille du marché final, mais aussi leur existence pourrait même gommer totalement l'effet positif des leaders d'opinion.

MOTS-CLEFS: BAO, bouche à oreille négatif, résistance consommateurs, l'adoption de l'innovation.

1 INTRODUCTION

La diversité des moyens de communication ont favorisé le développement des relations interpersonnelles dans notre vie quotidienne. Ces relations offrent la possibilité pour chacun de s'exprimer et de se renseigner sur tous les sujets. La multiplication de ces contacts entre individus peut alors conduire à une plus grande diffusion du bouche à oreille, avec des répercussions probables sur les comportements des individus.

D'autre part, lors du lancement des robes en papier pour filles et vendant plus d'un demi-million d'unités. L'industrie élaborée par Scott Paper, n'aurait pas pu être plus enthousiastes. Cependant, l'échec était aussi surprenant que le décollage, et les vêtements en papier ont disparu du marché, pour ne jamais réapparaitre. (Adler, Houghton, 1997). Pourquoi ces produits apparemment fructueux échouent après le début de leur promotion ? Ce type d'échec peut-il être attribué aux B.A.O négatifs, générés par des petits groupes de consommateurs résistants, qui ont pris parti contre le marché de l'innovation ? Ou encore les spécialistes du marketing seront ils capables de contrecarrer la résistance de ce type de consommateurs potentiels, et/ou de limiter leurs effets ?

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Ces interrogations ont constitué notre problématique et nous pousse à se poser la question centrale de notre recherche à savoir :

Quel est l'impact des opinons négatives des leaders d'opinion sur la résistance face à l'adoption de nouveaux produits et leurs effets sur la taille de marché ?

Pour répondre à cette question, il est primordial de s'interroger également sur le processus viral de cette transmission d'opinion négative et d'étudier comment ces graines de résistances peuvent elles réduire le marché d'un nouveau produit. Et comment pouvons-nous quantifier cette influence négative, et étudier les moyens pour contrôler les effets destructeurs de ce processus viral.

Dans le cas où la résistance du consommateur provoque des défaillances dans la commercialisation du produit qui ne sont pas difficiles à reconnaître parmi les innovations réussies, alors cette résistance empêche principalement le processus de diffusion et pourrait même réduire et affecter négativement le potentiel de son marché. En effet, dans son étude sur les innovations réussies dans l'industrie dentaire « successful innovations in the dental industry », Leonard Barton (1990) a constaté que, plus de 70% des dentistes ont essayé d'adopter des innovations spécifiques, alors que plus de 20% on complètement rejeté leur utilisation. Il est admis que les interactions entre les consommateurs dans le marché ou dans les forces internes stimulent la croissance des nouveaux produits et constituent une force principale qui gouverne le succès du produit (Eliashberg, 2004 et Arndt 1967). Néanmoins, des données empiriques portées sur le comportement réel des consommateurs au cours d'un procès d'adoption sont rares, et les données les plus disponibles sont basées sur les ventes globales (Goldenberg, 2000 et Muller, 1994). Par conséquences des données de terrain sur la résistance réelle et le B.A.O négatif dans les lancements des produits sont indisponibles.

Dans les ouvrages, il n'ya pas de distinction qualitative entre le B.A.O négatif et le positif conceptualisé dans son impact sur le processus de croissance (J. Eliashberg, et al, 2004 ; Mahajan, Muller et Kerin, 1998 et Midgley, 2007). Cependant, les travaux de Herr et al, 2003et celle de Richins, 1999, indiquent que les interactions négatives sont plus fortes et sont associées à un taux de diffusion plus élevé. Ainsi, si ce point de vue de deux forces internes et antagonistes (le B.A.O positif et négatif) est correct, les nouveaux produits confrontent une dynamique de compétition entre deux processus de croissance. Les deux processus sont allumés par le même déclencheur- la force extérieure des efforts marketing.

La présente étude a été conçue pour découvrir l'influence sous-jacente de ce qu'on peut dénommer les leaders d'opinion qui ont des opinions négatives a propos des produits, et qui montrent une résistance face à l'adoption des produits. Ces leaders d'opinion diffusent des B.A.O Négatifs et transmettent un processus de résistance contagieuse, qui est par nature invisible, et échappe à la capture des données relatives aux ventes. L'approche appropriée de la modélisation de la résistance a permis d'explorer la nature secrète et complexe du phénomène de résistance. Lors d'une première phase nous allons expliciter la propagation du BAO positif et négatif sur le marché d'un nouveau produit. En deuxième phase nous tenterons de clarifier le concept de la résistance afin de contrôler les effets destructeurs de ce processus.

Le présent document examine donc l'influence des leaders de la résistance sur la croissance des nouveaux produits et les innovations. Pour cela, il sera donc essentiel de répondre aux différentes questions intermédiaires qui en découlent :

a- Comment les leaders de la résistance affectent-ils le marché ?

b- Quel rôle jouent les autres consommateurs dans la présence d'opinion par rapport aux leaders de la résistance ?

c- La propagation du B.A.O négatif se fait elle d'une manière beaucoup plus rapide que celle de le B.A.O positif.

d- Comment peut réagir le marché face à l'effet de leaders de la résistance ? La part du marché sera elle affecté considérablement ?

Ci-dessous, nous présenterons en premier lieu le cadre théorique de la recherche et les hypothèses de recherche à étudier. En deuxième lieu, nous exposerons notre modélisation, la méthodologie de la recherche à suivre et les résultats obtenus. Finalement, nous terminerons par la conclusion, en mettant en évidence les différentes limites de la recherche.

2 CADRE THÉORIQUE ET CONCEPTUEL DE LA RECHERCHE

Le contexte théorique de notre étude a été essentiellement construit sur la propagation du BOA positif et négatif et sur l'influence des leaders de résistance dans le développement des nouveaux produits et des innovations. Nous allons, en premier lieu, nous focaliser sur les aspects du BAO, et en second lieu sur l'influence des leaders d'opinions sur les consommateurs. Nous allons aussi nous intéresser aux leaders de résistance et à leurs influences sur le développement des nouveaux produits et des innovations.

2.1 LE BAO : SOURCE DE RÉSISTANCE

Selon la théorie de la diffusion, l'adoption des nouveaux produits est perçue comme un processus composé de deux forces. Les travaux d'E.M. Rogers, 2003 et V. Mahajan, E. Muller et Y. Wind (2000) présentent ces deux forces par des forces extérieures, qui se compose de l'effort marketing (ex : la publicité, la force de vente) et des force internes, composée d'interaction entre les consommateurs (ex : B.A.O, imitation, externalité). Ces forces internes constituent l'un des fondements majeur dans la propagation de l'information concernant les nouveaux produits. Ces dernières constituent les différentes formes de communication interpersonnelles dont le BAO.

Le bouche-à-oreille est alors défini selon Sylverman(2001) en tant qu' « une communication informelle à propos de services ou de produits entre des individus qui sont indépendants de la compagnie qui offre les services ou les produits dans un médium aussi perçue comme indépendant de l'entreprise. Le bouche à oreille est produit par une tierce personne et transmis spontanément d'une manière qui est indépendante du producteur ou du vendeur. » De son coté, Westbrook, (1993), le définie comme étant : « un comportement post-achat, consistant à la transmission de communications informelles dirigées vers d'autres consommateurs à propos de la propriété, de l'usage ou des caractéristiques de biens, de services particuliers et même de leurs vendeurs. » Les chercheurs dans ce domaine soulignent que la communication de BAO a fait la preuve tant de son impact sur le marché que sur le rôle persuasif qu'elle a sur le consommateur (Stambouli et Briones, 2002). En effet, Voss (1998) a montré dans son étude que 80% des décisions d'achats des consommateurs étaient influencées par le bouche à oreille ou par les recommandations directes. Ce phénomène a été abordé par les chercheurs autant dans sa forme positive que négative (Voss, 1998).Ainsi, nous pouvons distinguer deux types de BAO.

2.1.1 B.A.O POSITIF

Quand une idée est perçue comme nouvelle, les individus n'hésitent pas à chercher des informations pour évaluer son utilité prévue et ses conséquences, auprès des personnes qui l'ont déjà adopté. Par le moyen du B.A.O, Les détenteurs de l'information et les demandeurs se lancent dans une interaction informationnelle. Les travaux de Rogers (1999), affirment l'existence de deux types de parties au sein de cette interaction, certains tentent d'influencer le comportement d'achat des autres consommateurs, alors que d'autres cherchent des conseils concernant la consommation du nouveau produit. Bien que les efforts marketing soient un moyen rentable de faire prendre conscience d'une innovation, les communications interpersonnelles sont perçues, selon Herr et al(2003), comme une source d'information plus crédible, ayant plus d'impact sur la volonté d'adoption d'un individu lors de la prise de décision. En effet, L'intérêt particulier accordé à ce phénomène par les chercheurs et les praticiens en marketing s'explique par l'importance de ce dernier, dans la formation des attitudes (Bone, 1995), des attentes (Zeithaml et Bitner, 1996) dans un contexte de prise de décision (Burzynski et Bayer, 1977; Herr et al., 2003; Bone,1995), dans la réduction du risque lié aux décisions d'achats (Murray, 1991), dans le succès du prestataire de service et la qualité du service rendu (Berry et Parasuraman, 1991), sur la satisfaction (Bone, 1995; Anderson, 1998) sur le niveau de confiance (Bergeron, Ricard et Perrien, 2003) ou sur le succès d'un produit ou service (Godes et Mayzlins, 2004). Les études de Brown et Reingen (1987), ont montré que le B.A.O est un des facteurs les plus influents sur l'attitude des consommateurs lors des décisions d'achat. Cet auteur insiste sur l'efficacité du B.A.O par rapport aux moyens de vente traditionnelle telle que la publicité dans les journaux, les magazines, ou la radio.

2.1.2 B.A.O NÉGATIF

Les ouvrages de marketing accordent peu d'attention à la forme négative du B.A.O. Le développement de ce dernier peut aller de l'insatisfaction à l'égard d'un produit spécifique a une opposition totale d'en consommer. Plusieurs chercheurs ont remarqué que les consommateurs réagissent d'une manière moins enthousiaste, lors du lancement de nouveaux produits (Rogers, 1999). Ce qui peut induire à la génération d'une vague d'informations négatives sur ce produit. D'autres parts, Lutz(1990) et Wright (1991), ont constaté que les consommateurs semblent accorder plus de d'attention sur les informations négatives lors de l'évaluation d'un nouveau produit. Cependant, Jager, (2001), considère que cette évaluation négative induit à la résistance au changement par le faite que les gens sont réticents à abandonner le familier et se méfient de l'inconnu. Mukherjee et Hayer (2001) et Smith(1995), attribuent une telle résistance à la nécessité d'acquérir de nouvelles compétences qui sont parfois associes à la complexité du produit. L'insatisfaction à l'égard d'un nouveau produit découle généralement de la performance inadéquate par rapport aux attentes. Ainsi, l'insatisfaction peut induire à trois types de comportements : (1) ''quitté '' ou l'interruption de l'achat, (2) ''voix'' ou une plainte contre le fabricant, et (3) B.A.O négatif (Richins, 1999 et Watkins, 1996). Herr et al (2003) affirme que les informations négatives ont une grande influence sur les consommateurs par rapport à l'effet positif du B.A.O. En d'autre terme, les consommateurs octroient leurs intentions aux informations négatives qui sont perçus comme plus informatif que les autres. En outre, le B.A.O, négatif se caractérise par

une vitesse de propagation très élevée. En effet, si l'interaction entre l'B.A.O positif et négatif est plus complexe qu'une simple rivalité de forces, avec des résultats contre-intuitifs qui peuvent s'ensuivre. Cette complexité a été reconnue par Midgley (1976), qui a présenté une première tentative d'intégrer le B.A.O dans un modèle de diffusion, en utilisant des équations différentielles pour exprimer un comportement complexe et calculer les taux des rejets du marché. Mahajan et al (1984) ont montré comment dans certain cas de B.A.O négatif, la meilleure politique de communication serait de limiter la publicité.

D'après ces constats, nous pouvons émettre les hypothèses suivantes :

H- 1. Il n'y a pas de différence significative dans la propagation du B.A.O négatif et le B.A.O positif.

H- 2. Il n'y a pas de différence significative des effets du B.A.O négatif et le B.A.O positif sur les décisions d'adoption et d'achat d'un nouveau produit.

2.2 L'INFLUENCE DES LEADERS D'OPINION

Haywood (1989), Vernette et Flores (2004) adoptent une différente perception du BAO et confirment qu'il s'agit d'un processus géré par une communication formelle par les entreprises et ses représentants. Ceci est possible grâce aux leaders d'opinion qui constituent une source d'information privilégiée. (Vernette, 2007). Des recherches ont montré que le leader d'opinion est considéré par son entourage comme une source d'information personnelle et crédible (Vernette, 2007). A cet effet, les avis de leaders sont recherchés par des acheteurs potentiels lors de l'achat d'un nouveau produit, plus particulièrement pour les produits dont l'achat est impliquant (Wilkie, 1986). Ces leaders, influencent ainsi le processus d'adoption d'un nouveau produit via leurs communications interpersonnelles avec leur entourage et par la diffusion d'une information spécifique (Childers, 1986). Ces derniers sont décrits comme '' les gens les plus influents'' dans le réseau social, les personnes ayant le plus grand nombre de fidèles, ''les modèles d'attitudes'', qui déterminent les changements de comportement, et les individus qui sont liés a un nombre relativement grand de différents réseaux sociaux (Valente, 1995, Venkatraman, 1989).

Bien que les leaders d'opinion ne soient pas des leaders officiels, c'est leurs caractéristiques qui incitent les autres à les écouter, demander leurs conseils, imiter leur comportement (Rogers, 1995). Leur influence vient de leur force de persuasion et leur association avec multiples réseaux sociaux. Ces leaders sont alors perçus comme ayant une meilleure connaissance des produits et familiarité avec les catégories des produits, en raison de leur exposition prolongée à toutes les formes de communication externes. Ces derniers sont plus inventifs et ont un statut socio-économique plus grand, un niveau de scolarité plus élevé et une meilleure individuation publique; malgré plusieurs tentatives de profiler les leaders d'opinion, il est intéressant de noter qu'il n'ya aucune preuve qui généralise l'opinion des leaders : le trait tend à varier selon le type de produit et la situation. Cependant, il y a un soutien d'avis cohérent selon lequel les leaders d'opinion maintiennent une position centrale dans le système social, avec la capacité et la volonté de fournir des conseils de l'information sur les nouveaux produits. En influant l'attitude et les changements de comportement des membres de leurs réseaux sociaux et en initialisant la diffusion d'information en dehors de leur groupe social immédiat, les leaders d'opinion jouent un rôle crucial dans la détermination du destin ou le sort des nouveaux produits ou technologies. Qu'est-ce qui se passe si les leaders d'opinion sont engagés à diffuser une attitude négative envers une innovation ?

2.2.1 LES LEADERS DE LA RÉSISTANCE

Selon Rogers, 1995, les leaders d'opinion peuvent participer à la diffusion d'une innovation, ou à l'opposition au changement impliqué dans le processus d'adoption. Les études de Lam et Schaubroeck (2000), considèrent ces leaders d'opinion comme des obstacles possibles à l'adoption du produit. Dans de tels cas, ces leaders diffusent des informations négatives et empêchent l'adoption de l'innovation. En effet, des études ont montré que les personnes qui ont tendance à diffuser des B.A.O négatifs et inhibent l'adoption de l'innovation sont similaires dans leurs traits à des leaders d'opinion: ils ont des liens sociaux plus solides, un statut socio-économique plus élevé, et ils sont plus actifs dans les organisations formelles et les groupes sociaux (Richins, 1999, H.S. Watkins, R. Liu, 1996 et Warland et al, 2004). Cependant, les travaux de Leonard-Barton(1990) et celle de Moreau et Al, (1996), démontrent qu'en cas d'innovation radicale, les experts sont les plus hésitants à adopter que les novices. Il est plausible de supposer que les leaders de la résistance peuvent être des experts qui forment une attitude résistante à un stade très précoce dans le lancement de produit, et génèrent une B.A.O Négatif. D'autre part, des études ont révélé que le flux d'informations est bilatéral : de leaders d'opinion à leurs adeptes, et vice versa (Venkatraman, 1990 et Gilly et al, 1998). Ainsi, l'information est partagée pour tous les membres et leurs contacts, mais les leaders d'opinion se caractérisent par un plus grand nombre de contacts avec les quels ils partagent leur informations. Par

conséquent, la résistance peut être le résultat d'une exposition à des efforts de marketing, B.A.O Positif ou négative, ou la combinaison des trois.

Le présent document explore l'influence des leaders de la résistance sur la croissance de nouveaux produits et innovations. Ce qui nous pousse à aborder les questions suivantes:

1. Comment les leaders de la résistance influent sur le marché?
2. Quel est le rôle des autres consommateurs dans la présence de la résistance des leaders d'opinons?
3. Comment les commerçants peuvent limiter les effets de la résistance?

Ces différentes interrogations nous permettent d'émettre les hypothèses ci-dessous:

H- 3. Malgré le B.A.O négatif, certains consommateurs maintiennent leurs décisions d'adoption d'un nouveau produit.

H- 4. Il n'y a pas de différence significative sur la taille d'un marché qui est soumis à la B.A.O Négatif.

3 LA MODALISATION DE LA COMPLEXITÉ

Les systèmes complexes selon Waldorp1992, sont généralement définis comme des systèmes qui se composent d'un grand nombre de personnes ou d'entités en interaction qui génèrent en fin de compte un comportement global, visible sur une grande échelle ; bien que les interactions dans beaucoup de ces systèmes adaptifs puissent être simples. Des systèmes peuvent permettre l'émergence de tendances qui sont par ailleurs difficiles à prévoir, difficiles à suivre de façon empirique, et souvent il est presque impossible de les analyser analytiquement.

Plusieurs disciplines, y compris la physique, la biologie et l'écologie, ont développé des théories et des méthodes pour étudier comment les systèmes complexes évoluent. Également l'attention a été portée sur l'analyse des systèmes complexes dans le domaine des sciences sociales, qui reconnaissent la complexité inhérente de nombreux systèmes tels que les organisations (Abrahamson, Rosenkopf, 1997 et Anderson, 1999), et les marchés (Goldenberg, Libai, 2002, Bhargava, A. Kumar, A. Mukherjee, 1993, Valente, R.L. Davis, 1999, Goldenberg, B. Libai, E. Muller, 2001).

La force des études de systèmes complexes, selon Bridges, Couglan et Kalish, (1991) réside dans leur capacité à lier les phénomènes micro et macro sociaux, capturer les détails sous-jacents du comportement visible pas encore expliqué. En outre contrairement aux modèles de diffusion basés sur des données antérieures, les modèles de micro représentation peuvent être utilisés lors du lancement de produits pour prévoir les futures ventes. (Bhargava, Kumar et Mukherjee, 1993 et Parker, 1994).

3.1 MODÈLE DE LA DYNAMIQUE DES LEADERS DE LA RÉSISTANCE

Dans la présente étude, nous utilisons un modèle fondé sur les conclusions tirées des ouvrages de diffusion, qui étend le modèle des automates cellulaire décrites ci-dessus de trois façons :

1. Des consommateurs peuvent intégrer le groupe des consommateurs qui ne sont pas leurs voisins adjacents. Midgley, (1976) explique pourquoi les réseaux de communication sont plus aléatoires que prévu.

2. Sur un marché unique et homogène, les consommateurs de notre modèle peuvent appartenir à l'un des trois groupes suivants : les leaders d'opinion, les leaders de résistance ou le principal marché des consommateurs (marché habituel). La différence entre les deux types de leaders, d'une part, et le marché principal, d'autre part, est exprimée par le nombre et l'intensité des liens sociaux qu'ils maintiennent : les leaders interagissent avec plus de personnes, et leurs interactions ont plus d'influence (Rogers, 1999, Valente 1995, Venkatraman, 1989).

3. Les consommateurs (dans tous les groupes) peuvent être dans un des trois états (non informé, adoptants et résistants), plutôt que deux états possibles (les adoptants et les non adoptants).

Par conséquent, les consommateurs non informés ne propagent pas le B.A.O Positif, tandis que les résistants propagent l'B.A.O Négatif. Ces implications sont fondées dans les ouvrages (Mahajan, Muller, 1984, Midgley, 1976) et ceci afin d'augmenter la validité du modèle, une étude empirique a été réalisée.

4 EXPÉRIMENTATION

Pour répondre à notre question centrale de recherche, quarante deux personnes ont été invitées à évaluer leur attitude, leur intention d'achat, et leur intention de B.A.O par rapport à quatre nouveaux produits. Les produits ont été choisis pour générer à la fois l'aspect positif et négatif du B.A.O.(E-paiement par mobile, virement bancaire par mobile, commande de chéquiers par mobile, modification des coordonnées et adresse de résidence par mobile). Pour éliminer toute influence éventuelle d'B.A.O existants, tous les produits étaient dans un état de pré-lancement.

4.1 PRÉSENTATION DE LA MÉTHODE DU KERNEL (VOIR ANNEXE)

Un ensemble d'affirmations structurées a été conçu afin d'étudier la résistance des consommateurs aux innovations et les effets du B.A.O (W.O.M) sur la taille du marché. La méthode utilisée est dite « KERNEL». Cette méthode utilisée est dite «Kernel®». Cette approche méthodologique de quantification des phénomènes qualitatifs ressentis s'appuie sur deux phases relatives à la collecte des données et leur traitement.

-a) La phase collecte s'articule sur trois piliers dont le socle est l'interclassement des préférences:

- un contenu qui procède des recherches les plus récentes relatives aux préférences cérébrales ;
- Une orientation fondée sur l'expérience des concepteurs relative aux exigences actuelles du management au sein des entreprises.
- une modalité de prise d'information innovatrice utilisant le dispositif de hiérarchisation développé par l'Analyse de Dominance® ; selon les processus de l'interclassements des préférences (Rebeillard et Kreweras, 2006).

-b) La phase analyse s'articule sur deux piliers dont le socle est la représentation multidimensionnel:

- Cette mise en oeuvre concerne l'analyse des tableaux de dissimilarité et d'analyser les proximités entre individus, ressemblances ou dissemblances résultant de l'observation des comportements à l'issue de l'expérimentation.
- À partir de la matrice des similarités ou dissimilarités interindividuelles ainsi obtenue, le positionnement multidimensionnel permet d'obtenir une représentation géométrique s'ajustant au mieux selon un critère donné à l'ensemble des proximités observées et d'en proposer une interprétation révélée par la structure du nuage des points représentant les stimuli projetés dans un espace euclidien.

Le principe de l'exercice est de pousser les consommateurs à choisir une position relative entre ces 30 à 60 affirmations en évitant qu'on puisse mettre toutes ou presque toutes les affirmations sur une même zone. Ce qui ne manquerait pas de se produire avec un exercice avec 20 affirmations. L'échantillon étant réduit, il faut que les consommateurs puissent interagir en permanence et interclasser leurs préférences.

Nous avons opté pour l'application de cette nouvelle méthode pour étudier la résistance des consommateurs aux innovations et les effets du B.A.O (W.O.M) sur la taille du marché. Un ensemble d'affirmations structurées a été conçu pour étudier les trois types de consommateurs par rapport à l'adoption du Mobile Banking face aux impacts négatifs sur un marché soumis à des effets du B.A.O négatif et le B.A.O positif sur les décisions d'adoption d'un nouveau produit (N.P).

4.2 ORGANISATION GÉNÉRALE DE L'APPROCHE: DU QUALITATIF AU QUANTITATIF

A partir des informations issues de l'approche qualitative, nous avons crée 41 affirmations figurant sur des cartes réelles à interclasser sur un tapis de jeu comportant 100 cases. Le critère de classement est le suivant : de la droite vers la gauche selon le classement par rapport à la phrase inductrice ainsi que de haut en bas dans chaque colonne. Ainsi la colonne la plus à droite est celle qui est la première dans l'ordre d'accord, tandis que les cases à l'intérieur de la colonne vont de la plus forte à la plus faible de la colonne elle-même et ainsi de suite en passant plus à gauche : la première en haut… Le tapis de jeu est organisé en 4 zones de 25 cases chacune, installées sur 5 colonnes de 5cases. En l'espèce il n'y a que 43 cartes pour 100 cases et leur disposition peut s'effectuer sur un grand nombre de possibilités, ce qui sous-entend que des zones blanches peuvent exister entre deux cartes, pourvu que l'ordre de priorité soit présent. Les cases blanches constituent des distances psychologiques correspondant implicitement au ressenti implicite de chacun. L'exercice consiste à interclasser ses avis par le degré d'accord. L'exercice se pratique par tâtonnements successifs puisque les cartes se présentent au hasard avec les

phrases qui y figurent et qui demandent une réflexion pour les classer les unes par rapport aux autres. Dans ces conditions chacun doit procéder en plusieurs étapes en classant les cartes.

- D'abord sur 4 grandes zones : accord total/ accord / accord relatif/ désaccord.

- Puis à l'intérieur de chaque zone de 25 positions, sur le tapis de jeu interclasser les cartes de droite à gauche puis de haut en bas. Si le nombre de cartes excède 25, le processus esr repris plus à gauche. Dans le cas inverse existent des cases non utilisées, espaces représentant les distances subjectives déjà évoquées. L'exercice d'interclassement aboutit à créer un « système » puisque toutes les cartes sont en rapport les unes avec les autres. C'est une grande différence avec les questionnaires classiques.

4.3 LA CRÉATION DES 41 AFFIRMATIONS AVEC LE SCÉNARIO CONSTRUIT À PARTIR DES ÉCOUTES QUALITATIVES, DE TROPES ® ET DU SCÉNARIO AD HOC (VOIR ANNEXE)

Le scénario est, comme ont l'a dit, appliqué en tant que « grille d'analyse automatique » aux textes de l'écoute ouverte effectuée en mode « quali ». Voici par exemple quelques phrases rédigées directement par l'ordinateur, supposées être représentatives des propos spontanés :

Restitution « automatique » de Tropes ® issues directement de l'ordinateur après la sélection des critères relatifs à l'émission de « propositions remarquables », c'est-à-dire représentatives de la conjonction des textes qualitatifs et de la grille du scénario. Le réglage porte sur le nombre de phrases remarquables pouvant servir de base pour un résumé naturel. Par exemple les affirmations suivantes ont été produites par ce processus automatique consistant à faire extraire de l'application du scénario sur le texte les propositions permettant de résumer le contenu de façon significative, c'est-à-dire en fonction des axes du scénario lui-même.

5 ANALYSE ET DISCUSSION

Nous avons sollicité 25 personnes à propos de leurs réactions à des phrases négatives. Dans un premier temps elles ont été sollicitées pour classer 41 phrases selon une phrase inductrice :

Phrase inductrice

Je suis, dans une certaine mesure, réceptif aux avis négatifs exprimés dans les conditions suivantes à propos de produits, services ou d'opinions politiques ou sociales …

Mode de placement des cartes

Placer chaque carte sur une des 100 cases disposées de droite à gauche selon la gradation (négative) suivante:

Très réceptif
Réceptif
Assez réceptif
Peu réceptif

Les zones vides représenteraient des distances psychologiques.

Les 41 affirmations qui suivent cette indication sont de plusieurs types :

- Suis-je à l'origine, ou bien suiveur, actif ou réactif, simple suiveur ?
- Quelle est ma réaction en fonction de l'origine de la négation ?
- Quel est l'impact de certains termes très connotés comme « menaces, changements… » ?

Le simple placement sur le tapis de jeu (qui déclenche une note) peut relever de chacun des Systèmes, à la suite de la lecture des mots peu ou très connotés. Selon les personnes, leur « construction mentale personnelle » les mots pourront avoir eu un impact différent. Sont-elles habituées à mettre en branle leur propre réflexion ou privilégient elles leur intuition sans trop de contrôles ?

Puis un second type d'exercice est sollicité, avec le placement de 5 types de jetons mettant nettement en œuvre le « Système 2 ». On demande de marquer les affirmations pour évaluer trois modes d'impact :

- Je suis capable d'avoir des réactions personnelles qui me poussent à résister contre les aspects négatifs et de ne pas forcément renoncer à acheter.

- Je suis capable d'avoir des réactions personnelles qui me poussent à diffuser et à propager du BAO pour mieux informer les consommateurs.

- J'évalue la probabilité que cette phrase se situe dans un contexte de non achat : entre moins de 20% et plus de 80%.

Comme on le voit il s'agit de deux appréciations contraires nécessitant un certain niveau de réflexion : évaluer la capacité de résistance face à la négativité ou le niveau d'impact des facteurs de non achat, de non adhésion.

VÉRIFICATION DES HYPOTHÈSES

H- 1. Il n'y a pas de différence significative dans la propagation du B.A.O négatif et le B.A.O positif.

L'enquête a plutôt évalué le « contre BOA » suite à BOA négatif… donc positif si l'on veut ou « contre-réactif ». Les affirmations concernant la propagation sont clairement du domaine du refus automatique à fort impact. Nous remarquerons à travers le Graphique 1 : Représentation des réactions face à la diffusion du BAO négatif et/ou du BAO positif, que la zone de réactions pour la diffusion du BAO négatif (en dessous de l'axe des abscisses) est plus dense que celle de la zone de réactions pour la diffusion du BAO positif (en dessus de l'axe des abscisses). Ce qui ne confirme pas nos hypothèses par rapport à la rapidité de la propagation du BAO négatif. La vitesse de propagation du BAO positif est beaucoup plus lente et moins dense que le BAO négatif qui cause des réactions de divergences entre les consommateurs.

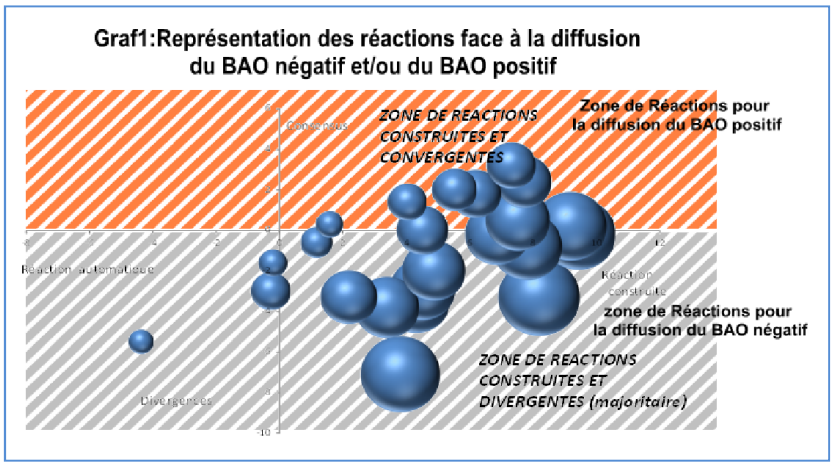

Figure 1 : Représentation des réactions face à la diffusion du BAO

H- 2. Il n'y a pas de différence significative des effets du B.A.O négatif et le B.A.O positif sur les décisions d'adoption et d'achat d'un nouveau produit (N.P).

REFUS D'ACHAT OU RÉSISTANCE À LA NÉGATION ?

Pour rendre les résultats plus lisibles nous avons décidé d'agglomérer les résultats d'ensemble des jetons. Tout d'abord l'impact négatif des phrases négatives pondérées pourrait se situer à 43% de ventes, d'adhésions non effectuées.

Ensuite, nous avons effectué la différence entre les probabilités de réaction (vers l'achat, en contradiction avec le négatif) et les ventes échouées. Sur le schéma ci-après, ce critère est placé en ordonnées, tandis qu'en abscisse sont placés les niveaux d'impact ressenti, affirmation par affirmation. Or les résultats sont spectaculaires avec une corrélation très nette entre les deux paramètres pourtant disjoints dans l'exercice. Si : les effets du BOA négatif sont concentrés (vers le haut), tandis que les autres sont dilués (vers le bas du graphe). Cela signifie que l'efficacité du premier est supérieure.

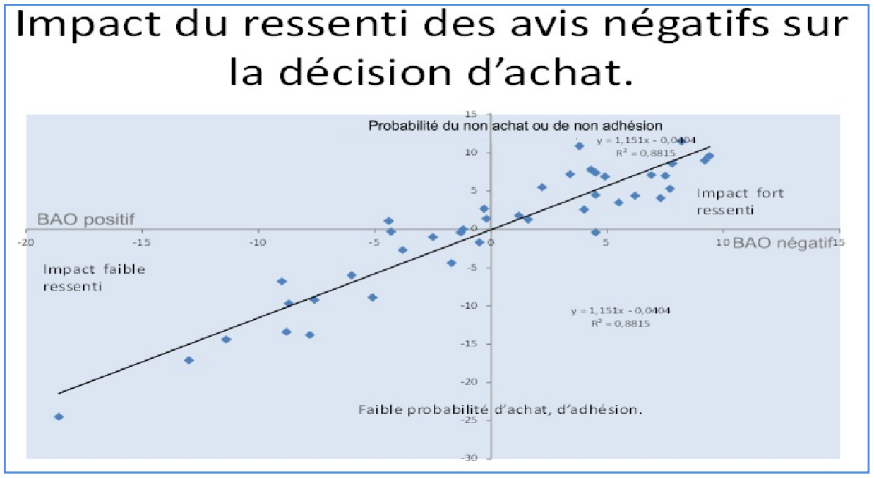

Figure 2 : Evaluation de la cohérence des personnes

H- 3. Malgré le B.A.O négatif, certains consommateurs maintiennent leurs décisions d'adoption d'un nouveau produit (N.P).

Oui, c'est statistiquement normal. 43% renoncent ce qui est beaucoup et ne signifie pas que les 57% achètent, loin de là. Il y a des reports, des « je réfléchis »…D'ailleurs je vais réfléchir à ça pour y voir plus clair. Selon le Figure 3 (Impact des avis négatifs vers la non vente, non adhésion), nous remarquerons deux zones (l'une dite d'achat et l'autre dite de non achat) qui montrent bien que certains consommateurs (une minorité) maintiennent leur décision d'achat et cela malgré les effets du BAO négatif. Cette décision n'a pas été influencée car ce type de consommateur a préféré construire sa décision et ne pas se soumettre aux bruits des recommandations.

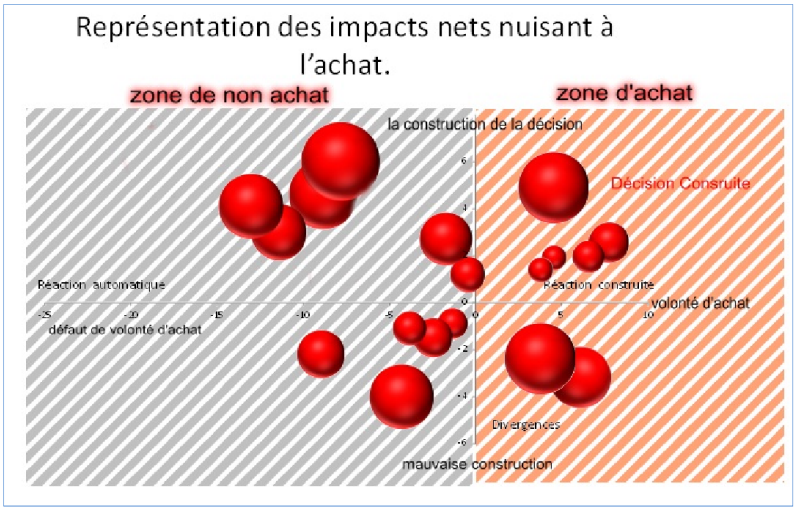

Figure 3: Impact des avis négatifs vers la non vente, non adhésion

Le schéma met en évidence le positionnement très dominant pour le non achat sur les réactions automatiques et consensuelles, ce qui signifie que formulées avec des termes négatifs, mettant en jeu les émotions la probabilité d'empêcher les refus d'achats est forte avec une forte efficacité si l'on peut dire.

H- 4. Il n'y a pas de différence significative sur la taille d'un marché qui est soumis à la B.A.O Négatif. Si : il se réduit par les effets multiplicateurs de la propagation en termes de dynamique du marché. La limite de notre exercice est qu'il est abstrait et limité à une analyse en « un seul coup » alors qu'il aurait fallu le faire en quasi réel sur une population qui interagit.

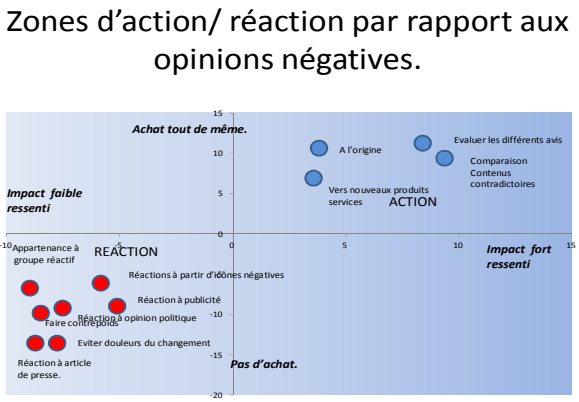

Figure 4: Adhésions, achats, malgré les avis négatifs

Les résultats sont spectaculaires avec une corrélation très nette entre les deux paramètres pourtant disjoints dans l'exercice. Pour l'interprétation cognitive complète il apparaît utile de vérifier les positions d'affirmations très différentes : l'action vs la réaction. Le schéma ci-après voit un zoom spécifique. La réaction est située sur le quadrant sud-ouest, celui du faible impact ressenti associée à la non-vente, comme si les ventes échouées étaient reliées aux phrases de faible impact cognitif, ce qui pourrait être paradoxal. En réalité il conviendrait d'interpréter davantage ces résultats surprenants au travers des enseignements déjà évoqués des cogniticiens comme Kahneman et autres. Les réactions à des acceptions négatives (style et contenu) sont le plus souvent du domaine de l'intuition, donc rapides avec un faible discernement.

Question cible	***Question heuristique***
Approuvez-vous la nouvelle Constitution ?	Voulons-nous nous débarrasser des anciens dirigeants et de leur organisation ?
Approuvez-vous les dispositions concernant le Traité Européen ?	Souhaitons-nous voir affaiblie la position de la France ?
Choix Sarkozy/ Hollande	Voulons-nous nous débarrasser de Sarkozy qui "favorise les riches" ?
Quel impact pour les avis négatifs ?	Avons-nous des réactions spontanées ?

Pourquoi choisit-on la voie « heuristique » ?

- Parce que la question est complexe (Traité Européen en 2005, Révision du rôle du Sénat en 1969 et double question…).

- Parce que l'influence des campagnes négatives a précédé la consultation, sans pour autant que l'opinion ait été rassurée : matraquage anti Sarkozy, crise financière, financements islamistes en Tunisie par les fonds du Qatar et de l'Arabie Saoudite (fondamentalisme).

Pour notre question expérimentale d'ordre marketing ou communication sur l'impact négatif, nous verrons en effet, et nous le montrons que la réponse est une sorte de détournement naturel de l'exercice cible.

6 CONCLUSION

Nos conclusions sur les réactions heuristiques et les conceptions des processus cognitifs nous conduisent à reprendre le schéma 1 en transformant l'interprétation de l'axe d'abscisse qui devient : réaction construite/ réaction automatique.

Plus délicate est la façon de contrebalancer de tels propos émis mettant en péril l'image de l'entreprise. Il est clair que la communication dite positive située sur le plan de l'émotion n'aura que de faibles répercussions, tant la majorité est impressionnée par ce qui concerne les risques courus réels ou imaginaires.

En termes d'action marketing ou de communication on peut en déduire qu'il est relativement aisé de construire une campagne négative à fort impact : il faut concentrer, dans les limites permises par la Loi des opinions évoquant des thèmes très connotés négativement, utiliser les effets d'amorçage, de halo qui les renforcent. Tout ceci en se situant sur les zones émotionnelles ou les réflexes.

En revanche il est possible d'utiliser des propos aussi négatifs pour évoquer « par l'absurde » les conséquences des premières positions émises, le risque couru « si on faisait confiance à ces gens là ». Parallèlement le recours au raisonnement construit, celui s'appuie sur le raisonnement pourrait engager une minorité (éventuellement influente) sur les zones de réaction construite. Ceci serait d'autant plus efficace sur les marchés B to B ou à forts contenus techniques. Ainsi donc pour clôturer cette conclusion, nous pouvons affirmer que :

- le refus suite à affirmations négatives est une sorte d'automatisme.

- la résistance à la négativité se construit de façon plus difficile.

Néanmoins ce travail nécessite une étude complémentaire du processus décisionnel qui pourrait fournir au marketing une meilleure compréhension des clients, en leur permettant de déterminer des campagnes marketing les plus efficaces permettant aux décideurs d'atténuer ou d'éliminer les obstacles à la diffusion et/ou à la propagation du BAO négatif. D'un autre côté, un échantillon plus géographiquement plus diversifié et aléatoire aiderait à rendre les résultats plus généralisables. Une des limites de ces travaux est que nous n'avons pas construit les affirmations principalement en ayant écouté les prospects. Nous n'avons pris en compte que les spécialistes de marketing, qui sont des analytiques rationnels.

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ANNEXES

ANNEXE 1 : KERNEL

Cette méthode utilisée est dite « KERNEL».

Le KERNEL est une approche méthodologique originale de quantification des phénomènes qualitatifs ressentis qui s'appuie sur trois piliers :

- Un contenu qui procède des recherches les plus récentes relatives aux préférences cérébrales ;
- Une orientation fondée sur l'expérience des concepteurs relative aux exigences actuelles du management au sein des entreprises. Ceci, nous permettra de collecter des données basées sur le principe d'interclassement des préférences, selon
- une modalité de prise d'information innovatrice utilisant le dispositif de hiérarchisation développé par l'Analyse de Dominance® ;
- Le KERNEL est en fait un « générateur d'applications » et a été conçu pour permettre la création d'une gamme d'outils performants dans le domaine de l'évaluation des personnes dans leur cadre professionnel comme sur les processus de choix et préférences.
- Nous avons utilisé un modèle simplifié d'analyse des choix et préférences, MercaLog®, qui exploite la méthodologie mise au point par Serge Rébeillard[1] et Cécile Kreweras[2] sous le nom de KERNEL®.
- Les premières applications de KERNEL ® ont traduit les réactions préférentielles de la personne à partir de ses prédispositions naturelles ; elle peut ainsi optimiser ses performances par une recherche d'adéquation entre ses prédispositions et ses savoir-faire acquis.

Les outils sont progressivement développés autours des applications liées à une plateforme Web et certains consultants.

MercaLog ® est plutôt utilisé pour la communication, le marketing ou le management.

L'APPORT DE CETTE MÉTHODOLOGIE

Les affirmations ne sont que reproductions des intentions de la volonté de nos contributeurs lors de notre étude qualitative, pour fournir de simples indications car il y a trois avantages pour notre audit:

- Echantillon réduit (très représentatif)
- Affirmations construites d'une façon bien précise. Pour qu'il soit un exercice fiable on a procédé à une écoute préalable sérieuse de consommateurs représentatifs (ici de l'e-commerce, de membres de communautés virtuelles).
- Autant de segments homogènes que nécessaire ce qui aide à cibler les mesures à prendre.

Ceci étant l'exercice fournit des indications à conditions que le défaut apparent de la taille d'échantillon soit compensé par un nombre d'affirmations supérieur à 30 (et inférieur à 100).

POURQUOI CE NOMBRE ?

Principe de l'exercice: on oblige à choisir une position relative entre ces 30 à 60 affirmations en évitant qu'on puisse mettre toutes ou presque toutes les affirmations sur une même zone[3]. Ce qui ne manquerait pas de se produire avec un

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[2] *Diplômée de l'Institut de Statistiques de l'Université de Paris* (ISUP), *de l'Institut d'Administration des Entreprises de Paris* (IAE), *et de Psychologie. Chargée de Mission à l'INSEE, Directeur technique à l'Institut de Recherches et d'Etudes Publicitaires (IREP), Directeur du marketing de la CEP (Compagnie Européenne de Publications), deuxième groupe de presse et d'édition en France, Directeur du marketing de LAROUSSE, Consultante auprès d'un certain nombre de grands comptes.*

[3] *Comme ce pourrait être le cas avec une enquête à base de notations (de 1 à 10 par exemple)*

exercice avec 20 affirmations. Il faut que l'interclassement pose un problème ! Notamment que les consommateurs puissent interagir en permanence et interclasser leurs préférences. D'autant plus que l'échantillon est réduit.

POURQUOI UTILISER CETTE MÉTHODE ?

a. Pour comprendre un problème humain complexe en ne travaillant que sur des faibles échantillons, tout en restant fiable.

b. Pour obliger les personnes à choisir, par l'interclassement, avec une méthode ludique respectant la liberté des personnes, un processus global et interactif. Ceci est une grande différence avec les batteries de questions préparées par les directions marketing, ne tenant pas compte des risques de lassitude des consommateurs.

c. Pour être certain que les affirmations soient "représentatives". Elles sont ici co-construites avec les membres des groupes de réseaux sociaux majeurs, ayant un rôle pour leur influence pour le choix des produits et marques, ainsi qu'avec des spécialistes marketing d'entreprise ou des formateurs.

d. Dans le cas d'un problème humain complexe pour simuler les comportements cognitifs, tout en évitant des questionnaires linéaires de plusieurs centaines de questions. Avec des possibilités d'ajout de dimensions supplémentaires (de 1 à 5), ce qui évite de multiplier d'autant les questions. Ces dimensions représentent des approches complémentaires pour déterminer les niveaux d'urgence, les évolutions ressenties, les typologies subjectives (comme pour ce travail)… Elles utilisent une technique simple de marquage par des « jetons » virtuels ou réels sur les cartes du tapis de jeu.

Alors que les sondages classiques sont linéaires et correspondent à des prédispositions analytiques des sondés, avec peu de possibilités d'interaction, notre mode d'approche ludique permet les différences de comportements suivantes, par exemple :

- « Je suis d'un tempérament qui me pousse à apprécier le détail et j'apprécie les questionnaires complets, avec des questions qui se suivent au fur et à mesure. Je prends mon temps et j'ai tendance à ne pas respecter les durées et horaires ».

- « Par prédisposition naturelle ou travaillée, je suis poussé vers le global, la synthèse et j'apprécie de voir ou je vais. C'est pourquoi je n'aime pas les questionnaires que je trouve fastidieux qui ne me permet pas de saisir le sens général. J'ai besoin de situer la totalité des réponses les unes par rapport aux autres ». Ceci est possible dans la dernière phase du test, alors que toutes les « cartes » se trouvent disposées sur le tapis de jeu réel ou virtuel.

Or, avec l'approche cognitive utilisée pour l'étude, chaque tempérament peut trouver ses marques. En fait son cerveau peut trouver ses voies les plus utilisées entre les différentes parties de ses lobes cérébraux, que ce soit pour les domaines de l'affect, de la vision ou du contrôle.

e. En obtenant très vite (faible échantillon) des résultats fiables le processus est réactif pour choisir les réponses adaptées (notamment en cas de crise).

f. Pour que les entreprises modernes, ouvertes sur leurs clients puissent travailler sur des bases quali/ quanti pour prendre des décisions en faisant évoluer leur style de management. Ici ce style d'enquête prend en compte la façon de réagir, le comportement des personnes, s'appuie sur leur liberté, ce qui rend le test encore plus représentatif et compatible avec un marketing qui prend sa source chez les clients eux-mêmes.

L'approche cognitive est celle qui représente au plus près le processus itératif de choix réalisé au sein de chaque cerveau de prospect ou consommateur. La communication interpersonnelle est l'objet d'une grande attention dans la psychologie sociale.

Cette ligne d'études a constamment démontré comment l'influence personnelle affecte les individus à effectuer des choix. Le pouvoir d'influence interpersonnelle à travers la communication de bouche à oreille a été bien reconnu dans la littérature des consommateurs (Arndt, 1967; King et Summers 1970; Herr, Kardes, Kim, 1991). L'influence des consommateurs par le biais de la communication de bouche à oreille est d'avantage accélérée avec l'avènement de l'Internet. Les rationalistes pensent qu'il est possible de présenter le raisonnement cartésien des consommateurs de façon linéaire : « une fois franchie l'étape 1 de l'inventaire des marques, je peux passer à l'étape 2 des caractéristiques statiques, puis sociales et à l'étape 3 je suis en capacité de choisir».

ANNEXE 2 : LES AVANTAGES DE TROPES

Tropes :

Tropes est un logiciel d'analyse sémantique de textes utilisé par de nombreux professionnels. Il existe et évolue depuis 1994. Il a été inventé par Pierre Molette et Agnès Landré, sur la base des travaux de Rodolphe Ghiglione.

C'est un logiciel performant en analyse de discours en langue française. Il permet de faire un traitement complexe visant à affecter tous les mots significatifs dans des catégories, procède à l'analyses de l'occurrence en sous catégories, à étudier leur ordre d'arrivée à la fois à l'intérieur des propositions, et sur l'intégralité du texte.

Tropes possède une très grande capacité à opérer une série d'analyses stylistiques, syntaxiques, sémantiques et a l'avantage de présenter les résultats sous la forme de chiffrages, de rapports ou de représentations graphiques permettant de mieux comprendre un texte et repérer tous les concepts.

ANNEXE 3

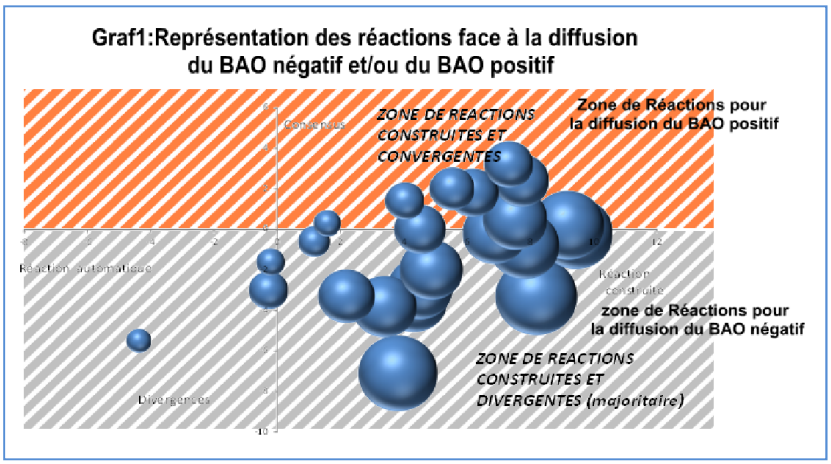

Figure 1 : Représentation des réactions face à la diffusion du BAO

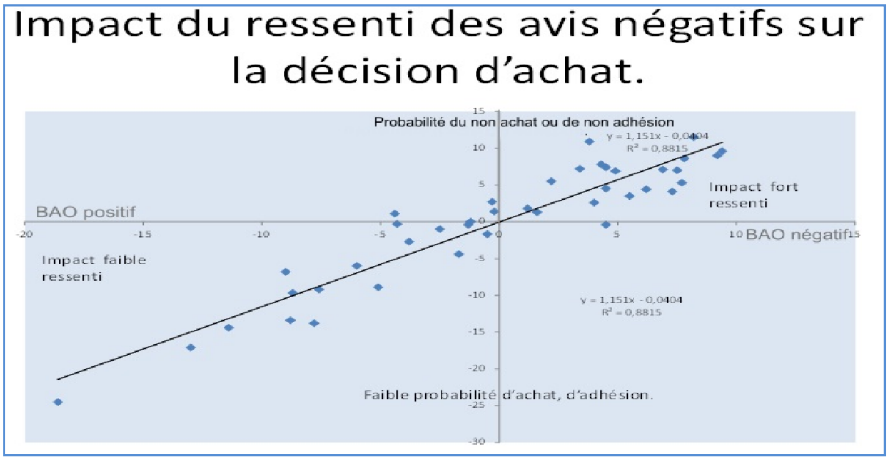

Figure 2 : Evaluation de la cohérence des personnes

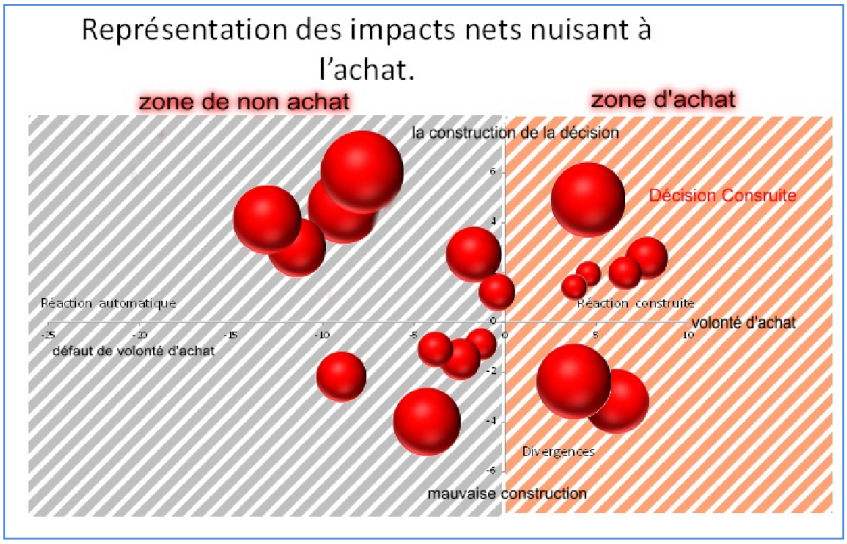

Figure 3: Impact des avis négatifs vers la non vente, non adhésion

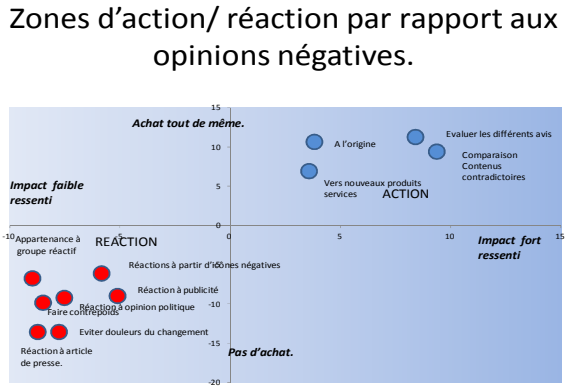

Figure 4: Adhésions, achats, malgré les avis négatifs

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Ranking the Macro-Level Critical Success Factors of Electronic Medical Record Adoption Using Fuzzy AHP Method

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ABSTRACT: Electronic Medical Record (EMR) has been introduced into healthcare organizations in order to incorporate better use of technology, to aid decision making and to facilitate searching for a medical solution. The EMR is an Information Technology (IT) tool supporting the examination, treatment and care of patients. Low adoption of the EMR persists despite the obvious benefits of centralized medical record management. The rate of EMR implementation among physician practices has been slow and limited. This needs those professionals in healthcare organizations to be in the process of changing from the use of paper to maintain medical records into computerized medical record keeping opportunities. The critical users are physicians, which play an important role in success of Health Information Technology (HIT) including EMR. Hence, study regarding individual level of adoption in EMR should be done to understand more about this issue. Hence, the objective of this paper is to finding out the imperative factors in affecting EMR adoption. The macro-level framework evaluated based on Fuzzy Analytic Hierarchy Process (F-AHP). Basically, surveys distributed to physicians who has experienced with using EMR technology in three Malaysian public hospitals. Findings showed the most important factors and sub-factors in macro-level context related to adoption of EMR. The results of F-AHP showed that the most important factors are Socio-pol-economic trends and HIS standards and the most important sub-factors are economic trends, standardized data, and political trends.

KEYWORDS: Electronic Medical Record (EMR), Health Information System (HIS), Health Information Technology (HIT), Fuzzy AHP.

1 INTRODUCTION

The main healthcare providers in developing countries are hospitals; therefore it is the first priority in hospital setting to be the one when there is a purpose on improving health information system [1]. According to [2] a medical record is defined as "file that contains records and documents about a patient's identity, and also medical examinations, treatments, actions, and other services provided to the patient". Medical records can be used to help physicians in documenting historical records and patient service management [2]. Compared to paper-based medical records, Electronic Medical Record (EMR) gives a greater possibility for physicians to improve their work performance quality [2]. The impact of the use of EMR is also mentioned in study of Lau et al. [3], which stated that 64.3% of studies on EMR found that it can improve the performance of

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medical personnel. The potential value for EMR is widely acknowledged, including improved office productivity, care coordination, and patient safety [17]. It is especially important for the EMR equipped public hospitals to perform efficiently whilst providing excellent services to the public [18]. Nowadays with large number of public hospitals, information is not integrated and mostly stored on paper. This causes significant challenges in the sharing of patient information due to duplication of information across the multiple healthcare service providers and geographic distances. This renders to decrease the quality in providing feedback by physicians to patients [15]. EMRs would remedy the intrinsic flaws of the conventional paper system through improvements in accessibility, efficiency, quality of data capture and cost saving [4]. Furthermore, the healthcare sector has also been reported to be slow in adopting of the EMR [19]. In relation with EMR, the current and emerging use of technology in healthcare is aimed at providing a well-integrated EMR in the effort to improve patient safety, increase quality of medical care and decrease healthcare costs to the community [11]. The purpose of this paper is to describe the factors that have more priority in affecting EMR to adopt in public hospitals in Malaysia.

The remainder of this paper is structured as follows. Section 1, describes the EMR and gives an overview of this research. Section 2 introduces the proposed research model. In Section 3, we explain the research methodology step by step. In Section 4, the data collection is discussed. Finally, the Fuzzy Analytic Hierarchy Process (F-AHP), results of F-AHP, and conclusion are expounded in Sections 5, 6, and 7, respectively.

2 PROPOSED RESEARCH MODEL

The framework for EMR physician adoption gives a conceptual framework to find out the most important factors that have an effect on acceptance of this new technology. This will follow Infoway Benefits Evaluation (BE) framework [10] (adapted from the [22] information system success model, which thereafter [23] in his study review developed Clinical Adoption (CA) framework based on three dimensions. It covers three aspects of micro, meso and macro-level dimensions. Each dimension has its own factors and sub-factors which could influence acceptance of physicians in adoption of EMR. In this study, macro-level factors have been concentrated to evaluate their impact on technology adoption. Physician adoption model at the macro-level determines Health Information System (HIS) success related to healthcare standards, legislation, policy governance, funding incentives and social-pol economic trends. Each of these has their own sub-factors which are found out their priority on EMR adoption. The physician adoption model was developed with a range of HIS in mind, including EMR. EMR adoption has been explained and impacted on physician practice, according to evaluation measures utilized in the studies. In regards of factors that have been caused by this impact, it has been described as the reasons cited that could explain the adoption and effect. Hence, in this study, it is concentrated on macro-level aspects that influence on EMR adoption. At the end, the proposed model has been enhanced and shown in Figure 1. At the macro-level, factors under HIS standards included standardized data [5,16]. Second, practice standards includes, medicolegal [21,16] prescribing practice [6], and guidelines [25] that affected EMR design/performance and user behaviors. Standardization would ensure that those who create data do so in a form that would be automatically recognizable and structured on receipt. The continuity of care record standard initiative specifies both the format and primary care owner of any report in a way that could be recognized by an Electronic Health Record (EHR).

Medicolegal is a phenomenon that has been addressed as a large concern which is the benefits of improved documentation [16]. In the Netherlands a Decision Support System (DSS) for prescribing drugs was introduced for General Practitioners (GPs) in 1998. The DSS was introduced to implement professional guidelines regarding the prescription of drugs. Prescription of drugs has great importance in modern health care [6]. Third, factors under legislative acts included need paper [21] and documentation [20]. Good documentation of patient records has been considered as a basis for good health care. The quality of patient records was found to depend on the electronic system used. The Electronic Patient Record (EPR) system seemed to have an influence on the documentation procedure. Documentation of records compared with legislation, the general informative value of records, and its relation to the experienced quality of consultations and to the electronic system employed [20].

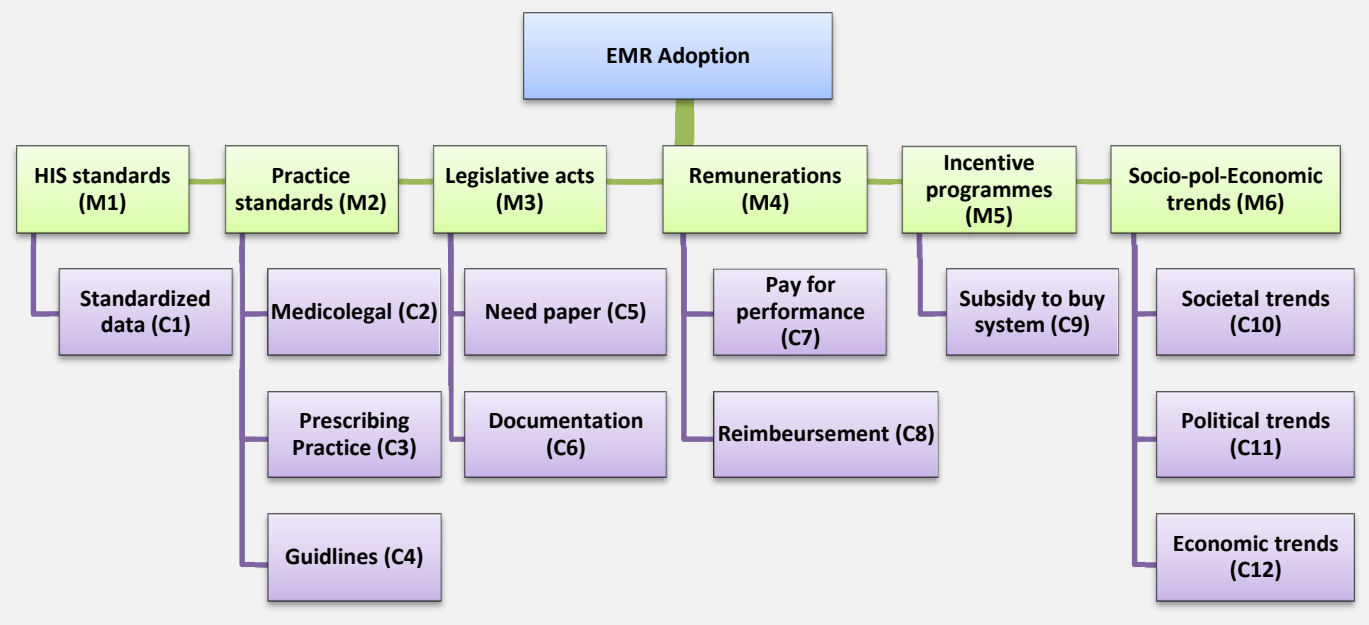

Fig. 1. Physician Adoption Model in Macro-Level

Fourth, factors under remunerations, are pay for performance [16,21,23] and reimbursement [24]. Fifth, factors under the incentive programmes are subsidy to buy the system [16]. Sixth, factors under socio-pol-economic trends are societal trends, political trends and economic trends [10]. Macro-level factors that found in previous research which has an effect on EMR adoption and effect were shown (see Table 1).

Table 1. Macro-level factors that influence EMR success

Factors	Sub-factors	References
HIS standards	Standardized data	[5,16]
Practice standards	Medico legal	[21,16]
	Prescribing practice	[6]
	Guidelines	[25]
Legislative acts	Need paper	[21]
	Documentation	[20]
Remunerations	Pay for performance	[16,21,23]
	Reimbursement	[24]
Incentive Programs	Subsidy to buy system	[16]
Socio pol Economic trends	Societal trends	[8,9]
	Political trends	[8,9]
	Economic trends	[8,9]

3 RESEARCH METHODOLOGY

A quantitative survey-based research study was performed and was analysed to explaining the factors that have an effect on EMR adoption. The three public hospitals in Malaysia practicing EMR have been chosen to conduct this research. A survey distributed to 12 physician experts in using EMR. The survey contains a number of questions that were designed to capture information about the factors and related sub factors in the research model. The questions that measured were HIS standards, practice standards, llegislative acts, remunerations, incentive programs and social-pol-economic trends besides

their sub-factors. F-AHP was used to obtain the ranking of these factors. Figure 2, contains a description of each step in this study.

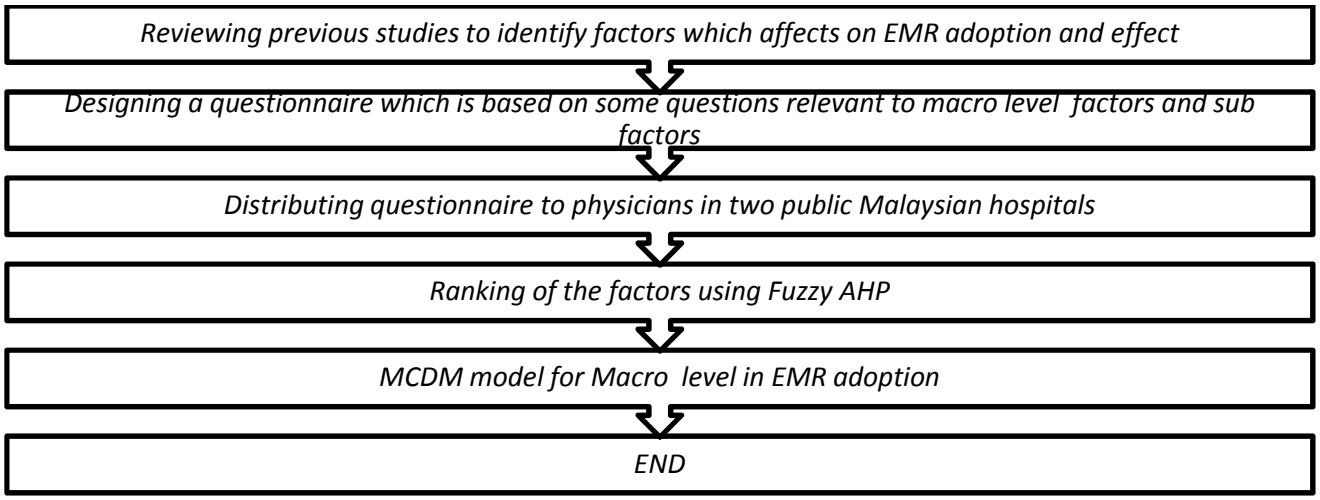

Fig. 2. Research methodology

4 DATA COLLECTION

In this study, the primary data was collected through sets of pairwise questionnaire which delivered to the physician experts in using the EMR systems. In this research, the questionnaires by email have been dent by researchers as an efficient and effective instrument to collect data from the respondents. For this study, numbers of respondents for pairwise questionnaire, were 12 (n=12) experts. All experts give the feedback in the pairwise questionnaire. The first section comprises of information on respondent demographic profile, six sections on the independent variables and twelve of their sub-variables. Five options (index) ranked from 1-5 for the raised questions as: 1= very low important 2=low important 3=moderately important 4= high important 5= very high important. Table 2 provides the respondents' demographic profile. About twenty five percent of physicians were male and the rest, were female who work as a medical professionals.

Table 2. The respondents' demographic profile

Pairwise Questionnaire			
Gender	Male	3	25%
	Female	9	75%
Age	30-40	4	33.33%
	40-45	5	41.66%
	45-50	3	25%
Years of electronic medical records	1-5	7	58.33%
experience	6-10	3	25%
	Over 10	2	16.66%

5 FUZZY AHP

The AHP method was proposed by [27,28]. Among Multi Criteria Decision Making (MCDM) techniques, it is a powerful approach to solve complex decision problems [7,12,13,14]. AHP rank and prioritizes the relative importance of a list of criteria in decision making problems. The elements for ranking can be critical factors and sub-factors which through pairwise comparisons amongst the factors by relevant experts using a nine-point scale are prioritized. F-AHP was proposed by Buckley [26] with incorporating the fuzzy theory into the AHP. Buckley [26] started the F-AHP derives more precisely results rather than AHP for vague and subjective decision making problems. Both quantitative and qualitative can be used in F-AHP. In F-AHP, the uncertain comparison, judgment can be represented by the fuzzy number. There are several types of membership

functions for F-AHP where triangular fuzzy number is the special class of the fuzzy number whose membership defined by three real numbers, expressed as (l, m, u). The triangular fuzzy numbers are represented as follows:

$$\mu_{\tilde{A}}(x)=\begin{cases}\dfrac{x-l}{m-l}, if\ l\le x\le m\\ \dfrac{u-x}{u-m}, if\ m\le x\le u\\ 0, \quad otherwise\end{cases} \tag{1}$$

.

For constructing pairwise comparisons of alternatives under each criterion or about criteria from the experts, similar to the pure AHP, a triangular fuzzy comparison matrix is defined as follows (it can be any type of membership functions):

$$\tilde{A}=(\tilde{a}_{ij})_{n\times n}=\begin{bmatrix}(1,1,1) & (l_{21},m_{12},u_{12}) & (l_{1n},m_{1n},u_{1n}\\ (l_{21},m_{21},u_{21}) & (1,1,1) & (l_{2n},m_{2n},u_{2n})\\ (\mathrm{l}_{n1},m_{n1},u_{n1}) & (\mathrm{l}_{n2},m_{n2},u_{n2}) & (1,1,1)\end{bmatrix} \tag{2}$$

.

Where $\tilde{a}_{ij}=(l_{ij},m_{ij},u_{ij})=\tilde{a}_{ij}^{-1}=(1/u_{ij},1/m_{ij},1/l_{ij})$

Different methods can be used for total weighs and preferences of alternatives which one of them is Fuzzy extent analysis proposed by Chang (1996). The steps of Chang's extensive analysis can be summarized as follows:

First step: In this step we compute the normalized value of row sums (i.e. fuzzy synthetic extent) by fuzzy arithmetic operations presented in Equation 3.

$$\tilde{S}_i=\sum_{j=1}^{n}\tilde{a}_{ij}\otimes\left[\sum_{k=1}^{n}\sum_{j=1}^{n}\tilde{a}_{kj}\right]^{-1} \quad . \tag{3}$$

In Equation 3, $\otimes$ denotes the extended multiplication of two fuzzy numbers.

Second step: In this step, we compute the degree of possibility of $\tilde{S}_i\ge\tilde{S}_j$ by Equation 4:

$$V(\tilde{S}_i\ge\tilde{S}_j)=\sup_{y\ge x}[\min(\tilde{S}_j(x),\tilde{S}_j(y))] \quad . \tag{4}$$

Which can be equivalently expressed as,

$$V(\tilde{S}_i\ge\tilde{S}_j)=\begin{cases}1 & m_i\ge m_j\\ \dfrac{u_i-l_j}{(u_i-m_i)+(m_j+l_j)} & l_j\le u_i\quad i,j=1,...,n;j\ne i\\ 0 & otherwise\end{cases} \quad . \tag{5}$$

Third step: In this step, using Equation 6, we calculate the degree of possibility of $\tilde{S}_i$ to be greater than all the other (n-1) convex fuzzy numbers $\tilde{S}_j$.

$$V(\tilde{S}_i\ge\tilde{S}_j\mid j=1,...,n;j\ne i)=\min_{j\in(1,...,n)j\ne i}V(\tilde{S}_i\ge\tilde{S}_j),\ i=1,...,n \quad . \tag{6}$$

Fourth step: In this step, using Equation 7, we define the priority vector $W = (w_1, ..., w_n)^T$ of the fuzzy comparison matrix $\tilde{A}$ as:

$$w_i = \frac{V(\tilde{S}_i \geq \tilde{S}_j \mid j = 1, ...n; j \neq i)}{\sum_{k=1}^{n} V(\tilde{S}_k \geq \tilde{S}_j \mid j = 1, ...n; j \neq k)}, i = 1, ..., n \qquad (7)$$

.

6 RESULTS OF WEIGHTING USING FUZZY AHP

Using fuzzy AHP, the end weights of all main-factors and sub-factors were calculated which are shown in Tables 3 and 4, respectively. It can be see that in the Macro-level, main factors such as M1 (0.2912) (HIS Standards) and M6 (0.3423) (Socio pol Economic trends) have the high level of importance rather than others. In addition, from the results it can be concluded that C12 (0.3592), C1 (0.2823), C11 (0.2129), C7 (0.2102) and C3 (0.2034) are the most important criteria for HIS adoption in the Macro-level.

Table 3. Weights of main-factors by Fuzzy AHP

Parameters ranking by Fuzzy AHP	
Parameters	Weight
M1	0.2912
M2	0.1311
M3	0.2567
M4	0.1762
M5	0.2289
M6	0.3423

Table 4. Weights of sub-factors by Fuzzy AHP

Parameters ranking by Fuzzy AHP	
Parameters	Weight
C1	0.2823
C2	0.1011
C3	0.2034
C4	0.1722
C5	0.1288
C6	0.1433
C7	0.2102
C8	0.1621
C9	0.1723
C10	0.1875
C11	0.2129
C12	0.3592

7 CONCLUSION

In this research, macro-level framework was evaluated by using Fuzzy AHP and the importance of sub-factors inside their appropriate factors was determined out. EMR adoption model was evaluated and investigated to increase the medical professionals' behavior in adopting and using of this specific type of technology which can positively affect their performance in doing their work routines. This study conducted in the physician's community in public hospitals in Malaysia and it is hoped that finding of this study provide the essential components to make sense of EMR adoption in the individual level. Findings showed the most important factors and sub-factors in macro-level context related to adoption of EMR. The most important

factors are Socio-pol-economic trends and HIS standards and the most important sub-factors are economic trends, standardized data, and political trends.

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Removal of Methyl Orange from Aqueous Solutions Using Thermally Treated Egg Shell (Locally Available and Low Cost Biosorbent)

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ABSTRACT: The effluent water of any industries such as textile, leather, paper, printing, cosmetic, etc. contains large amount of hazardous dyes. There is a huge number of treatment process as well as adsorbent which are available in low cost adsorbents for the removal of hazardous dyes from aqueous waste by adsorption treatment. In this study, thermally treated egg shell was used as an adsorbent for the removal of methyl orange from an aqueous solution. All operating parameters like; adsorbent dose, contact time, particle size and initial concentration of methyl orange were effective on their removal efficiency of the dye.

KEYWORDS: Adsorption, egg shell, methyl orange and Uv-vis spectroscopy.

1 INTRODUCTION

Progress in industrialization in particular textile industries have led to the discharge of unprecedented amount of wastewater containing synthetic dyes, which pollutes the rivers and consequently causes harm to human and other living organisms [1]. A majority of the used dyes are azo reactive dyes which are bright in color due to the presence of one or several azo (–N═N–) groups associated with substituted aromatic structures [2]. Methyl orange (MO) is a commonly used **an anionic** monoazo dye in laboratory assays, textiles and other commercial products and has to be removed from water due to its toxicity [7-8].These dyes or their breakdown products are toxic to living organisms [3]. Furthermore, dyes in wastewater are difficult to remove because they are stable to light, heat and oxidizing agents. In short, they are not easily degradable [4].

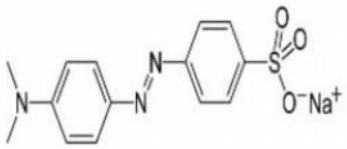

Figure 1. Molecular structure of Methyl Orange

Dyes are chemicals, which on binding with a material will give color to them. Dyes are ionic, aromatic organic compounds with structures including aryl rings, which have delocalized electron systems. The color of dye provided by the presence of a chromophore group. A chromophore is a radical configuration consisting of conjugated double bonds containing delocalized electrons. The Chromogen, which is the aromatic structure normally containing benzene, naphthalene or anthracene rings, is part of a chromogenchromophore structure along with an auxochrome. The presence of ionizing groups known as auxochromes results in a much stronger alteration of the maximum absorption of the compound and provides a bonding affinity. Colored dye wastewater arises as a direct result of the production of the dye and because of its use in the textile and other industries. There are more than 100,000 commercially available dyes with over 7 x 10^5 of dyes produced annually worldwide [11].

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In recent years, numerous low cost natural materials such as rice husk [4], activated carbon prepared from coir pith [9] and fruit shell [13] have been used and investigated for removal and adsorption of MO from aqueous solution.

Meanwhile, eggshells are used in enormous quantities by food manufacturers, restaurants and household and the shells are disposed of as solid waste. Investigations have been conducted to explore the possibility of useful applications of eggshells, especially for wastewater. Research has shown that eggshells and eggshell membrane may be used as an adsorbent for cationic dye[15], azo dye[16] and malathion[17], however, there has so far been no study reported in academic literature related to the use of powdered eggshells as an adsorbent for removing MO from aqueous solution. Therefore the main aim of this study was the use of powdered eggshells as adsorbent material for removal of MO from aqueous solution. The effects of adsorbante concentration, adsorbent dose, particle size and effect of contact time of MO were investigated. Objective of this study are

- To remove organic dyes from aqueous solution by using natural product as bioadsorbane
- To study Methyl Orange removal efficiency of thermally treated egg shell from aqueous solutions.
- To study the effect of operating parameters (initial adsorbante concentration, adsorbent dosage, contact time and particle size)

2 MATERIALS AND METHODS

2.1 APPARATUS

The materials employed in this work include among others, spectrophotometer (Model 722, Shanghai), Electronics weighing balance (Ohaus,USA), Dryer/ Oven, Sieve, Conical flasks, Stop watch, Centrifuge, egg shell , methyl orange(Beijing Chemical Co.). All chemicals used were of analytical grade.

2.2 CHEMICALS AND REAGENTS

Sodium bi carbonate, Sulfuric acid, Methyl Orange dye

2.3 EXPERIMENTAL SITE

Egg shell sample was collected from different cafeterias of Adigrat town which is located in the northern part of Ethiopia, Tigray region 898km far from Addis Ababa and 120km away from north of Mekelle city, which is capital city of Tigray regional state.

2.4 BIOSORPTION STUDY

2.4.1 ADSORBENT COLLECTION AND PREPARATION

The eggshell used in the experiment were collected free of charge from different hotels located in Adigrat, Ethiopia using plastic bags and washed with tape water to remove surface adsorption then dried at 105 °C for 1 h in a convection oven, grounded using mortar and pestle then socked with H_2SO_4 solution 1:1 ratio weight per volume for overnight to increase adsorption efficiency.

Then washed with distilled water till it attained neutral P^H and treated 2% $NaHCO_3$ over night in order to remove excess of acid present then it was washed with distilled water to remove dirt and boiled to remove color and dried at oven at $105C^o$ for 1 hours and activated in muffle furnace at $450C^o$ for an 1 hours.

Finally allowed to pass through 0.5, - 2 mm sieves. Then the powdered eggshell was washed with distilled water to remove dirt and boiled to remove color. The eggshell powder comprises of 94% $CaCO_3$, with small amount of $MgCO_3$, Calcium phosphate and other organic matter including protein [20].

2.4.2 PREPARATION OF ADSORBATE SOLUTION

Methyl Orange, 4-dimethylaminoazobenzene-4'- sulfonic acid (MO), a bright orange crystalline powder with a molecular formula of $C_{14}H_{14}N_3NaO_3S$, molecular weight of 327.34 , melting point around 300 ^oC and maximum absorption (λ_{max}) 465nm used without further purification. The molecular structure of MO a water soluble dye is shown in Figure 1.MO is dark

red in aqueous solution below pH 3 and the color brightens to orange as pH increases. A stock solution of MO was prepared by dissolving 12.5 g of the dye in 1 L of distilled water and filtered via Whatman filter paper (No. 1). The prepared stock solution was then wrapped with aluminum foil and stored in a dark to prevent exposure to direct light.

2.5 BATCH ADSORPTION STUDIES

Batch mode adsorption studies for individual eggshell were carried out using 250 ml Erlenmeyer flask. The effects of different parameters such as adsorbate concentration, adsorbent dose were studied. The Erlenmeyer flasks were pretreated with the respective adsorbate for 24 hours to avoid adsorption of the adsorbate on the container walls. Standard solutions of the dye were mixed with the egg shell and agitated at different agitation rate on a mechanical shaker. This was carried out by varying the dye concentrations, and the mass of egg shell used for adsorption. Finally, the resulting suspension of each of the dye was filtered using a Whatman No.1 filter paper and the filtrate was analyzed for the corresponding dye concentration. Removal efficiency was finally calculated by using the relationship.

Adsorption (%) = $((Co - C_f)/Co) \times 100$ eq……(1)

Where Co = the initial concentration (mg/L) and C_f = final concentration (mg/L) of the dye being studied. The adsorption capacity of the egg shell is the concentration of the dye on the adsorbent mass and was calculated based on the mass balance principle.

2.6 SORPTION STUDIES

Dye concentration was estimated spectrophotometrically by monitoring the absorbance at 465 nm nm using a UV-vis spectrophotometer. The samples were withdrawn from the shaker at predetermined time intervals and the dye solution was separated from the adsorbent by centrifugation at 20.000 rpm for 10 min. The absorbance of supernatant solution was measured. The effect of particle size was investigated by using four different particle sizes: 0.50, 1.00 and 2.0 mm, of powdered chicken eggshells. The experiments were carried out using 20 g of powdered eggshell for 60 minutes.

2.6.1 EFFECT OF ADSORBENT DOSAGE

The effect of adsorbent dosage was studied by adding Samples of egg shell 0.5, 1.0, 1.5, 2.0 and 2.5 g to 50 mL dyes solution in 250 ml Erlenmeyer flask and the adsorption efficiency for different dose was determined by keeping other parameters constant.

2.6.2 EFFECT OF ADSORBENT PARTICLE SIZE

The effect of adsorbent particle size was studied by using 5, 10, 15 and 20 g of adsorbent after passing with 0.5mm, 1.0mm, 0.20mm sieve and evaluate it's absorbance by using spectrophotometer by keeping the other parameters constant.

2.6.3 EFFECT OF CONTACT TIME

Contact time is one of the most important parameters for the assessment of practical application of sorption process [2]. For the determination of the rate of dye biosorption by the egg shell from 100 ml of standard solutions, the quantity of dye adsorbed was determined by varying the contact time: 5, 10, 15 and 20 min. Other parameters were kept constant.

2.6.4 EFFECT OF INITIAL DYE CONCENTRATION

This step determines the effect of MO concentration on dye removal efficiency of adsorbent. The effect of dye concentration were determined using different concentrations of the eggshell (5, 10, 15 and 20 mg/L) and keeping other parameters uniform.

3 RESULT AND DISCUSION

3.1 EFFECT OF ADSORBENT DOSAGE

The effect of powdered egg shell dosage on the adsorption of methyl orange is shown in fig.1. So as the amount of adsorbent egg shell increases the removal efficiency also increases with some continuous variation.

As the dosage of adsorbent increases the adsorption increases proportionately. The increase of dosage increases adsorbent sites thus surface area of contact with the dyes increases. Therefore the amount of dye uptakes increases and consequently leads to a better adsorption [23]. This observed trend is mainly due to the increase in sorptive surface area and availability of more adsorption site.

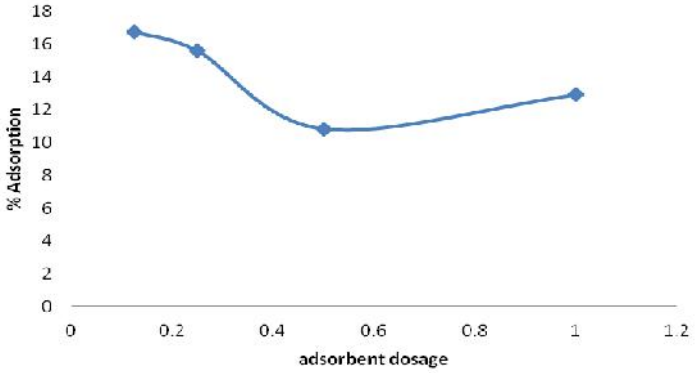

Fig.1. % adsorption Vs adsorbent dosage

3.2 EFFECT OF ADSORBENT PARTICLE SIZE

Determination of the effect of particle sizes on sorption was conducted using samples of four different average particle sizes (5 mm, 10mm, 15mm, and 20mm) at constant temperature for 80 minutes. So as it is supported in fig2 . as the particle size of adsorbent material increases then there is a constant decrement of on the removal efficiency of methyl orange because surface area of adsorbent material decreases so adsorption was high in 5mm particles size due to high surface area.

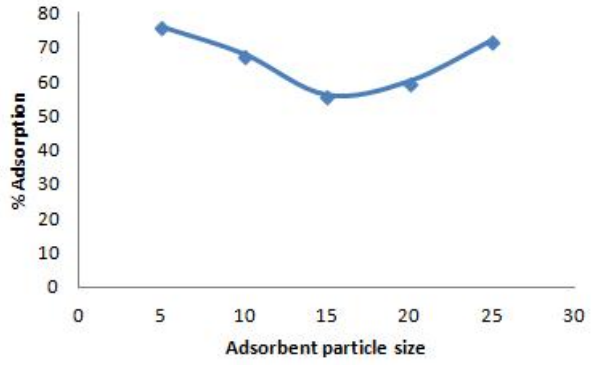

Fig2. % adsorption Vs particle size

3.3 EFFECT OF CONTACT TIME

The adsorption rate was rapid during the first 5 min and then continued at a slower rate from 5 to 35 min, and almost reached a plateau after approximately 40 min of the experiment (see Figure 2). This was due to the fact that, at the initial stage the number of free adsorption sites was higher, and the slow adsorption rate in the later stage was due to slower diffusion of solute into the interior of the adsorbent. The maximum adsorption occurred after 40 min and there was almost no adsorption beyond this time because the equilibrium is attained.

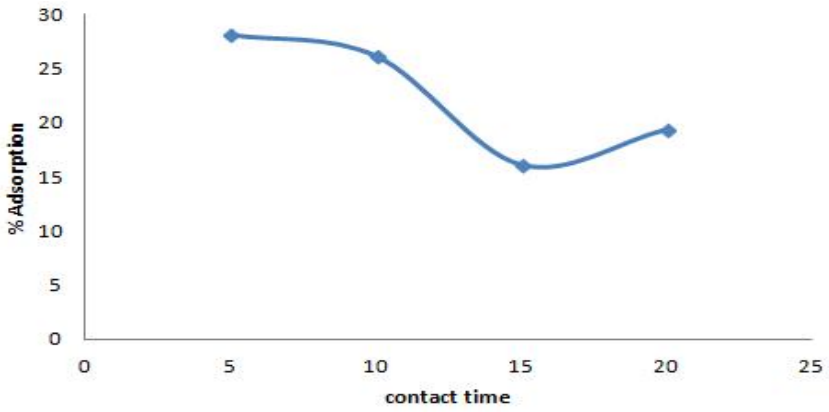

Fig. 3 . % adsorption Vs contact time

3.4 EFFECT OF INITIAL DYE CONCENTRATION

The results displayed in Figure 4 show that an increase in initial concentration enhances the interaction between the dye molecules and the surface of the fibers. The dye molecules have to encounter the boundary layer effect before diffusing from boundary layer film onto the adsorbent surface followed by the diffusion of the dye into the porous structure of the adsorbent which eventually will take relatively longer contact time. The time profile of the dye uptake by the adsorbent is a single, smooth and continuous curve leading to a saturation point [22]. In addition, Increasing the initial dye concentration increases the number of collisions between dye molecules and the adsorbent, which enhances the adsorption process.

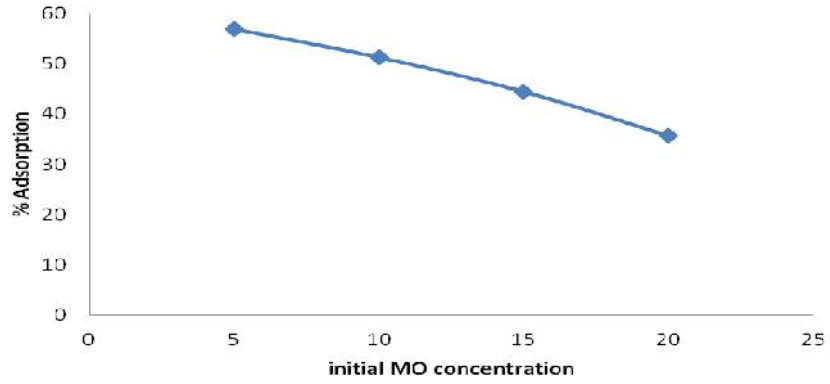

Fig. 4. % adsorption Vs initail MO concentration

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSION

This study is focused on the removal of methyl orange using egg shell from aqueous solution. The operating parameters: adsorbent doses, contact time, adsorbent particle size and initial MO concentration were effective on the removal efficiency of dye. The maximum removal efficiency of egg shell was found as 98.8% for 12.5 mg/L at conditions of 2 g adsorbent dosage,20 min contact time. Activated egg shell increased the removal efficiency of Methyl orange from aqueous solution as a result of the increased internal surface area. Based on the results of this study, it can be concluded that the egg shell adsorbent is an effective and alternative adsorbent for removal of methyl orange from aqueous solution because of its considerable adsorption capacity, being of its abundance and low-cost.

MO exhibited a fast biosorption rate during the first 5 minutes of contact time due to a great availability of surface area/binding sites or large number of vacant surface sites is available for dye molecules to be biosorbed. Generally, MO

anions will bind to all the active sites until they are fully occupied or until it attains equilibrium. Hence with time, fewer active sites are available and thus reduce the amount of dye being adsorbed or after a lapse of time the remaining vacant surface sites are difficult to be occupied due to repulsive forces between the solute molecules on the solid and bulk phases.

When the initial concentration increases the removal efficiency decreases. This is probably due to high driving force for mass transfer. The reduction of dye removal as a function of its concentration can be explained by the limitation of available free sites for adsorption of dye with the increase in dye concentration in bulk solution for a fixed mass of adsorbent, as well as by the increase in intraparticular diffusion.

As the dosage of adsorbent increases the adsorption increases proportionately. The increase of dosage increases adsorbent sites thus surface area of contact with the dyes increases. Therefore the amount of dye uptakes increases and consequently leads to a better adsorption. This observed trend is mainly due to the increase in sorptive surface area and availability of more adsorption site.

The removal efficiency was high at smaller particle size of adsorbent material because as the particle size decreases the surface area increases and this leads to high removal efficiency.

4.2 RECOMMENDATIONS

The following recommendations are made in order to benefit those who need to intervene with the result of the study under consideration.

- Further study should be conducted in order to make use of egg shell adsorbent to remove dyes from wastewater from different factories.
- The adsorbent should characterized by using FT-IR.
- The use of adsorbent for removal of other toxic heavy metals should be studied.
- Other factors such as P^H, temperature and kinetic isotherm should be studied.

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A study of Merger and acquisition between Centurion Bank with Bank of Punjab: Analysing Premerger and Postmerger Financial Performance

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ABSTRACT: Mergers and acquisitions in banking sector have become familiar in the majority of all the countries in the world. A large number of international and domestic banks all over the world are engaged in merger and acquisition activities. Mergers and acquisitions in India with Banking sector are on the rise. Volume of M&A in India in 2009 have grew two fold from 2008 and four times compared to 2007. (M&As) activities of Indian companies slowed down in 2013 to a total of nearly 500 deals worth $27 billion, but the momentum is set to pick up in 2014 especially after the elections. Important M&A in India in banking sector in recent years include the merger between IDBI (Industrial Development bank of India) and its own subsidiary IDBI Bank. Another important merger was between Centurion Bank and Bank of Punjab in 2005 this merger led to the creation of the Centurion Bank of Punjab and later on 25 feb,2008 HDFC Bank acquired the Centurion Bank of Punjab (CBoP) for Rs 9,510 crore is one of the largest merger in the financial sector in India.The objective of the project was to find out whether the merger and acquisition deal between the two banks ie (Centurion Bank and Bank of Punjab) was successful or not ? An attempt has been made to draw the results of the case (Centurion Bank with Bank of Punjab) while analyzing the impact of these merger and acquisition on the employees, customers, organization , and on its shareholders.? And then finally the conclusion was that the merger activity has become good for both the banks ,the overall efficiency and the productivity increases over the years.

KEYWORDS: Mergers & Acquisition, Market Expansion, Net worth, Operating expense.

1. INTRODUCTION OF THE TOPIC

A merger is the combination of two similarly sized companies combined to form a new company. The combining of two or more companies, generally by offering the stockholders of one company securities in the acquiring company in exchange for the surrender of their stock is called a merger. A fundamental characteristic of merger is that the acquiring company (existing or new) takes over the ownership of other companies and combines their operations with its own operations.

On the other hand acquisition occurs when one company clearly purchases another and becomes the new owner. Mergers and acquisitions are strategic decisions taken for maximisation of a company's growth by enhancing its production and marketing operations. They are being used in a wide array of fields such as information technology, telecommunications, and Banking sector in order to gain strength, expand the customer base, cut competition or enter into a new market .

There are various types of Mergers:

- **Horizontal merger:-** This kind of merger exists between two companies who compete in the same industry segment. For example, combining of two automobile firms to gain dominant market share.
- **Vertical merger:-** Vertical merger is a kind in which two or more companies in the same industry but in different fields combine together in business. For example, joining of a TV manufacturing company and a TV marketing

company . Vertical merger may take the form of forward or backward merger. When a company combines with the supplier of material, it is called backward merger and when it combines with the customer, it is known as forward merger.

- **Conglomerate merger:-** is a kind of venture in which two or more companies belonging to different industrial sectors combine their operationsFor example, merging of pharmaceutical firm with the cement manufacturer or merging of Software Company with mobile firm.

India has emerged as one of the top countries with respect to merger and acquisition deals. Volume of M & A has increase a lot over the last few years. Starting from the year 2009 it have grew two fold from 2008 and four times compared to 2007. In 2007 the estimated figures for the M & A deals a total of more than $ 100 billions worth in India. In 2011 the estimated figures for M & A deals worth $ 44.6 billion having 644 transactions (According to one of the report of press trust of India : : December 29, 2013) .Indian companies were involved in 598 M&As deals worth $35.4 billion in 2012 . Then (M&As) activities of Indian companies slowed down in 2013 to a total of nearly 500 deals worth $27.4 billion, but the momentum is set to pick up in 2014 especially after the elections.

And if we talk about the M & A in the banking sector it has the capacity to ensure efficiency, profitability and synergy. Deregulation in the financial market , market liberalization and a number of other factors have played important function behind the growth of mergers and acquisitions in the banking sector. Though, there are many challenges that are still to be overcome through appropriate measures. Mergers and acquisitions in banking sector are forms of horizontal merger because the merging entities are involved in the same kind of business or commercial activities. The advantage behind this kind of merger is that in this process, competition is reduced because merger eliminates competitors from the banking industry. Banks can achieve significant growth in their operations and minimize their expenses to a considerable extent. In the banking sector, important mergers and acquisitions in India in recent years include the merger between IDBI (Industrial Development bank of India) and its own subsidiary IDBI Bank. The deal was worth $ 174.6 million (Rs. 7.6 billion in Indian currency). Another important merger was between Centurion Bank and Bank of Punjab worth $82.1 million (Rs. 3.6 billion in Indian currency), this merger led to the creation of the Centurion Bank of Punjab with 235 branches in different regions all over India.

In this Paper a recent merger and acquisition case has been taken that is the merger and acquisition between the Bank Of Punjab Ltd with The Centurion Bank in 2005 and The formation of Centurion Bank Of Punjab . And later on 25 feb,2008 HDFC Bank Board approved the acquisition of Centurion Bank of Punjab (CBoP) for Rs 9,510 crore in one of the largest merger in the financial sector in India. CBoP shareholders will get one share of HDFC Bank for every 29 shares held by them. The study focus on the pre and the post merger effect. The pre and the post merger ratios(profitability, liquidity, solvency ratio and per share ratio) has been compare (i.e. from 2004-2006)and the financial analysis has been done and the conclusion has drawn from the close analysis of these merger between two big giants.

1.1 ABOUT THE CENTURION BANK

The company was incorporated on 30th June,1994 and the certificate of Commencement of Business on July 20th 1994. It is promoted as a joint venture between 20th Century Finance Corporation Ltd, and its associates and Keppel Group of Singapore. It has got a network of 10 branches.

Achievements

- In 1995, 20th Century Finance Corporation Limited, has been amalgamated With Centurion Bank Limited.
- In 1995, The Bank set up in a fully computerised environment with ATM facility at every branch and Computer networking.
- Same year Bank has introduced, for the first time in the country, the concept of `anywhere banking' which enables to operate the account from any other branch of the Bank.
- In 1996 ,the Bank made an issue of 22,50,000 Equity Shares to the shareholders of promoter company and allotted 9,42,50,000 Equity Shares to the promoters as well as others including Keppel Group, International Finance Corporation and Asian Development Bank out of the application money which had already been received by the Bank.
- In 1997 ,bank was awarded the highest safety A1 rating By the Industrial Credit Rating Agency.
- In 1998, Centurion Bank Ltd proposes to be the first bank to offer Internet banking in its true sense.

- Same yearThe company also recently spun off its Car finance division into a 49:51 joint venture with General Motors Acceptance Corporation (GMAc), one of the largest auto finance companies in the world.
- In 1999, The Bank is linked to the Society for Worldwide Interbank Financial Telecommunication (SWIFT) network enabling it to transmit worldwide the financial messages instantly. The Bank will also continue to focus on trade financing, both domestic and international, as a niche-market product.
- In 2005, Bank of Punjab (BoP) and Centurion Bank (CB) have been merged to form Centurion Bank of Punjab (CBP) effective from October 1, 2005.

1.2 ABOUT THE BANK OF PUNJAB

The company established in 1989, in pursuance of The Bank of Punjab Act 1989 and was given the status of scheduled bank in 1994. The Bank of Punjab is working as a scheduled commercial bank with its network of 272 branches at all major business centres in the country.

Achievements

- The Central Board of Revenue presented "Excellence Award" to the Bank of Punjab in recognition of the contribution made by the bank towards Government exchequer.
- the Bank honoured with "Top Bank for Agriculture Loans" and "Best Bank Crop Insurance" under 3rd Kissan Time Awards year 2006.
- Bank of Punjab is the first bank to focus on retail banking and to introduce faxbanking and telebanking for itscustomers.
- Bank of Punjab offers a range of services to its customers through internet and fully computerised branch or off-site ATM Network. These services are as mentioned below:

Any Time Anywhere Banking
Banking Through Our ATM Network
Online eBanking/Internet Banking
eAlerts
eNews
Telebanking / Fax Banking
Special Service For Senior Citizens

1.3 MERGER OF CENTURION AND BANK OF PUNJAB IN 2005

From left) Mr Shailendra Bhandari, MD, Centurion Bank, Mr Tejbir Singh, ED, Bank of Punjab, Mr Rana Talwar, Chairman, Centurion Bank and Mr C. K. Sharma, CEO, Bank of Punjab... The merger handshake — Kamal Narang.

1.3.1 POST MERGER IMPACT (POSITIVE IMPACT)

In the research we found out that the merger has made a good impact on the 2 banks.Following are the post merger effect of CBOP:

- After merger the Centurion Bank Of Punjab has become a 10 top largest private sector bank.
- While Centurion Bank has 82 per cent of its business coming from retail, Bank of Punjab is strong in the Small and Medium Enterprises (Smells) segment and agricultural sector. The combined entity will have a nationwide reach.
- The Bank expanded its distribution significantly to tap into both existing as well as emerging market segments.The Direct Distribution channel of the Bank was focused on Mortgages, Personal Loans and Credit Cards. This channel widened the Bank's reach across different customer segments. The year 2006-07 has been another year of transformational growth for the Bank. The Bank continues to grow rapidly in all the business areas . The growth in the Bank's retail advances at 65% reiterates its retail focus.Additionally, the growth in the Corporate/SME advances at 89% demonstrates the emergence of the SME segment as a rapidly scaling up second growth engine for the Bank.
- The Bank has a network of 279 branches across 147 locations, 47 Asset Finance Division offices, 77 administrative offices and 408 ATMs as on March 31, 2007. As on 2008, the Bank had a significantly larger distribution network with 1,229 branches and 2526 ATMs in 444 cities as against 761 branches and 1,977 ATMs in 327 cities as of March 31, 2008.
- The Bank crossed the milestone of 100,000 credit cards with the Miracle Credit Card.
- During the year 2006-07, the Bank's Information Technology (IT) Department successfully completed the implementation of Finacle 7.0.11 across all the branches of the Bank. The Bank now has a single Core Banking Platform. In addition new software systems for Retail Assets, ATMs, Cash Management, Depository Operations, Electronic Payment Gateway and Wealth Management were implemented during the year.
- The staff strength has increased to 5,832 as on,2007 from 4,471 as on 2006. Accordingly, the staff costs have increased to Rs.221.31 crores from Rs.142.4 3 crores
- The Bank stays committed to augment its talent with quality resources from the top Management Schools in the country. 253 Management Trainees joined the Bank during the year 2006 - 07. Further, 427- Management Trainees have been recruited who join in 2007-08.
- Training programmes for Relationship Managers, Branch Heads, Financial Advisors and others were instituted to enhance product knowledge, selling skills and customer service across the Bank . 63 training programmes were conducted for 1040 employees to facilitate smooth transfer to the new software.
- The Bank continued to use the online HRMS system, now re-christened as 'OASIS' and additional modules like online transfers, confirmations leave records, etc. were launched during the year. The online Appraisal system was further refurbished and was used for conducting performance appraisals during the year.
- The following awards were received by the Bank during 2006:

  a) Combined entity the Punjab centurion bank would be the among the top 10 private sector banks in the country
  b) Fastest Growing Bank in its segment - Awarded by Business Today, a leading business magazine.
  c) After merger with HDFC , The Bank jumped to the 7th position among commercial banks from 10th. However, the merged entity would become second largest private sector bank.

- **<u>Financial performance</u>**

  a) The Perform net worth of combined entity as at March 2005 stood at Rs 696 crore with Centurion's net worth at Rs 511 crore and Bank of Punjab's net worth at Rs 181 crore, and the combine entity (Centurion Bank of Punjab) will have total asset 9,395 crore, deposit 7,837crore and operating profit 43 crore.Net worth can be calculated by:

TOTAL ASSETS – TOTAL LIABILITIES

The higher net worth is a good indicator that the bank is working very accurately after the merger between 2 entity.The higher net worth is the essential requirement of the bank.

a) The bank's profitability also improved substantially during this period. The Bank's profit after tax rose by 38.25% to Rs.121.38 crores during the current year as compared to Rs.87.80 crores during the previous year.

b) The book value of the bank would also go up to around Rs 300 crore. The higher book value should help the combine entity to mobilize funds at lower rate.

Book value = COST – ACCUMULATED DEPRICIATION

c) The operating profit of the Bank has increased by 144.44% to Rs.269.20 crores After the merger as compared to Rs.110.13 crores earned before the merger.

d) The Bank's operating expenses excluding interest expenses have increased by 40.38% to Rs.705.82 crores during the year 2007 from Rs.502.81 crores in the previous year. Expenses incurred on infrastructure, establishment of additional distribution channels and expenses pertaining to marketing of retail loans have contributed to the increase in operating expenses during the year

e) The total deposits have grown to Rs.14,863.72 crores as on 2007 as against Rs.9,399.64 crores at the end of the previous year 2006.

f) Bank's ratio of gross non-performing assets (NPAs) to total customer assets was 2.78% as against 4.63% as on March 31, 2006. The net NPAs to customer assets ratio as at March 31, 2007 is 1.26% as against 1.13% as of March 31, 2006.

g) The Net Interest Income for the year 2007 witnessed an increase of 42.84% to Rs.569.58 crores from Rs.398.76 crores in the previous year. This increase was primarily due to the growth in the asset book.

h) The total assets of the Bank increased to Rs.18,482.78 crores as on 2007 from Rs.11,330.19 crores in the previous year.

OBJECTIVE OF THE RESEARCH

A. In this research paper an attempt has been made to draw the results of some of the case (Centurion Bank with Bank of Punjab) while analyzing the impact of these merger and acquisition on the employees, customers, organization , and on its shareholders.

B. To analysis what is the effect of merger on the merged company in its growth and size and on its profit and loss account,whether its net profit has increase/decrease or to see whether the expenses has increase/ decrease.

C. The purpose of this piece of research was to find out the overall impact of the post merger and acquisition on the overall industry and to see whether this merger was successful or not.

D. Financial analysis has been done ,it is a process of identifying strength and weakness of the firm properly and establishing relationship between the items of the balance sheet and the profit & loss account.

E. Whether the merger and acquiation is a right way for the expansion of the business and what changes could be made to make the merger and acquisition more successful.

F. Whether Bank that have been taken over by other bank increase their capital investment and their R&D spending.

G. To access what are the post merger difficulties and challenges face by the acquirer and acquired party

H. This research shows, in our view, the importance of analyzing the longer-term consequences of mergers and acquisitions

RESEARCH METHODOLOGY

The research problem given was investigated on the basis of Secondary data collection . I had search various literature , magazines, journals and books from the different sources. Several information was also gathered from internet, internal files, in house journals and from the records .

The research methodology applied in the study **is descriptive** in nature.

- **Secondary Data**

Already published data formed the launch pad for the study. This included: -

i) **Internal Data**

Brochures of the Centurion Bank and the Bank of Punjab

Official reports- PROFIT & LOSS A/C,RATIOS and Balance sheet of the banks

ii) **External Data**:

The World Wide Web for Information 'or' the Internet

Research papers and books

- **SAMPLING PERIOD**

It is considered as year from 2004-2007 (centurion bank of punjab)

- **TOOLS AND TECHNIQUES**

- Financial analysis has been done ,it is a process of identifying strength and weakness of the firm properly and establishing relationship between the items of the balance sheet and the profit & loss account.Formulae use are capital adequacy ratio, EPS ,NET WORTH, GROSS PROFIT MARGIN,CURRENT RATIO AND many other formula is use.

- All the ratios profitability, solvency ,liquidity and other are use for the analysis purpose.

The case study is a qualitative research technique which may or may not involve observation.

As mentioned earlier, qualitative research is usually undertaken in a more unstructured, rather informal way than quantitative inquiry.

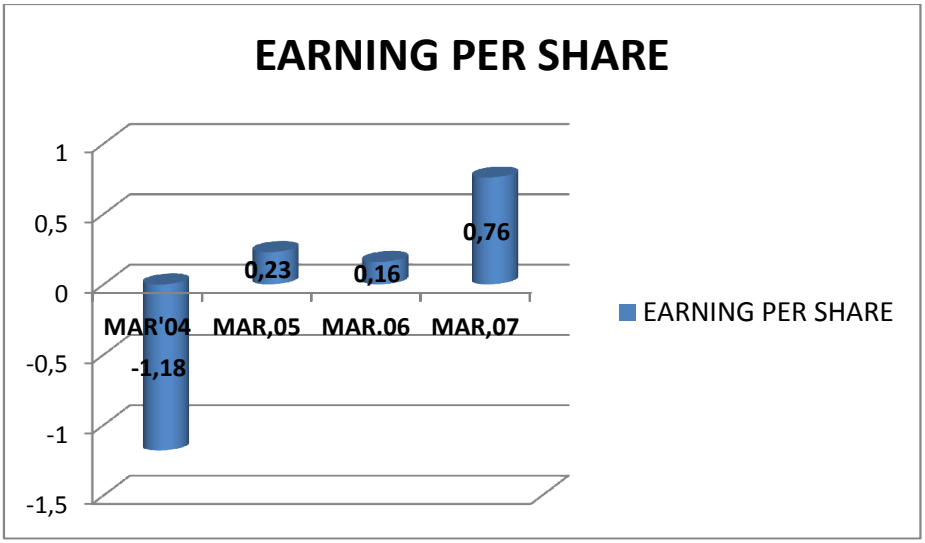
DATA ANALYSIS AND INTERPRETATION

Research paper is not complete unless and until the data analysis and data interpretations are interpreted in the true form. In this study of mine, an attempt has been made to investigate and evaluate the financial balance sheet and the ratios of the 2 banks and make the accurate results.Financial analysis has been done ,it is a process of identifying strength and weakness of the firm properly and establishing relationship between the items of the balance sheet and the profit & loss account and ratio analysis is a powerful tool of financial analysis.A ratio is used as a benchmark for evaluating the financial position and performance of a firm.

RATIO OF CENTURION BANK OF PUNJAB

	Mar ' 07	Mar ' 06	Mar ' 05	Mar ' 04
Per share ratios				
Adjusted EPS (Rs)	0.76	0.16	0.23	-1.18
Operating profit per share (Rs)	1.65	0.80	0.44	-0.68
Book value (excl rev res) per share (Rs)	8.91	6.61	5.82	3.40
Net operating income per share (Rs)	10.51	7.41	4.05	7.28
Profitability ratios				
Operating margin (%)	15.69	10.85	11.02	-9.44
Gross profit margin (%)	12.23	5.92	3.78	-18.18
Adjusted return on net worth (%)	8.61	2.54	4.06	-34.59
Leverage ratios				
Total debt/equity	10.65	10.09	15.98	15.70
Fixed assets turnover ratio	1.77	1.18	0.61	0.55
Liquidity ratios				
Current ratio	0.63	0.54	0.75	1.04
Quick ratio	10.15	8.03	6.40	7.46

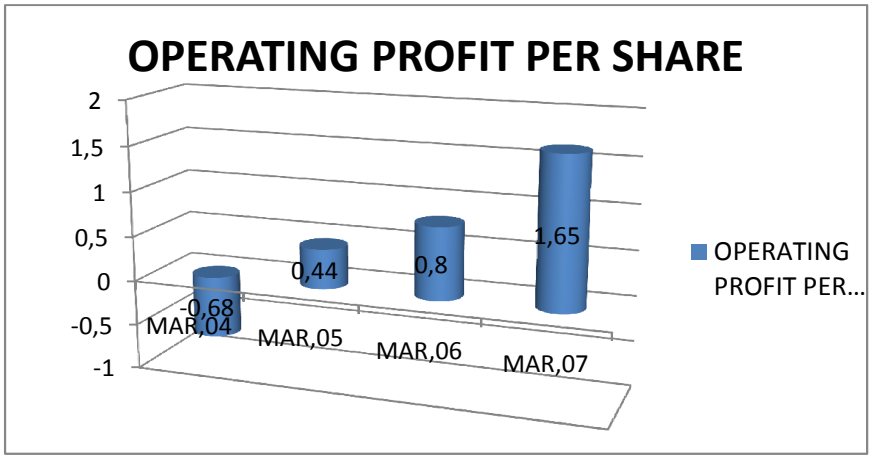
1. EARNING PER SHARE



EPS is the portion of a company profit allocated to each of its outstanding share.It is a indicator of companys profitability.In the above fig,the eps is low in march 2004 as compare to 2005 and 2006.This indicate after the merger of both the banks in 2005,the EPS is improving continuaslly.It is a good sign of a merger.

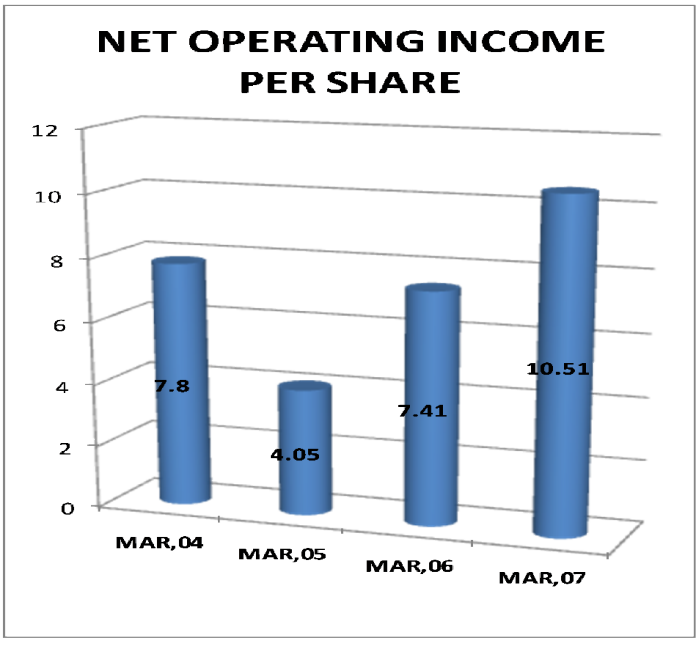
EPS = **PROFIT AFTER TAX/ AVERAGE NO. OF SHARES.**

2. OPERATING PROFIT PER SHARE



It is profit earned from a firm's normal core business operations.Profit after tax subtract expenses such as market expenses,COGS,administrative and many more..In march 2004,this operating profit is in a negative side but after the merger deals it goes positive and on 2006 it is 0.8.It shows a higher jump in 2007 and reaches to 1.65.Higher the operating profit good will be the financial position of the company.

3. NET OPERATING INCOME



A company's operating income after operating expenses are deducted, but before income taxes and interest are deducted. If this is a positive value, it is referred to as net operating income, while a negative value is called a net operating loss (NOL).

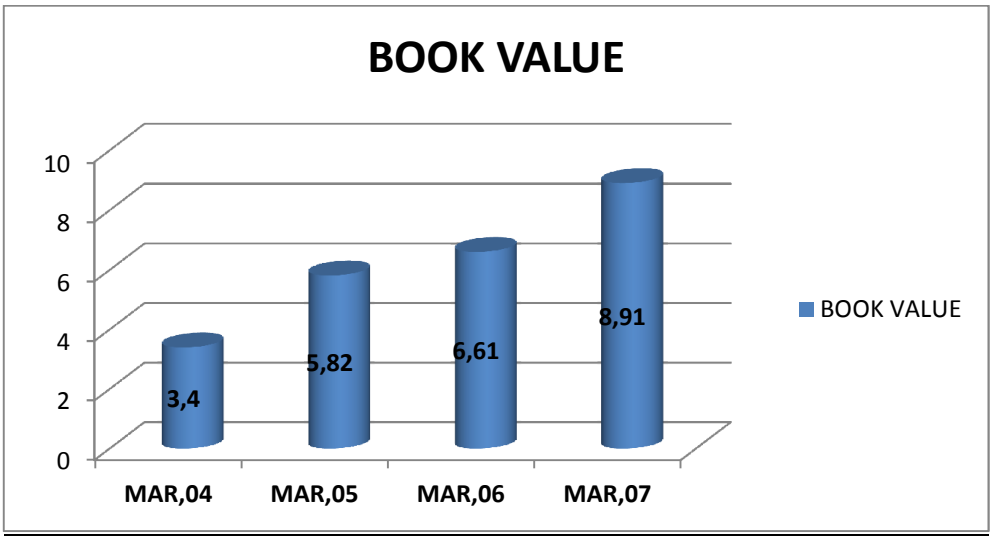
NOI is often viewed as a good measure of company performance. Some believe this figure is less susceptible than other figures to manipulation by management.The NOI also shows a positive sign,in 2005 it is 4.5 and in 2007 it goes up to 10.51.The net operating income is become low in march 2005 due to high cost involve in the merger process.

Thus it indicates that the NOI of the bank has increase after merger.

4. BOOK VALUE

Book value is the value of the asset as appear on the balance sheet which is equal to the **cost subtracted accumulated depreciation**.Thus the figure clearly shows that the book value goes to increase fron 2004 to 2007 which is a positive

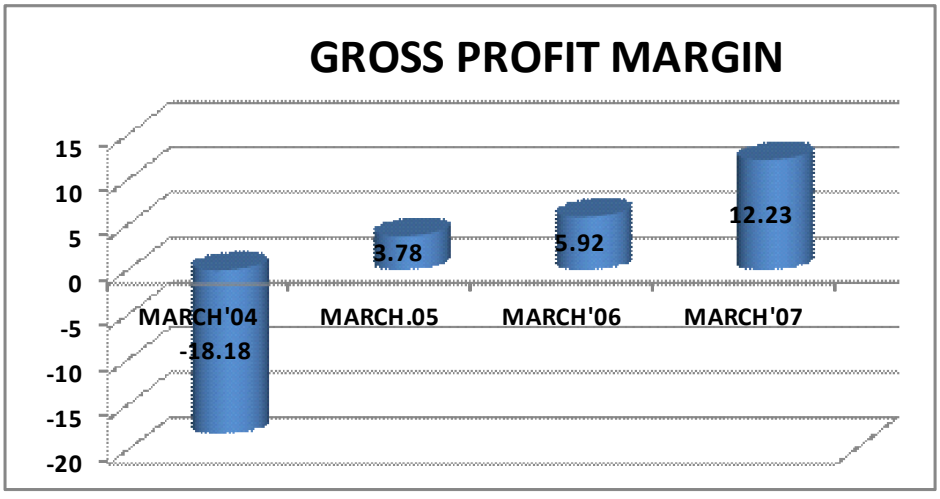
financial indicator.IN 2005 it is 5.82 and on 2006 it is 6.61 and on 2007 it is 8.91. So clearly there is a continuos growth in the book value of the asset after the 2005 which is a very good indicator.



5. GROSSS PROFIT MARGIN

The gross profit margin reflects the efficiency with which management produces each unit of product.A higher GPM implies that the firm is able to produce at relatively lower cost. This figure shows us that the gross profit margin has increase frm 2004 to 2007 .Before merger it was in negative but form 2005 onwards increase sharply due to the merger effect.In 2007 it is high at 12.73 which shows that the management very effective.

$$GPS = \frac{REVENUE - COGS}{REVENUE}$$

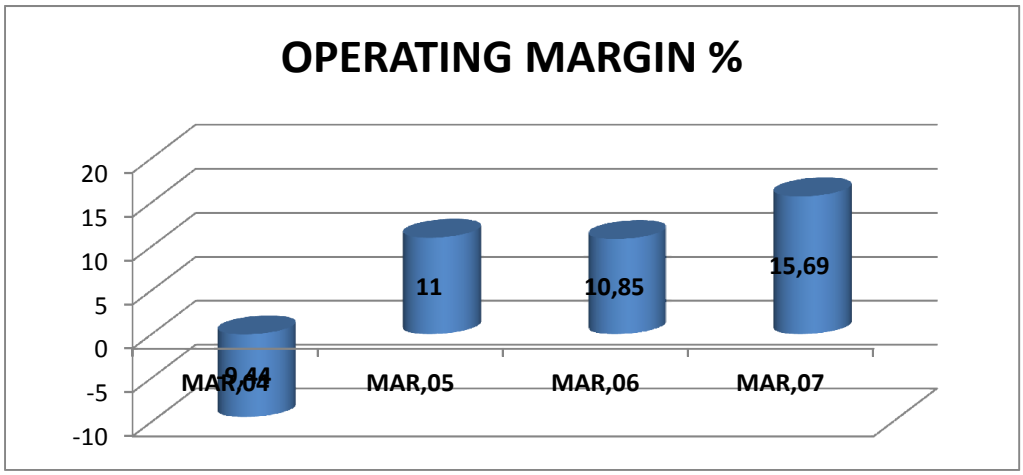


6. OPERATING MARGIN (%)

Operating margin gives an idea how much company makes on each dollar of sales .

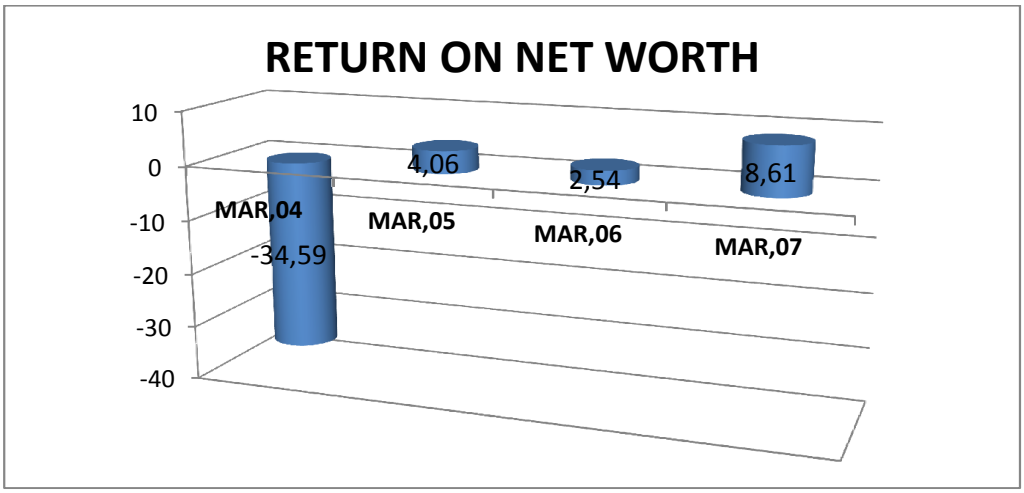
OM= OPERATING EXPENSES/ NET SALES.

The figure depits that the margin in 2007 is 15.69 as compare to the margin on March 2004 which was 4.3.So operating margin has seen a increase after merger.



7. RETURN ON NET WORTH

Net worth is nothing but TOTAL ASSET – TOTAL LIABILITIES. Net worth can be used to determine creditworthiness because it gives a snapshot of the company's investment history. **also called** owner's equity, shareholders' equity, or net assets..In figure the net worth improves from 2005.In 2004 it is negative which is a very bad indicator but on 2007 it is 8.61.In 2005,it is 4.65 ,which means after the merger the net worth improves.

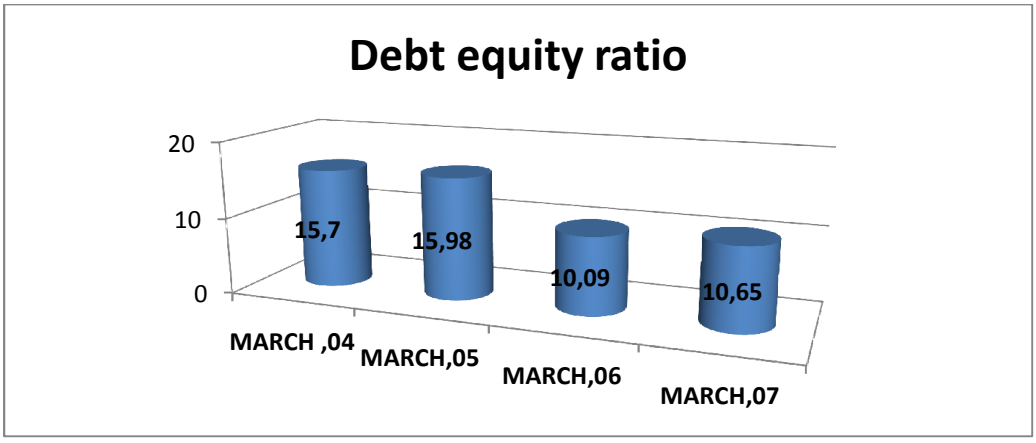


8. DEBT –EQUITY RATIO

A measure of a company's financial leverage calculated by dividing its total liabilities by stockholders' equity. It indicates what proportion of equity and debt the company is using to finance its assets.

$$= \frac{\text{Total Liabilities}}{\text{Shareholders Equity}}$$

A high debt/equity ratio generally means that a company has been aggressive in financing its growth with debt. This can result in volatile earnings as a result of the additional interest expense. In the fig, the debt equity ratio going down after the merger ie from 2005.It was 15.7 in 2004 and then it decline to 10.65 on 2007.

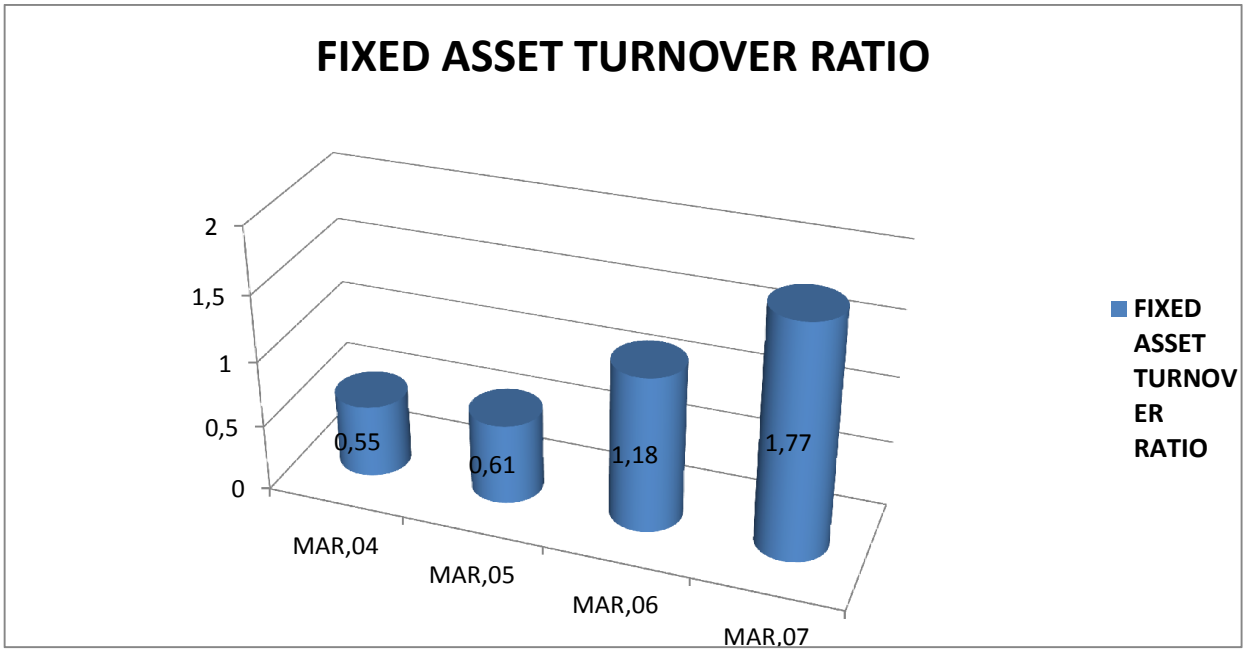


9. **FIXED ASSET TURNOVER RATIO**

Fixed asset turnover ratio helps in knowing the efficiency of utilizing fixed assets .Fixed asset can be calculated by –

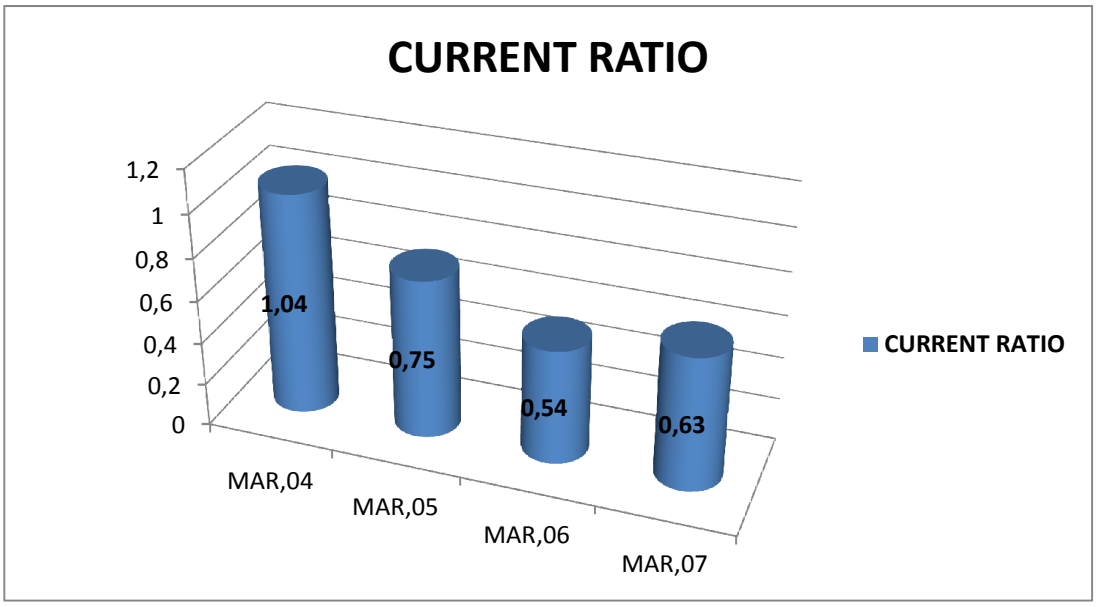
$$FAT = \frac{SALES}{TOTAL\ ASSETS}$$

This ratio helps the firm ability in generating sales from the financial resources to total asset.In 2004 the turnover was 0.55 but on 2007 it became 1.77 which is higher than the 2004 and 2005.It is a good indicator that the bank can generate more of the revenue from their fixed assets.



10. **CURRENT RATIO**

The current ratio is a current asset /current liabilities.It measure a company ability to pay short term obligation.Higher the ratio more capable the company is paying its obligation.But in this case the current ratio is going down frm 2004-2006..It show that the bank is not very good in paying its short term obligations.

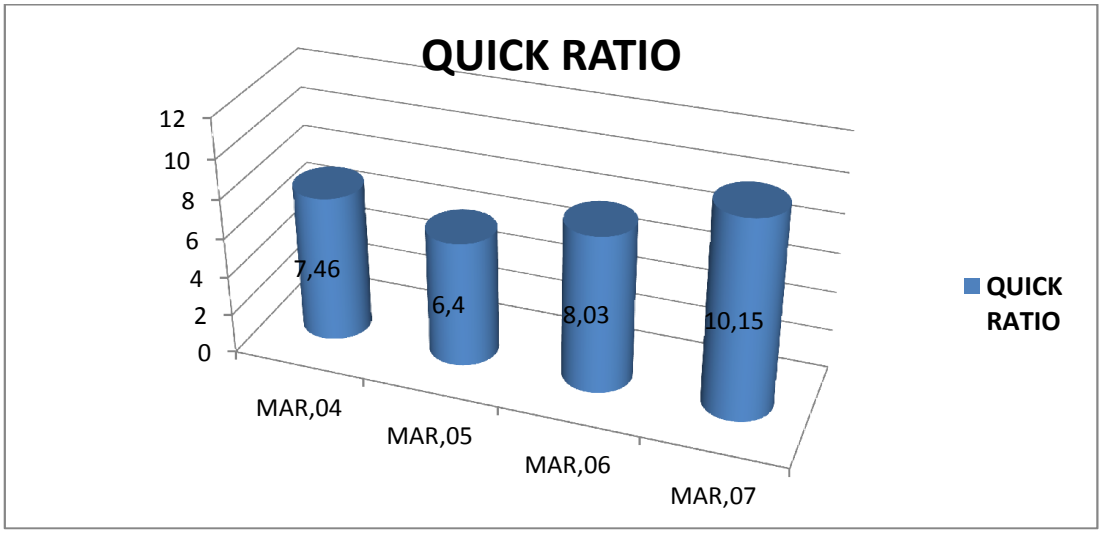


11. QUICK RATIO

This ratio established a relationship between liquid asset and current liabilities. A asset become liquid if it converted into a cash immediately.

$$\text{Quick ratio} = \frac{\text{current asset} - \text{inventories}}{\text{Current liabilities}}$$

Generally quick ratio of 1 to 1 is considered satisfactory .In the given figure,the ratio on 2004 was 8.2 and on 2005 it is 3.2 and it further down and became 1.2 on 2007 which is good indicator.A company with quick ratio can suffer from the shortage of funds and company with low quick ratio is prospering and paying current obligation on time.



LIMITATIONS

- The study was limited in terms of financial analysis and ratio analysis only
- All the data on the site of bank and RBI was not available due to the removal of historic data.
- Time duration was a constraint only the data from 2004-2007 has been taken .The post merger effect of CBOP with HDFC has not been considered
- No primary data has been taken and the study is depends only on secondary data so the fresh information is not available.

CONCLUSION

a) The research on the bank mergers and acquisitions presents a clear paradox. Evidence indicates clearly that on average there is a statistically significant gain in value or in the performance of Banks after merger activity. It is true by looks at accounting data.

b) After merger the centurion bank of punjab has become a 10 top largest private sector bank.

c) The size of the bank has increase and it starts competiting with the top bank of the country ie. With ICICI,KOTAK MAHINDRA,AND WITH THE AXIS BANK.

d) The centurion Bank of punjab has a network of 279 branches across 147 locations, 47 Asset Finance Division offices, 77 administrative offices and 408 ATMs as on March 31, 2007 and now in 2009 it has approximately 1200 branches.

e) The staff strength has increased to 5,832 as on,2007 from 2000 as on 2004. Accordingly, the staff costs have increased to Rs.221.31 crores from Rs.142.4 3 crores after the merger.

f) The combine entity (Centurion Bank of Punjab) will have total asset 9,395 crore, deposit 7,837crore and operating profit 43 crore.

g) The bank's profitability also improved. The Bank's profit after tax rose by 38.25% to Rs.121.38 crores .

h) Bank's ratio of gross non-performing assets (NPAs) to total customer assets was 2.78% as against 4.63% as on March 31, 2006.

i) The total deposits have grown to Rs.14,863.72 crores as on 2007 as against Rs.9,399.64 crores at the end of the previous year 2006

j) During the year 2006-07, the Bank's Information Technology (IT) Department successfully completed the implementation of Finacle 7.0.11 across all the branches of the Bank. The Bank now has a single Core Banking Platform.

All these analysis , ratios and the post merger impact shows that the merger activity has become good for both the banks.They overall efficiency and the productivity increases.The services and the value of the 2 combine bank has seen a rapidly positive change .So this merger was very successful for these banks.

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USING SIMOROUBA AS A BIO-DIESEL STUDIES THE EFFECT OF MODIFIED (THREADED) – PISTON ON PERFORMANCE, COMBUSTION AND EMISSION CHARACTERISTICS OF DIESEL ENGINE

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ABSTRACT: In the present scenario bio-diesels have received a lot of attention as an alternate vehicular fuel. But the properties of bio-diesels are not the same as diesel fuels especially their high viscosity and low volatility. Also the bio-diesels have very poor atomization characteristics due to decreased cone angle during fuel injection.
This paper relates the modification of engine combustion chamber design, for inducing turbulence to improve the combustibility of combustible mixture. A survey of literature shows that experimental studies have not been done on a threaded piston for evaluating influence on the combustion and emission characteristics using diesel blends as well. The objective of this work is to study the effect of combustion chamber geometry on combustion and emissions of a bio-diesel (Simorouba) fuelled threaded piston diesel engine. It has been noticed that for the engine under consideration with threaded piston gives optimum performance.
This work is to study the effect of threaded piston on combustion, performance and emissions of a bio-diesel (Simorouba) fuelled threaded piston diesel engine. It has been noticed that for the engine under consideration with threaded piston gives optimum performance.

KEYWORDS: Simorouba, Bio-Diesel, Piston, Diesel Engine.

INTRODUCTION

Air motion plays a significant role in fuel - air mixing, combustion and emission processes [1]. Along with air motion, spray characteristics, spray angle, injection pressure and injection timing also have a significant role in diesel engine combustion.

Swirl, squish and tumble are the important flow pattern of air motion. These patterns not only affect the fuel-air mixing and combustion process in diesel engines, but also have significant impact on combustion quality [2].

Swirl motion of the air is adequately achieved with good intake port design [3, 4, 5, 6, 7, 8, and 9]. When there is swirl in the in-cylinder air, the swirl-squish interaction produces a complex turbulent flow field at the end of compression. This interaction is severe in reentrant combustion chamber design [10]. Intensification of turbulence is due to the highly turbulent

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squish of the air near TDC of compression. The intensification of turbulence leads to efficient combustion which in turn causes higher NO_x emission and less HC emissions [11]. The author however has not reported the effect of tumble. Better air mixing and combustion are possible with higher injection pressure. Higher injection pressure produces smaller fuel droplets which evaporate faster and mix rapidly with air.

Bio-diesels play an important role in the on going balance between two major societal needs, viz., fuel economy and environment friendly Emissions. Bio-diesels can be produced in a way that does not cut into food supplies as Simorouba is non edible oil. Bio-diesel production reduces the dependency on imported oil and supports the agricultural sector [12]. The properties of bio-diesel are not the same as diesel fuels especially their high viscosity and low volatility. These properties strongly affect injection pressure injection timing and spray characteristics [13].

An increase in viscosity of bio-diesel will result in poor atomization characteristics due to decreased cone angle during fuel injection [14]. The pre - heating of vegetable oil gives better performance than raw vegetable oil. It has been observed that viscosity reduces exponentially with temperature. It has also been observed that when pre - heated vegetable oil is injected into the cylinder, spray pattern and atomization character has improved. The injection pressure has an effect on the spray formation of bio-diesel blends in CI engines [15]. Also studies have shown that the combustion characteristics alter with the changes in injection pressure. With the increase in pressure, the fuel penetration distance become longer and the mixture formation of the fuel-air was improved [16]. Also when the injection pressure is increased fuel particle diameter will be reduced. The mixing of fuel-air becomes better during ignition delay period. The combined effect of increased compression ratio, injection timing and injection pressure on engine performance, combustion and emission characteristics was discussed [17]. It was observed with increased brake thermal efficiency, decreased SFC and decreased emission for PME 20. The optimum combination was observed at CR=19.1, IP = 240 bar and injection timing of 27^{o} BTDC. Studies on the effect of injection pressure on the performance and emission characteristics of bio-diesel fuelled direct injection CI engine. It was observed that 200 and 250 bar is the optimum injection pressure with B20 and B30 blends.

CFD work on multi chambered piston has been carried out to analyze squish and tumble flow. A maximum of 13.1 m/sec squish velocity was observed at 10^{o} crank angle before TDC. The increase in squish velocity was 31% compared to a standard engine.

This work relates to engine design modification to induce turbulence by enhancing squish and tumble of charge during combustion. The present work has been undertaken to study the effect of injection pressure on performance and emission characteristics of threaded piston CI engine. The experiments have been carried out at constant speed of 1500 rpm and compression ratio of 17.5 at 250 bar injection pressure. The performance parameters such as SFC, brake thermal efficiency, carbon monoxide, NOx and UBHC have been studied.

EXPERIMENTAL SET UP

The experiments were conducted on a computerized CI engine test rig shown in Fig.1.

A Kirloskar make single cylinder 4-stroke, direct injection, water cooled CI engine test rig of 5.2kW, CR=17.5, IP=200bar rated power at 1500rpm is directly coupled to the eddy current dynamometer the engine and the eddy current dynamometer are interfaced to a control unit, with built in software in a computer. This software is used for recording test parameter such as fuel flow rate, temperatures, air flow rate and speed for calculating performance parameters such as brake power (BP), brake thermal efficiency and specific fuel consumption.

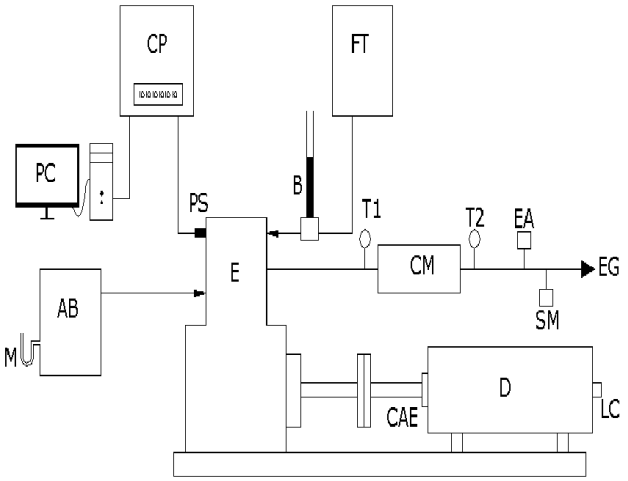

Fig.1 Experimental set up

The calorific value and the density of particular fuel are fed to the software for calculating above performance parameters. The exhaust emissions such as CO, UBHC, and NOx were measured with PEA205-5gas analyzer. The engine specification is shown in Table.1.

Table.1.Engine Specification

SL NO	ENGINE PARAMETERS	SPECIFICTION
01	Engine Type	TV1(Kirloskar)
02	Number of cylinders	Single Cylinder
03	Number of strokes	Four-Stroke
04	Rated power	5.2KW(7HP) @1500RPM
05	Bore	87.5mm
06	Stroke	110mm
07	Cubic Capacity	661cc
08	Compression ratio	17.5:1

MODIFICATION MADE TO PISTON CROWN

Turbulence is very important in mixing and combustion of fuel with air in CI Engine. In the present work the turbulence was induced by modifying the base piston face to a threaded-piston. During the modification care was taken to maintain compression ratio of 17.5. This was done by adding a thin layer of material on the piston crown by aluminum alloy welding and performing threading operation in the piston crown in such a way that the volume of the material removed balances the volume of material added so that the compression ratio of the engine is not altered in any way. The surfaces over the piston crown were finished to close tolerances on an engraving machine. Pictorial views of original and threaded pistons are shown in Figure. 2 and Figure. 3 respectively.

Fig.2. Standard piston

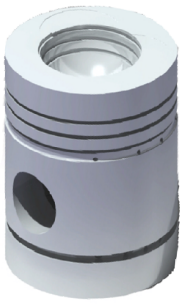

Fig.3. Threaded piston

At the end of compression stroke, the fuel vapor squeezes into threaded piston spirally due to direct compression, which leads to the enhancement of turbulence for better mixing and combustion.

EXPERIMENTAL PROCEDURE

A set of experiments were conducted for standard and modified piston engine at the rated engine speed of 1500rpm at compression ratio of 17.5 and at the injection pressure of 250 bar. Tests were conducted at 20% load, 40% load, 60% load and 80% load. The test was conducted at the injection timing of 21^{o} before TDC. The combustion and performance characteristics were found and emission characteristics like CO, UBHC and NO_x were recorded for diesel and subsequently for blend of S20 (20% Simarouba+ 80% of Diesel).

RESULTS AND DISCUSSION

The results of the engine experimentation are presented in Figs. 4-11. All comparisons have been made at constant engine speed 1500 rpm and injection timing 21^{o} crank angle.

Cylinder pressure

Figure 4 shows the cylinder pressure with crank angle for standard and threaded pistons at CR=17.5, IP=250bar for S20 blend. It is found that the standard piston produces higher cylinder pressure compared to threaded piston. This trend may be attributed due larger delay period with the standard piston in which more amount of fuel is accumulated in the combustion chamber

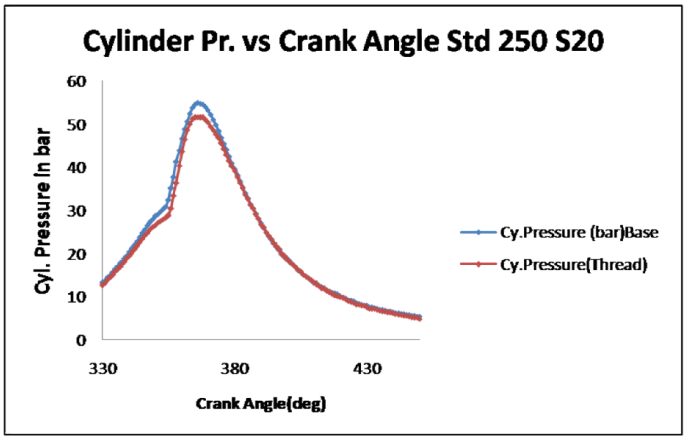

Fig.4. Cylinder pressure Vs Crank angle

Heat release rate

The net heat release rate is an important parameter for the analysis of combustion characteristics in the engine cylinder. The net heat release rate can be expressed as

$$dQ/d\theta = (\gamma/\gamma\text{-}1)\, dV/d\theta + (1/\gamma\text{-}1)\, V.\, dP/d\theta \qquad \text{(Eq. 1)}$$

Where, $dQ/d\theta$ is heat release rate (J/deg),

p is the in-cylinder pressure,

V is the in-cylinder volume and

γ is the ratio of specific heats.

In equation 1, the cylinder content is assumed to be homogenous mixture of air and combustion products. It is further assumed that γ=1.3 as an appropriate value of γ for CI engine is 1.3 to 1.35 [1].

The heat release rate varying with crank angle at 80% load condition for standard and threaded pistons is shown in figure 5. It is seen that the premixed combustion region is rather higher for threaded piston indicating that higher of delay period due greater mixing of fuel with air because of swirl generation.

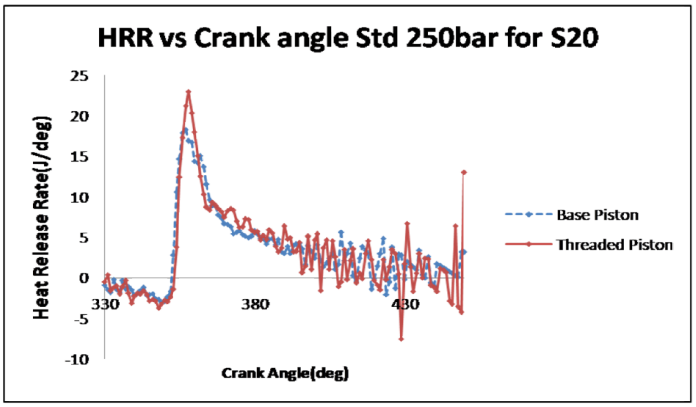

Fig.5. Heat release rate Vs Crank angle

Mass fraction burned

The effect of induced turbulence due to swirl caused by threaded piston on mass fraction burned is compared with standard piston at 80% is shown in figure 6. The mass fraction burned is high with threaded piston. This could explain higher NO_x, lower CO and HC emissions with threaded piston.

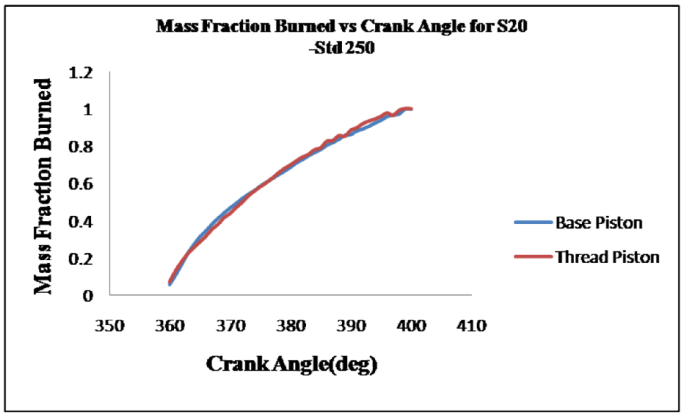

Fig.6. Mass fraction burned Vs Crank angle

HC EMISSION

Fig. 7 compares the HC emissions with standard and threaded pistons at CR=17.5 and IP= 250bar for S20 blend. The HC emission is the direct result of incomplete combustion. It is apparent that the HC emission is decreasing with the increase in turbulence in threaded piston, which results in complete combustion of fuel.

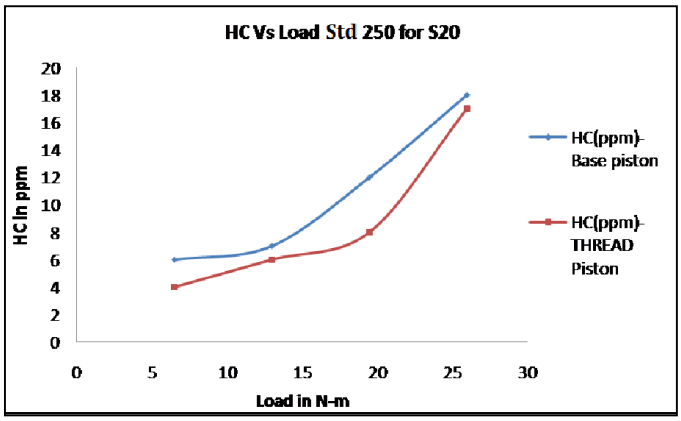

Fig.7. HC emission Vs Load

CO EMISSION

Generally CI engines operates with lean mixtures, hence the CO emission would be low. With increase in turbulence due to swirl motion in threaded piston the oxidation of carbon monoxide is improved, which results in reduction of CO emissions as shown in figure 8. The CO levels with standard piston are high at full load conditions due to combustion inefficiencies.

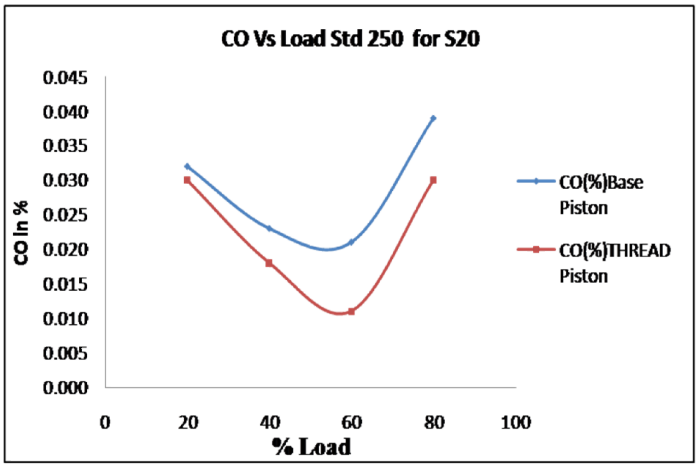

Fig.8. CO emission Vs Load

NO_x EMISSION

Figure 9 shows the comparison of NO_x emission with load for threaded and standard pistons. It is observed that the NO_x emissions are slightly increased for S20 blend with threaded piston in comparison with the standard piston. This due to the higher temperature in the combustion chamber because of complete combustion of fuel with swirl generated threaded piston.

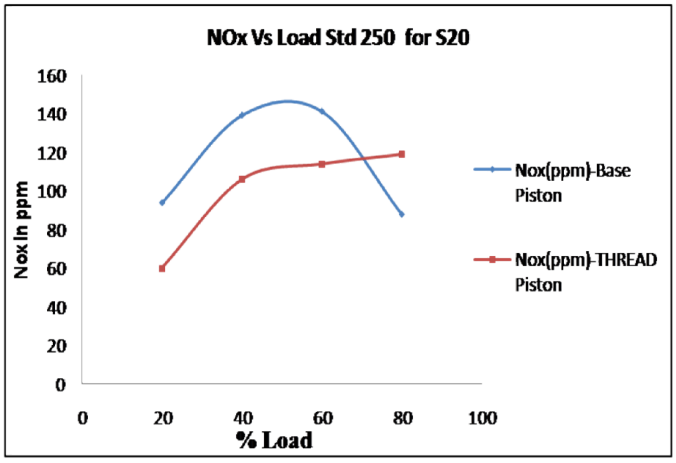

Fig.9. NO_x emission Vs Load

CONCLUSIONS

The Experimental investigation on combustion in threaded-piston CI engine was conducted on single cylinder, 4-stroke, direct injection, constant speed diesel engine. The test was conducted at 1500 rpm, CR=17.5, injection pressure of 250 bar and 21^0 crank angle BTDC. The major conclusions observed from the experiments are as follows:

- Ignition delay of S20 fuel was found shorter with threaded piston due to better mixing of fuel with air compared to standard piston.
- Peak cylinder pressure slightly lower in premixed combustion and slightly higher at diffused combustion in modified piston.
- Peak heat release rate higher for threaded piston due to diffused combustion in threaded piston.
- The mass fraction burned with threaded piston is slightly high compared to standard piston.
- CO and HC emissions are found to be lower with threaded piston.

- A comparison of the results obtained on the standard and a threaded piston engine have been made with reference to the combustion and emission characteristics and is generally observed that the threaded piston gives enhanced combustion and lower emissions compared to the standard piston.
- Better mixing of fuel and better combustion due to swirl action with modified piston increases the combustion and cylinder wall temperature which results in increase of NO_x emissions compared to standard piston engine.

NOMENCLATURE

TDC	: top dead centre
BTDC	: before top dead centre
UBHC	: unburned hydrocarbon
NO_X	: oxides of nitrogen
CO	: carbon monoxide
CI	: compression ignition
PME	: poly methyl ester
CFD	: computational fluid dynamics
SF C	: specific fuel consumption
CV	: calorific value
CR	: compression ratio
IP	: injection pressure
Bth	: brake thermal efficiency
BP	: brake power

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Taxonomic study of the Genus Anabaena (*Nostocophyceae Cyanophyta*) from Chickan Lake.Distt:Dadu.Sindh, Pakistan

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ABSTRACT: 11 species of blue green algae belonging genus Anabaena have been collected from three stations of Chickan Lake, District, Dadu, Sindh, Pakistan, during January 2013 to December 2013.

KEYWORDS: Taxonomy, *Anabaena*, Chickan Lake.

INTRODUCTION OF LAKE

Chickan Lake is the largest & oldest salt water lake in Sindh, it is located at Palh village 26º 57'33.94 N, 67º 51' 06. 10 E, nearly 25 Km in north from Dadu city. The Lake covers an area of 142 Hectors. The Lake collects water from numerous small agriculture channels from(Dadu canal). It was nearly 12 meters deep in the beginning but continually silting and deposition of decaying plants have decreased the depth up to 5 to 7 meters.

There are few studies of this genus have made from Pakistan for taxonomic point of view (Leghari *et al*, 2000, 2002; Sahato *et al*, 2003;Lashsri *et al,* 2008; 2009; 2014), but no taxonomic investigation was made so for.

A collection of *Anaebaena (Cyanophyceae*) was made from three stations of Chickan Lake, and detailed taxonomic study was carried out (Naz *et al,*2004a,b).The present work was described with the taxonomy of *Anabaena* in three stations of Chickan Lake.

MATERIAL AND METHODS

Three sampling stations established in Chickan Lake 1.Palh Village, inlet water from Dadu canal through river Indus.2.Fishing spot, centre of the Lake.3.Miyani village, Outlet of Lake,(fig 1). The methods used for the collection and studies of materials were the same as described with the previously (Naz et al.2004a;Lashari et al.2008,2009).The *Anabaena (Cyanophyta)* species were taxonomically described with the help of literature (Gomont.M,1892; Forti.A,1907; Tilden.J,1910;Fremy.p,1929; Geitter.L,1932;Desikachary,1959).

RESULT AND DISCUSSION

On the basis of their morphological characteristics 11 species of *Anabaena* systematically arranged according to the recently proposed classification.

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Class Nostocophyceae: filamentous, heterocyst's without true branching

Order Nostocales: Plants filamentous, with filament and trichome organization, hormogones present; heterocyst's, akinate endospores, hormocysts present; true branching absent, false branching present.

Family Nostocaceae: Trichomes free or in a common mucilage, generally with cells in a single row, cells generally similar throughout, ends or end cells sometimes attenuated, with intercalary growth; hormogones present; heterocyst's present or absent, when present intercalary or terminal, generally single, in some more than one together; spores present or absent, singly or in series, formed in a definite manner beginning from near the heterocyst or in between two of them.

KEY TO SPECIES

Trichome straight_____1

Trichome irrigular_____2

1. Akinate spherical or sub- spherical _____3

1. Akinate otherwise _____4

2. Heterocyst barrel shaped _____*A.iyengarii*

2. Heterocyst spherical _____ 5

3. Akinateon one side of heterocyst_____6

3. Akinate on both sides of heterocyst _____7

4. Akinate barrel shaped with flattened end _____*A. variabilis*

4. Akinate ellipsoidal _____ *A. iyengarii var.tenuis*5.Akinate not contiguous with the intercalary heterocyst's but occasionallynext to the terminal heterocyst's_____ *A. oryzae*

5. Akinate up to 3-4 time as long as broad with round end _____*A. oscillarioides*

6. Heterocyst round 4-6.µ _*A.inaequalis*

6. Heterocysts sub- spherical _*A. spiroids*

7.Heterocysts 6-6.6 µ broad ___*A. orientalis*

7.Heterocysts 8-10 µ broad___*A. circinalis*

1. *Anabaenaoryzae*(Fritsch)

Fritsch, 1929; Desikachary, 1959

Characters

Thallus soft, green, gelatinous, membranous, trichomes short, straight, densely aggregated, generally paralleled cells 2.5-3µ (4.0µ) broad, more or less barrel- shaped 1½ -2 times as long as broad; heterocyst's terminal and intercalary, broader than the vegetative cells, 3-3.5µ (4.5µ),(6 µ) broad;spores rarely single next to terminal heterocyst's,spherical or short ellipsoidal 9 m in diameter, 12µ long, akinete yellowish brown.

Geographical distribution:

Faridpur,Bengal (Fritsch,1929),Pakistan.

Locality: Miyani village outlet of the lake

Remarks:It was reported from Miyani village outlet of a lake in the month of April, This species occurred large quantity in Spring Season at surface water.

2. *Anabaena spiroids* (klebahn)

Forti, 1907; Fremy, 1929; Geitler1932, Desikachary, 1959.

Characters:

Trichome single, free floating, regularly spirally coiled, spiral 45-54 µ (45 µ) broad. Cells spherical 6.5-8 µ (6 µ) broad. Spores spherical.

Geographical distribution:

India, Hyderabad (Ghousuddin, 1936), Calcutta (Biswas1942), Burma, (Skuja, 1949).Pakistan.

Locality: Palh village inlet water sources from Dadu canals through river Indus.

Remarks: It has been recorded first time from Chickan Lake. Collection mad from Palh village inlet water source of Lake during January 2013-December 2013.It has been observed large quantity.

3.*Anabaena circinalis var. crassa*(Ghose)

Forti, 1907; Geitler1932; Fremy, 1933; Desikachary, 1959.

Characters:

Trichome free floating single semicircular loosely coiled, cells nearly spherical cell 5-7 µ (5.5 µ) broad.

Geographical distribution:

Bengal (Biswas, 1926), Pakistan.

Locality: Fishing spot centre of the Lake.

Remarks: The collection was carried out in the month of June 2013, during summer season it recorded low quantity, but in winter season this species recorded in large quantity in the lake.

4.*Anabaenaorientalis Var. ellipsospora* (Rao,C.P)

Rao, 1937; Desikachary, 1959.

Characters:

Trichome 3.3-4 µ broad, apical cell 1.6 µ broad, cells 3.3-11 µ long; heterocyst's 6-6.6 µ broad and 6-11.6 µ long; spores one or two together on either side of the heterocyst's, 9.6-13.5µ broad and 11.6-19.8(23)µ long.

Geographical distribution:

India,Benaras (Rao,C.B,1937),Pakistan.

Locality: Palh village inlet water source from Dadu canal through river Indus and fishing spot centre of the Lake.

Remarks: Collections were carried out from two spot of Chickan Lake during August 2013. It occurred in bloom condition in both spot.

5.*Anabaenavariabilis* (kutzing ex Born.et Flah).

Bornet, 1888; Forti, 1907; Fremy, 1929; Geitler, 1932; Desikachary, 1959.

Characters

Thallus gelatinous, dark-green; trichome without any sheath, flexuous, 4-6 µ broad, more often 4.2-5 µ broad slightly constricted at the cross-walls,end-cells conical, obtuse; cells barrel-shaped ;heterocyst's spherical or oval, 6 µ broad, up to 8 µ long; spores formedcentrifugally, not contiguous with the heterocyst barrel- shaped, in series,7-9(-11) µ broad.8-14 µ long, epispore smooth, or with fine needles, colorless or yellowish brown.

Geographical distribution:

Burma (Ghose, 1924); Lahore (Ghose, 1924).Rangoon (Ghose, 1927); Calcutta (Banerji, 1938), Pakistan.

Locality: Miyani village out let of Lake.

Remarks: It was recorded for the first time from Chickan Lake, Dadu, Sindh, Pakistan.It appeared high quantity in Miyani spot out let of lake. It was mixed with *Nostoc* species.

6. *Anabaenaoscillarioides* (Bory.ex Bornet Flah)

Bory,1822;Bornet,1888;Forti,1907;Fremy,1929;Geitler1932;Fremy,1933;Desikachary,1959.

Characters

Thallus gelatinous, dark green , trichome 4.2-6 µ broad; cells barrel- shaped as long as broad; heterocyst's spherical or oval, 6-8 µ broad, 6-10 µlong, spores on both sides of the heterocyst's; single or 2-3, at first oval, later rounded cylindrical.8-10 µ broad, epispore smooth and pale brown.

Geographical distribution:

India,Bombay,(Gonzalve,1943a);Ragoon,(Skuja,1949).Pakistan.

Locality: Fishing spot centre of the Lake.

Remarks: Collection was made from fishing spot centre of the Lake during September 2013. It appeared in large quantity in free floating state.

7. *Anabaenaiyengarii* (Bharadwaja)

Singh, 1938b; Gupta, 1953;Desikachary, 1959.

Characters

Trichome single or irregularly curved, 5.2-6.3 µ board, end-cell conical with rounded apex; cells barrel - shaped, as long as broad, or slightly shorter or longer than broad, heterocyst's barrel – shaped, rarely spherical,7.3-8.4µ broad and 7.3-10.5µ long; spores ellipsoidal, spore thick, smooth and yellowish brown.

Geographical distribution:

India (Rao,1938).Pakistan

Locality: Palh village in let water sources, fishing spot centre of the lake,Miyani village out let of the lake.

Remarks: It was recorded from oligotrophic lake during summer2013,It occurred high quality in summer season and favorable for its growth.

8. *Anabaenaiyengarii var. tenuis* (Rao,C.B).

Rao.1937; Desikachary, 1959.

Characters

Plant mass floccose, thin, free- floating , pale blue-green; trichomes single, straight or irregularly, curved, 3.5-4.5 µ broad, end cells conical with rounded apices, cells barrel-shaped, as long as broad, or slightly shorter than or long than broad,(2.5)3-6. 4 µ long; heterocyst's more or less barrel- shaped, sometimes spherical, 4.8-6.4 (-8) µ broad and 5.2-9 (-12) µ long; spores ellipsoidal, or cylindrical, with rounded ends, single or in pairs on either side of heterocysts,7.5-9.6 µ rarely 10.5 µ broad and 9-19 µ rarely 21(-24) µ long, with smooth hyaline outer wall.

Geographical distribution:

India, Allahabad (Gupta, 1953).Pakistan.

Locality: Miyani village out let of the Lake.

Remarks: Collections were collected during July and September 2013.Specimens collected during July (Rainy day) was high quantity and obtained during September in low quantity.

9. *Anabaenaaequalis* (Borge)

Borge, 1907; G.W Preacott, 1961.

Characters

Trichomes straight, forming a small plant mass, or scattered among other algae; cells somewhat quadrate or barrel-shaped, (4.5)- 5.5-7.5 µ in diameter, 7.6-8.5 µ long; heterocyst's ovate to sub-cylindrical (5.5)-8 µ in diameter,(10)-13-(15.2) µ long; gonidia cylindrical remote from the heterocyst's, the wall smooth and colorless;5-7.6 µ in diameter (21)-35-41-(49.4) µ long.

Geographical distribution:

India Madras;Malyan lake (Nygaard.G 1926).Pakistan.

Locality: Palh village, in let water from Dadu canal through river Indus.

Remarks: It was reported for the first time from Sindh and it was collected from Palh village, inlet water from Dadu canal through river Indus, due to favorable condition it was found in large quantity.

10. *Anabaenainaequalis* (kuetz. Bornet and Flahault)

Bornet,1888;G.W.Prescott 1961

Characters

Cells broadly barrel-shaped,4-5 µ in diameter, heterocyst's rounded, 6 µ in diameter; akinates single or in group of 2-3, cylindrical, 6-8x14-17µ, smooth, yellow, trichomes straight, parallel , sheath absent or distinct around akinetes, forming blue-green masses.

Geographical distribution:

India; Benaras, Numdur (Rao, 1937, 1938).Pakistan.

Locality: Fishing spot, centre of the lake.

Remarks: The collection has been carried out in fishing spot; centre of the lake, during summer season 2013.It was mixed with other algae and floating free in marginal water.

11. *Anabaena oscillarioides var. angustus* (Bharadwaja).

Bory,1822;Bornet,1888;Forti;1907;Fremy,1929;Geitler,1932,Fremy,1933; Desikachary,1959.

Characters

Trichomes single, irregularly bent or spirally coiled 4.2-5.2 µ broad, end cell rounded; cells barrel-shaped, as long as or slightly shorter or longer than broad, heterocyst's intercalary, very rarely terminal, ellipsoidal, 5.2-6.3 µ broad and 7.3- 10.5 µ long, spores long, cylindrical, single or in short or long chains, on both sides of the heterocyst's, 6.5-8.4 µ board and 14.7-41.0 µ long, epispore smooth yellow brown.

Geographical distribution:

Rain water pools, Borivli near Bombay,(Gonzalves and Joshi,1943a) Royal lakes, Rangoon (Skuja,1949).Pakistan.

Locality: Miyani village out let of lake

Remarks: It has been collected for the first time from Miyani village, out let of lake. It was mixed with *Calothrix, Raviloria* and *Nostoc* in Chickan Lake.

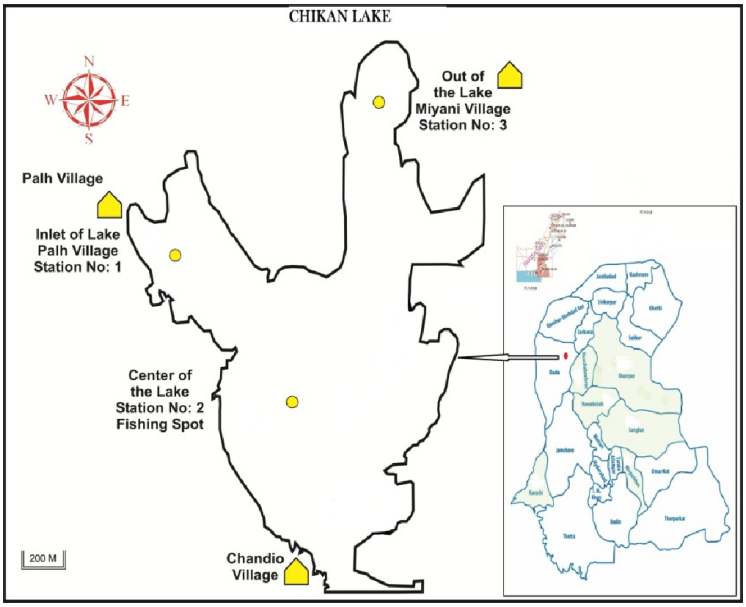

Fig 1. The position of three selected Stations at Chickan Lake.

1, Palh Village2, Fishing Spots 3, Miyani Village

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CAREER DEVELOPMENT PROBLEMATIC OF TEACHERS IN GLOBALIZATION ERA (Survey of Elementary School Teachers in the Region Ministry of Religious City of Jambi)

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ABSTRACT: Career development is a very important thing in doing a series of professional work of a teacher a good career became the benchmark for a teacher to be promoted to higher positions. Causes of teacher career development barriers there are two factors: internal factors and external factors. Internal factors are factors that come from within the teachers themselves are less motivated to take care of his promotion, in addition to the proximity of retirement of a teacher who becomes the cause standstill rank,. External factors are factors outside themselves teachers themselves who received less intensive guidance in preparing and calculating the credit score promotion. So that the teacher asks for help to one of the employees of Religion department to compile and calculate the credit score rank. There has been no significant effort that can be done by the teachers themselves, and the MORA as a builder in the career development of teachers, only to give an explanation to the teachers about the consequences if it does not rank in the care of a teacher at all.

To the ministry of religious affairs greater city of Jambi is expected to provide guidance, and direction specifically about arranging credit score to teachers teaching religion in MI with the status of civil servants as well as can provide easiness for teachers who proposed promotion, reward teachers who made it to the rank or a certain group, or even go straight to the field to observe the career development of teachers and teacher's career delays. As this will provide the stimulus that will also have implications on the creation of professional teachers and responsible. To each teacher of religion, should continue to improve their career to a higher level, although was nearing retirement age.

KEYWORDS: CAREER DEVELOPMENT, TEACHERS, GLOBALIZATION ERA.

INTRODUCTION

Society is a society of the 21st century technology and the science community, it means that society of the 21st century is composed of community members who have the technology, has the knowledge, that still survive in the society. Members of the public may only be prepared to become professional teachers are teachers who can carry or deliver learners entering the world of science and technology. Law of the Republic of Indonesia number 20 year 2003 on National Education System is the legal basis and the implementation of national education reform, as well as national development strategies in the theory of modern education, to achieve quality education, relevant to the needs of the people, and competitive in the global life.

Career development is a very important thing in doing a series of professional work of a teachers, a good career became the benchmark for a teacher to be promoted to higher positions. As the opinion of some experts by Moekijat namely: a. Edwin B Flippo; A career can be defined as a sequence but related work activities that provides continuity, order, and meaning in a person's life, (Career is defined as a series of activities separate jobs but that has to do, which gives continuity, position and significance in the history of one's life). b.Thomas H. Sone; A career is defined as a sequence of positions or jobs held by one person over time. A relatively long, usually ten years or more, (Career is defined as a series of positions or jobs held by a person over a relatively long period of time, usually ten years or more). c.William B, Werther; A career is all the jobs that are held during one's working life (career are all the jobs held by a person during working life).

Hadari Nawawi also expressed some understanding of career development, namely: a. Career development is a sequence (order) position or positions occupied by a person during a particular period of life. b. Career development is the change in

the values, attitudes and motivations that occur in a person, because with the addition / improvement will become more mature age. c. Career development is the work done by the formal and ongoing focus on improvement and the addition of the ability of a worker. There are three phases of career development programs as follows:

1. Phase Planning

This phase is designed to align the activities of workers and organizations regarding the design of career development in his neighborhood. The purpose of this phase is to identify the strengths and weaknesses of workers in carrying out their duties. Therefore, it can be done a variety of efforts to help the workers, aid or business, among others, are:

a) Help choose the path of career development correspond to available. The selection should be based on ability, that for every worker must believe that the ability to actually support to be able to carry out the work effectively and efficient.

b) Improving deficiencies or weaknesses, for workers who demonstrate seriousness and need to realize a successful career.

2. Phase Briefing

This phase is intended to help the workers to be able to realize the plans into reality, by establishing the type of career he wants, and adjust the steps that must be taken to make it happen. In this connection, there are two approaches, namely:

a) Briefing by organizing career consoling

b) Organize information service, which includes the following activities:

(1) Each provision of open jobs. This briefing is done by providing information to all workers, especially regarding career development.

(2) Provide inventory information worker capabilities, and which can be known by each worker.

(3) Information about a career flow chart showing possible directions and opportunities available within the organization. In that connection can even be provided as well as information about career steps that can be achieved, including scheduling a time required for promotion from one level to the next, up to the maximum level in any stream career development, which is designed rationally.

(4) Hold a career development center in the form of a set of materials related to the job, job title, etc. in the form of a workbook, tape recorder, photo copy of the letters are not confidential, various other written materials. By using these materials, workers will get a variety of information that can be used to meet the interests of career development.

3. Development phase

This phase is time limits workers used to meet the requirements that enable it perform motion from a position to another position he wanted. During this phase the worker can perform repair activities and improve the knowledge, skills / expertise and attitude. In this phase employ should strive to realize the creativity and initiative, which can support to enter the position / positions for future activities that can be done include:

a. Openness Implementation Mentor. Mentor system is a way to carry out the development of the relationship between senior workers with junior workers as colleagues (Work friend) or a working spouse. Senior workers act as mentors (mentors) provide exemplary duty, assist and arrange in contacting officials for information, and provide support in general, in an effort to develop career junior workers.

b. Training. Career developments training in order for the workers are very wide-ranging space, not just institutionally organized and formal classroom, laboratory or workshop and others.
In connection with the above concept, the teacher educators and teachers is one of the factors that determine the success of a business education. The teacher is spearheading education, which is a very influential figure on the output quality of education in the birth of qualified human resources. As it was pointed out by Tilaar, bring teacher profiles in 21st century is to have a mature and growing, possessing strong science, have the skills to arouse the interest of participants to science and technology, continuous professional development.

The professional demands of the teachers, the aspect of protection and development of the careers of teachers is a matter that needs to be prioritized in order to reach a balance between competence and performance will ask teacher

compensation and rewards given to them in this regard, the government through policies in education should have a bias against teachers' professional careers.

According to William Glasser and Jihad Hisham, "Any government, system, organization, that does not success in helping the people it serves to increase of the guiltily of their lives until either fail or Be Unable to Compete successfully that one does". Glasser's Proposition implications, ie if the power system is not currently capable of improving the quality of life, education will fail the practical elicits mission for students at various levels. Based on preliminary studies (grand tour) writer on religious ministries City of Jambi found 75% of teachers with the status of the civil religion taught in Elementary School who experience barriers to career level (rank) them. The details of the delay of rank are as varied as the rank group II / d to III /a, III /a to III/ b, III/a to IV /a and to rise to IV/b. If in the future work to connect with each rank there are indications that the delay was promoted to vary between 8 years to 3 years. Delay rank is indicated that there are some teachers are less able to meet the requirements of promotion to the next level. This is caused by the lack of guidance in order to structure credit score. Such conditions cause the enunciator becomes obstructed and career education teacher at the Elementary School. This situation can leave if in a negative influence on the performance of the teacher in the learning process.

Departing from the above conditions, in view of research needs to be done to find solutions to the teachers who have problems in the development of his career, due to issues of career development is very important as the motor in motivating learning performance. Therefore, the question is why the career development of teachers MI Environment of the Ministry of Religious Affairs in the city of Jambi is not optimal?, What are the factors which is the bottleneck and supporting the career development of teachers?, And what efforts will be undertaken to overcome career obstacles teachers MI Elementary in the Environment of the Ministry of Religious Jambi?.

The purpose of this study is to analyze the various barrier factors to develop teacher career, which can affect the performance of teachers. Therefore, this study may provide benefits theoretically and practice. Theoretically can provide scientific information on teacher career development concepts that can conveniently be made in reference to the individual teacher career development. Therefore the focus in this study is about problems in the promotion of teachers or calls the career development of teachers.

RESEARCH METHODS

In this study, researchers used a qualitative-naturalistic approach. Through this qualitative approach, in the hope raised an idea of the quality of the social reality and perception tainted by research goals without formal measurement. Naturalistic approach requires the collection of data on the natural setting. With this concept the researcher to strive for the presence of the researcher does not change the situation or the behavior of the person in care. The method of data collection in the field, namely the method of observation, interview and documentation.

EMPIRICAL AND DISCUSSION

1. Condition Career Development Teachers *Madrasah Ibtida'iyah* (MI)

The starting point in the career development of teachers of religion of the Ministry of Religious Environment City of Jambi, starting from the teachers themselves. This is done from the first time someone appointed as civil servants teacher then placed teaching at Government Elementary School. Therefore, the development of a more or less religious teacher career will have implications for the promotion and performance of teachers in the future.

Professorship is a functional position, which is more career development based on the discipline of work and job performance. As the table hierarchy of office, rank, and class space below:

Table 1. Teacher career Place and Career Teacher Position

No	Teacher Career Place	Career Teacher Position
1	*Guru Pertama*	*Pengatur Muda.II/a*
2	*Guru Pertama Tingkat I*	*Pengatur Muda Tingkat I,II/b*
3	*Guru Muda*	*Pengatur, II/c*
4	*Guru Muda Tingkat I*	*Pengatur Tingkat I, II/d*
5	*Guru Madya*	*Pengatur Muda, III/a*
6	*Guru Madya Tingkat I*	*Penata Muda Tingkat I, III/b*
7	*Guru Dewasa*	*Penata, III/c*
8	*Guru Dewasa Tingkat I*	*Penata Tingkat I, III/d*
9	*Guru Pembina*	*Pembina, IV/a*
10	*Guru Pembina Tingkat I*	*Pembina Tingkat I, IV/b*
11	*Guru Utama Muda*	*Pembina Utama Muda, IV/c*
12	*Guru Utama Madya*	*Pembina Utama Madya, IV/d*
13	*Guru Utama*	*Pembina Utama, IV/e*

The table above, describe the career path that should be followed as teacher professional workers. Therefore, every teacher career ladder to fulfill the number of different credit score. The data collected from the office of the Ministry of Religious City of Jambi showed that the majority of teachers who have been hampered his career at the rank of class II/d as many as 3 people, class rank III/3 as much as a person, class rank III/b by 5 people, and group III/d by 5 people, class rank IV/A 1, other than that indicated that 67 people do not experience barriers to his promotion. For a teacher basically has the right to move up to class IV/c, but the reality shows that the teachers in this research environment can only move up to class IV/a. In this condition, as it is recognized that the difficulty for teachers to move up from class IV /a-b is in because of the obligation to make a scientific paper and should be published in the accreditation journal. Case promotion is not only experienced by teachers of religion MI alone but also experienced by teachers who teach in other places, namely elementary (MI), junior high school (MTs) and Senior high school (MA).

Throughout the study, there was only one teacher who teaches religion at Government Elementary School in City of Jambi Religion Environment ministry that rank until IV/a, but who came to the class III/d was only 5 teachers of religion. This is not apart of a religious teacher difficult to gather credit points for promotion, as the table cumulative number of credit points for the appointment and promotion / teacher career position following:

Table 2. Cumulative Number Of Credit Points For The Appointment And Promotion /Teacher Career Position

No	Element point	%	Position, Group Space and credit score												
			II/a	II/b	II/c	II/d	III/a	III/b	III/c	III/d	IV/a	IV/b	IV/c	IV/d	IV/e
1	The main element a. education b. Learning/ Tutoring c. Professional Development	80	20	32	48	64	80	120	150	240	320	428	536	644	752
2	Supporting Units	20	5	8	12	16	20	30	40	60	80	110	140	170	200
	Total	100	25	40	60	80	100	150	200	300	400	550	700	850	1000

Table 2 above a portrait of the total number of credits that will be met by teachers as promotion requirements. If the look on the face of the career development of teachers MI looks forward, it is indicated by rank or class that has been achieved in general is in group III/d and III/b. However, if in reference to the decree of appointment of each new, only about 75% done, but in the future career development effort these teachers look so enthusiastic and motivated to take care of rank. There are two factors which is the bottleneck in efforts to meet the specified number of credits such that the internal factors and external factors, as follows: Internal factors are factors that come from within the teachers themselves are less motivated to prepare the terms of the promotion or in the call loan rate. This was revealed by one of the teachers of religion who has rank III/d want to be promoted to the VII/a in which the number of credits that will be met, namely approximately 400 cumulative number of credits in the capture of the elements of education, teaching, professional development, as well as elements

supporting. Another opinion was also expressed by one of the teachers of religion who has rank III/b would rise to the rank III/c, expressed in rank barriers caused it difficult to arrange the loan rate, the problem is one of the teaching hours of teaching a little bit, but it is difficult to field support in the search, because the MI where students teach a little and not a lot of activity.

External factors are factors that come from outside the teacher's own self as the distance existing rank with tenure was nearing retirement. Therefore, teachers are not motivated to take care of his promotion, especially the requirements that will be fulfilled very much in accordance with the rules that have been set by the Ministry of Religious Affairs. Researchers also found no coaching training undertaken by teachers of religion to be one factor ignorance of religious teachers to calculate credit score rise in rank. Therefore, the teachers trust the religious ministry staff to calculate the credit score at the same time prepares religious teachers ranks of someone who wants to be promoted.

Based on the factors mentioned above can be concluded that the internal and external factors are very negative influence to the religious teacher Elementary School in career development from a low to a higher level. But in this case the researchers also found a contributing factor of a teacher to be motivated in the development of his career or take care of that hike be promoted to a teacher and school principal in promotion to become a supervisor and in the place of another move, what if the teacher found a career not develop. It is precisely to smooth teacher career development can increase the compensation of any rank, career ladder or ladder. As pointed out by Werther and Davis, explained that the compensation is Compensation is what resolved employee in exchange of their work, holy Whether wages or salaries periodically, the personnel department designs and administers employee usually compensation. It is intended that any compensation that a worker received in reply that it provides jobs, both hourly wage and salary and managed by the personnel. Edwin B. Flippo, explaining wages is defined as the adequate and equitable remuneration of personnel for their contribution to organizational objectives. Meant that the wage is defined as a fair remuneration and decent given to workers for services in achieving organizational goals.

Hasibuan, compensation is all the income in the form of money, goods directly or indirectly received by the employee in exchange for services rendered to the company. Another opinion expressed by Simamora, compensation contains a broader scope than just wages and salaries. More emphasis on the concept of wage remuneration is more financially while compensation includes fringe benefits are financial and non-financial. Compensation can be divided into two namely; (1) Direct compensation (direct compensation) in the form of salaries, wages, and wage incentive, (2) indirect compensation (indirect compensation or employee) or the well-being of employees.

According Hadari Nawawi, Compensation is an award / reward to workers who have contributed in realizing its objectives, through the so-called work. The types of compensation as follows: 1. Direct Compensation, Direct compensation is an award/reward called salary or wages, which are paid regularly by fixed time. In line with the wage or salary workers earned cash for the implementation of the work. Wages also interpreted as the price for the services that have been given by one person to another. 2. Indirect Compensation, Indirect Compensation is giving the profits/other benefits for workers beyond salary or wages, may be money or goods example THR, Benefits highway, and others. 3. Incentive, Incentives are awards / rewards given to motivate workers to higher work productivity, is not permanent, or at any time. Therefore, as part of a profit incentive, particularly given the workers who worked in good or outstanding, for example, in the form of bonuses.

In addition, incentives can also be provided in the form of goods. In its manifestations can be distinguished between total compensation and compensation Special namely: a. Total Compensation, This is the overall compensation awards/rewards received by a worker for all the work he did as a contribution to the achievement of organizational goals. Components consist of three types of compensation mentioned above, the salary/wages, some types of indirect compensation and incentives, b. Special Compensation, this compensation is called the supplemental income also awards/rewards given to workers with a certain status in the organization. Compensation is usually provided specifically for top-level managers. The shape which include vehicles, parking, payment association members for executive meetings and sports and others.

According Hasibaun, Destination compensation (fringe benefits), among others, is a collaboration ties, job satisfaction, effective procurement, motivation, employee stability, discipline, as well as the influence of trade unions and the government. Salary is the remuneration paid to employees periodically fixed and have a definite guarantee. That is, the salary will still be paid even if the worker is absent from work. Wage is remuneration paid to day laborers by referring to the above agreement agreed to pay him. While wages are incentive additional remuneration granted to certain employees whose performance on a standardized achievement Benefit and services are supplemental compensation (financial or non-financial) discretion given to all employees in an effort to improve their welfare. Such as holiday allowance, pension, uniforms, prayer rooms, sports, and excursions. Based on the above description it can be concluded that the compensation is

a remuneration received by the worker for the work he has done, whether it is compensation in the form of direct or indirect compensation such as money, health allowance, holiday allowance food allowance, leave, and other -other. Compensation dimensions, namely; (1) direct compensation, and (2) indirect compensation. As for the indicators in the form; receiving salaries, honoraria and incentives received, receiving excess money teaching, receive transport, receive, and social, educators receive professional allowance, holiday allowance receive, hold a comparative study, following the field trip activities, and relationship, receive health insurance, enter the *Taspen* receive uniforms, have the ease of lending cooperative, providing a means of worship, got off easily.

1. Efforts to do in overcoming barriers to career teachers MI.

Talk about efforts in addressing barriers to career teachers of religion in today's era of globalization, in a world of teacher education becomes a very high priority by the government need to be considered as a builder and supervisor of teachers, as a teacher career ladder positions that must be achieved by a teacher as professional worker. In accordance with Law No. 14 of 2005 on teachers and lecturers, teachers in the compulsory professional competence and skills in science and technology (IT). Teachers who indicated a good performance can be promoted to positions such as principals, school supervisors. Therefore, teachers need to have a sense of responsibility, skill and ability to carry out the obligations and work well and efficiently. To obtain such teachers, in need of the existence of a provision regulating the status, obligations, rights and coaching teachers carried on by a teacher the system objective, namely the career system and job performance.

The position of a teacher is generally specified in the decree the organization of office or position, as well as the rate and the prevailing wage system for him. While the obligations and rights of teachers are two things that arise because of the position and both must be balanced, one should not take precedence over the others. The obligation of a teacher in general includes the elements of fidelity, performance, responsibility, obedience, honesty, cooperation and obligations have been performed as well as possible by a teacher are the primary consideration for the teacher to gain an appreciation of the leadership organizations which include the promotion of development without prejudice to the provisions of existing formations. While displacement is a principle in the application of the career system work, removal is an unavoidable step because without displacement means one career coaching efforts of teachers that can be done. Therefore, according to the observations of researchers have not found significant efforts made by the teachers themselves and will be undertaken by the government to overcome the barriers of religion teacher career.

Based on information and data obtained through observation research shows that not much effort is made both for itself and for the teachers. The efforts made by MORA, especially the head of affairs personnel who deal with the promotion of religious teachers just by calling the MI teacher who hampered his career, while giving an explanation due, if teachers are not willing to take care of MI promoted them to the front. But training specifically on counting the number of credits the teacher promotion, has not seen done by the Ministry of Religious Affairs of the City of Jambi. As the statement of one of the teachers of religion, which in this case is hampered his promotion of III/d to IV/a, explain: For now generally not much effort will be undertaken by the Ministry of Religious affairs personnel Region City of Jambi, in overcoming barriers to career or MI teacher dub delay. For problems promotion or career development is highly dependent on the teacher's own self teachers to collect approximately 300 credit number consisting of the main elements and supporting elements. The main element is part of education, learning or guidance and professional development. While the supporting elements that support learning. Another opinion was also pointed out by one of the teachers who have the rank MI IV/a to IV/b, explaining: attempts to be promoted from IV/a to IV/b, it is difficult to do. The total number of credits is pretty much 400. Portions were very difficult to achieve, namely the writing of scientific papers and published to be seminar. Meanwhile, to make the scientific work that hard for me who was nearing retirement age. While specific training in writing scientific papers, I have never followed. Thus, I lack a lot of effort in doing, just let go and feel pretty rank on IV/a only.

The next statement is also presented by one of the teachers who experience barriers MI his promotion from III/C to III/d. For now I continue to attempt to collect the amount of the credit figures, to be promoted to III/c, although not as fast as other teachers. Another effort that is coordinated with the head of the Ministry of Religious Jambi City Region and with other teachers who not hampered in his promotion. Because for now in the age of globalization a teacher also in demand has skill about information technology (IT), while I am the one who stutters with IT. The statement above, reinforced by one of the teachers who was also hampered the career of the III/a to III/b, very aware of his promotion for the delay. But I am still trying to gather the number of credits in accordance with the conditions set by MORA. The problem is an important advancement in the career path as a teacher. However, the credit number gathering experience into trouble, because the number of credits that are collected quite a lot less than 100 credit points consisting of main points and supporting elements.

In accordance with the concept of career coaching that has been set in the handbook credit scoring promotion of teachers, should the Head of the Ministry of Religious Affairs of the City of Jambi to guide the conduct of religious teachers with approaches that can motivate teachers to overcome problems of MI in the process of his promotion. Coaching and

supervision in accordance with the procedures carried out during this enacted. In addition, the data obtained from the application of information for teachers credit score can be made as inputs for decision-making to solve problems and overcome difficulties, obstacles and weaknesses of the case. Era of reform is a process to improve, repair, alter the knowledge, skills and attitudes code of conduct a person or group of persons in the intellectual efforts of human life through guidance and training activities of which there are nine changes that need to be done on the teachers themselves in this era of globalization in order to improving human resources, namely commitment, discipline, science technology (IT), responsibility for the given task, loyalty, ideals, honesty, welfare, and *akhlakulkarimah*. This process shows the activity in the form of action where there is an active and dynamic interaction done consciously in order to achieve the desired goal. Achievement of the set objectives is one measure of individual performance. As pointed out Rival and Basri saw performance can be done by taking into account factors such as achievement; 1) Quality of work (accuracy, skill, thoroughness, neatness), 2) the quantity of labor (the breadth of the task, the speed of completing the task), 3) toughness (follow orders, safety, initiative, punctuality, attendance), 4) attitude (towards change , cooperation). While Manullang provides a measure of performance such as 1) quality, 2) capability, 3) the quantity of labor, 4) knowledge about the task, 5) cooperation, 6) initiative 7), adaptability, 8) presence, 9) planning and organizing.

CONCLUSION

Causes of teacher career development barriers there are two factors: internal factors and external factors. Internal factors are factors that come from within the teachers themselves are less motivated to take care of his promotion, in addition to the proximity of retirement of a teacher who becomes the cause standstill rank,. External factors are factors outside themselves teachers themselves who received less intensive guidance in preparing and calculating the credit score promotion. So that the teacher asks for help to one of the employees of Religion department to compile and calculate the credit score rank. There has been no significant effort that can be done by the teachers themselves, and the MORA as a builder in the career development of teachers, only to give an explanation to the teachers about the consequences if it does not rank in the care of a teacher at all.

RECOMMENDATIONS

To the Ministry of Religious Affairs Greater City of Jambi is expected to provide guidance, and direction specifically about arranging credit score to teachers teaching religion in MI with the status of civil servants as well as can provide easiness for teachers who proposed promotion, reward teachers who made it to the rank or a certain group, or even go straight to the field to observe the career development of teachers and teacher's career delays. As this will provide the stimulus that will also have implications on the creation of professional teachers and responsible. To each teacher of religion, should continue to improve their career to a higher level, although was nearing retirement age.

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Phytochemical Constituents and Physicochemical Properties of Medicinal Plant (*Moringa Oleifera*) Around Bule Hora

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ABSTRACT: The investigation was carried out a qualitative test for the possible phytochemical components (Alkaloids, Phenolic compound, Quinone, Protein, Anthraquinones, Saponins, Coumarin, Flavonoids, Tannin Fixed oil and fats and Steroid-glycosides) and quantitative analysis for some selected physicochemical properties after extracting the sample using soxhlet extraction by using ethanol and methanol as extractants. And Phenolic compound, Tannins, flavonoid and Steroid-glycosides are intensively found in the plant but Anthraquinones, protein and fixed oil and fat were not found even in a minimum amount. The medicinal use of Moring is results from the presence of some active phytochemical constituents.
Lastly the physic-chemical properties value is investigated as follow: Moisture content 0.032% Total ash value 96 % Saponification value 37.4, Refractive index for Ethanol and methanol extract are 17,7 , Acid value 3.94 and the extract is Insoluble in chloroform but highly soluble in Ethanol, Diethyl ether and Water.

KEYWORDS: Moringa oleifera, physicochemical properties, phytochemical sceerining and soxhlet extraction.

1 INTRODUCTION

In India and other countries of the world, phytomedicines have been used since time immemorial to treat various ailments long before the introduction of modern medicine. Herbal medicines are still widely used in many parts of the world especially in areas where people do not have access to modern medicines [1, 2]. Moreover in most Asian countries where herbal medicines are still heavily relied upon because of high cost of chemotherapeutic drugs, there is a need for scientific research to determine the biological activities of medicinal plants. The findings obtained from such research may lead to the validation of traditionally used medicinally important plants and enable full usage of the properties of these plants [3].

Moringa oleifera is one of the best known, widely distributed and grown species of a monogeneric family Moringaceae [4]. It is a drought-tolerant plant that thrives best under the tropical climate and tolerates different soil types [5]. The plant is highly valued since almost every part of the plant (leaves, roots, barks, fruits, flowers etc.) is used as food with high nutritional value [4, 6]. In addition the plant has been reported to possess antibacterial properties and this explains the reasons for its wide use in the treatment of human diseases [4, 7]. *Moringa oleifera* is used as drug by many ayurvedic practitioners for the treatment of asthma and the antihelminthic activity of the methanol extract of *Moringa oleifera* was also noted [8]. Various parts of the plants such as leaves , roots, seeds, barks, fruits, flowers and immature pods act as cardiac and circulatory stimulants, possess antipyretic, antiepileptic, anti-inflammatory and antiulcer [9]. Other important properties of the plant include antispasmodic [10], diuretic [11], antihypertensive[12], cholesterol lowering[13], antioxidant, ant-diabetic, hepatoprotective [14], antibacterial and antifungal activities[15].

Moringa oleifera are contains more than 92 nutrients & 46 types of antioxidants. Moringa is said to cure about three hundred diseases and almost have all the vitamins found in fruits & vegetable even in larger proportions. [16]. Moringa has vitamin A (Beta carotene), vitamin B_1 (Thiamine), vitamin B_2 (Riboflavin), vitamin B_3 (Niacin), Vitamin B_6 (Phyrodixine), vitamin B_7 (Biotin), vitamin C (Ascrobic ucids), vitamin D (Cholecalciferol), vitamin E (Tocopherol) and vitamin K [16].

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Phytochemicals are chemical compounds that are naturally found in plant. They are responsible for the color and organoleptic properties of the plant [17]. It is also referred to as those chemicals that may have biological significance but are not established as essential nutrients in plant. Phytochemicals could be available as a dietary supplement, but the potential health benefits of phytochemicals are derived from consumption of the whole plant [18].

Although many works are done by different scholars on metal analysis in Moringa no research has done on phytochemical constituents and physicochemical properties of Moringa oleifera in Ethiopia.

The objectives of this study were

- To investigate chemical composition and physicochemical properties of the crude extract of Moringa Oleifera.
- To conduct preliminary phytochemical screening on Moringa crude extract
- To extract the leaf by soxhlet extraction
- To study physicochemical properties of crude extract.

2 LITERATURE REVIEW

2.1 MEDICINAL PLANTS

Medical plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavondoids, and phenolic compounds [19]. Many of these indigenous medicinal plants are used as spices and food plants. They are also sometimes added to foods meant for pregnant and nursing mothers for medicinal purposes [20,21]. Traditional knowledge of medicinal plants has always guided the search for new-cures. In spite of the advent of modern high through out drug discovery and screening techniques. Traditional knowledge systems have given clues to the discovery of valuable drugs [22].

Traditional medicinal plants are often cheaper, locally available and easily consumable, raw or as simple medicinal practices form an integral part of complementary or alternative medicines. Although their efficacy and mechanism of action have not been tested scientifically in most cases, these simple medicinal preparations often mediate beneficial responses due to their active chemical constituents [23].

Traditional medicines are used by about 60 per cent of the world population. The nursery for the introduction of food, crop and medicinal plants was created in 1823. And before the introduction of chemical medicines, man relied the healing properties of medicinal plants. Medicinal plants have been indentified and used through out human history in this case medicinal plants are of great importance to the health of individuals and communities [24].

The importance of medicinal plants, are extremely useful for us on the one hand they provide us with the oxygen we need to be able to breathe for edible landscaping, a moringa tree is hard to beat. Moringa plants produce special substances in their roots, leaves, flowers or seeds that help them to survive and healing with medicinal plants old as mankind itself.

Moringa oleifera is considered to be effective in the treatment of many diseases [25]. It is an exceptionally nutritious vegetable tree with a variety of potential uses. The tree itself is rather slender, with dropping branches. It is often cut back annually to one meter or less and allowed to re-grow so that its pods and leaves remain within arm's reach.

Moringa tree is mainly grown in the semi-arid tropical and sub-tropical areas. It grows best in dry sandy soil and can tolerate any other type of soil. It is a fast growing drought resistant tree that is native to the Southern foothills of Himalayans in Northern India. It is considered as one of the world's most useful tree, as almost every part of the plant could be used for food or has some other beneficial properties [26]. In the tropics, it is used as forage for livestock and in many countries as vegetables that has the potential to improve nutrition, boost food security, foster rural development and support sustainable land care.

2.2 MORINGA AND IT'S MEDICINAL USAGE

Moringa medicinal plants are used in the treatment of AIDS, high blood pressure, anemia and etc. The history of medicinal plants can trace it self back 4,000 years ago and an attempt to review the prevalence of medicinal herb use in different societies and the various line. The Global and national markets for medicinal herbs have been growing rapidly and significant economic gains. Medical plants have been used from ancient times to attempt cures for diseases and to relive physical suffering and healing with medicinal plants old as man kind it self.

Amorphophallus paeoniifolius is used long period in various chronic diseases therapeutically and these practices also play an important role in protection natural resources of medicinal plants for systainable use. Moringa is a genus of the tropical flowering plant family moringaceae containing 13 diverses species [24]. Crushed seeds of the moringa oleifera tree have been used traditionally as natural flocculant to clarify [28].

Free radicals, produced as a result of normal biochemical reactions in the body, are implicated in contributing to cancer, atherosclerosis, aging, immunosuppression, inflammation, ischemic heart diseases, diabetes, hair loss and neurodegenerative disorders such as Alzheimer's disease and parkinson's disease ([28,29,30].

The human body possesses innate defence mechanisms to counter free radicals in the form of enzymes such as superoxides dismutate, catalose, and glutathione peroxidase. Vitamin C, vitamin E, selenium, B – carotene, lycopene, lutein and other carotenoids have been used as supplementary antioxidants. A part from these, plant secondary metabolites such as flavonoids and terpeniods play important role in the defence against free radical [23,31,32]. Medicinal plants parts are commonly rich in phenolic compounds such as flavonoids, stillbenes, tannis, coumarins, lignans and lignins [33,34]. There have been several studies on the antioxidant activities of various herbs/ plants with medicinal values.

Phytochemicals in fruits, vegetable, spices and traditional gerbul medicinal plants have been found to play protective role against many human chronic diseases including cancer and cardio vascular disease (CVD). Phytocomponents including phenolics, flavonoids, tannis proanthocyanidins and various plants or herbal extracts have been reported to be radical scavengers and inhibitors of lipid peroxidation [35].

When Phytochemicals compounds react with a free radical, it is the delocalization of the guined electron over the phenolic antioxidant and the aromatic nucleus that prevents the continuation of the free radical chain reaction. This is often called "Radical scavenging". But polyphenolic compounds inhibit oxidation through a variety of mechanisms [36].

The plant possesses valuable medicinal properties but most of the advantages are still confined to tribal areas because of raw knowledge and absence of proper scientific standardization. For the useful application of the plant parts in modern medicine, Physico-chemical and phytochemical standardization is very important [37]. So that the medical benefits of the plant may be used properly and scientifically and reach to the larger populations to the world. Therefore, in the present research work was to evaluate the physicochemical parameters and phytochemical constituents of the whole plant of moringa oleifera.

Medicinal plants have been a major source of treatment for human diseases since time immemorial. One fourth of the world population i.e. 1.42 billion people are dependent on traditional medicines, particularly plant drug for curing aliments [38]. Herbal medicines are promising choice over modern synthetic drugs. They show minimum/ no side effects and are considered to be safe. Generally herbal formulations involve the use of fresh or dried plant parts. Correct knowledge of such crude drugs is very important aspect in preparation, safety and efficacy of the herbal product. The process of standardization can be achieved by stepwise pharamacognostic studies [39].

2.3 VITAMIN COMPONENT OF MORINGA OLEIFERA

Moringa aleifera: contains more than 92 nutrients and 46 types of antioxidants. moringa is said cure about three hundred diseases and almost have all the vitamins found in fruits and vegetables. Vitamins that are found in moringa are, vitamin A (Beta carotene), vitamin B_1 (thiamine), vitamin B_2 (Riboflavin), vitamin B_3 (Naiacin), Vitamin B_6 (pyrodixine), vitamin B_7 (Biotin), vitamin C (ascorbic acids), vitamin D (cholecalciferol), vitamin E (tocopherol) and vitamin K [16] **.** With all the health benefits of this miracle herb, it can easily be termed as the most nutritious herb on earth. There are no side effects which also has tried, tested documented and proved evidence to support the same. It can be consumed by small children and adults. Today, millions world over have started using Moringa based products in porridge, pastas, bread and to reap the everlasting health benefits of the extraordinary "Moringa" herb [15]. Moringa leaves contain all the essential amino acids to build strong healthy bodies. Example of some few nutritional value of Moringa: 2 times – the protein of yogurt ,3 times – the potassium of Bananas ,4 times – the calcium of milk ,4 times – the vitamin A of carrots and 7 times of – the vitamin C of oranges.

2.4 PHYTOCHEMICAL CONSTITUENTS AND THEIR SPECIFIC ADVANTAGE

Tannins are a group of polymeric phenolic compounds and cause local tumours [40]. They are able to inactivate and kill microorganisms. They used in the treatment of varicose ulcers, hemorrhoids, minor burns, frostbite as well as inflummantation of gums, in recent years, these compounds have demonstrated their antiviral diseases including AIDS [41].

Flavonoids are strong antioxidants and are effective antibacterial substances *in vitro* against a large number of microorganisms by inhibition of the membrane-bound enzymes [41]. They also showed substantial anticarcinogenic and antimutagenic activities due to their antioxidant and anti-inflammatory properties [42,43] and also they are an important class of natural products, are the main bioactive constituents of a lot of medicinal or dietary plants, they have been reported to show extensive benefits to human health, including antioxidant, anti-inflammatory, and anti-cancer activities in most cases, Flavonoids are present in plants as a series of analogues with similar structures and physicochemical properties.

Coumarins: is a fragrant organic chemical compound in the benzopyrone chemical class, which is a colorless crystalline substance in its standard state. It is a natural substance found in many plants. These derivatives are found in antibiotic, anti-mitotic, immunomodulating, antiviral, anticancer, anti-inflammatory, anti-coagulant, anti-fungulant, antifungal, antioxidant and cytotoxic agents, as well as some biological assays.

Alkaloids are group of naturally occurring chemical compounds that contain mostly basic nitrogen atoms. This group also includes some related compounds with neutral and even weakly acidic properties. Some synthetic compounds of similar structure are also attributed to alkaloids. In addition to carbon, hydrogen and nitrogen, alkaloids may also contain oxygen, sulfur and more rarely other elements such as chlorine, bromine, and phosphorus. The boundary between alkaloids and other nitrogen-containing natural compounds is not clear-cut. Compounds like amino acid peptides, proteins, nucleotides, nucleic acid, amines, and antibiotics are usually not called alkaloids. Natural compounds containing nitrogen in the exocyclic position (mescaline,serotonin, dopamine, etc.) are usually attributed to amines rather than alkaloids. Some authors, however, consider alkaloids a special case of amines. [44].

The leaves of *M. oleifera* contain alkaloids, which showed potential antimicrobial properties by intercalating with bacterial DNA such as nicotine, are used in pesticides and others are used as chemicals reagents. The primary use of alkaloids, however, is in medicine, because they can act quickly on specific are as of the nervous system, strychnine, used in small does as a stimulant and a tonic, is highly poisonous. Alkaloids have also pharmacological effects and are used as local anesthetic and stimulants. Cocaine, caffeine, nicotine, the analgesic morphine , the anti-bacterial berberine and antimalarial drug quinine are all Alkaloids [44].

Quinine, is a natural white crystalline alkaloid having antipyretic (fever reducing), analgesic (painkilling), and anti-inflammatory properties and a bitter taste used in treating malaria, can cause dizziness if taken in large doses. Morphine and cocaine are among the most effective drugs known for temporarily relieving pain with out causing is their use is continued. And advantage over previous reaction detection methods for quinines is the simplicity of this system. No pot column reagent addition pumps are required. Additionally, the reaction is accomplished in a very short reactor which minimizes band broadening and analysis time.

Steroids are drugs that are structurally related to the cyclic steroid ring system and have similar effects to testosterone in the body. They increase protein within cells, especially in skeletal muscles. Anabolic steroids also have androgenic and virilizing properties, including the development and maintenance of masculine characteristics such as the growth of the vocal cords, testicles (primary sexual characteristics) and body hair (secondary sexual characteristics) [46].

Phenolic unit can be found dimerized or further polymerized, creating a new class of polyphenol, for example, ellagic acid is a dimer of gallic acid and forms the class of ellagitannins, or a catechin and a gallocatechin can combine to form the red compound the a flavin, a process that also results in the large class of brown thearubigins in tea.

Saponins : Any of a class of glycosides, found widely in plants, that have detergent properties and form a lather when shaken with water. which are stable both in alkaline and acidic media. Color reaction can be used to characterize saponins (and sapogenins) in order to verify the identity of drugs. Possess antioxidant, anti-inflammatory, antiapoptosis and immunostimulant properties which were found in *M. oleifera* [47].

Anthraquinones are a group of naturally occurring phenolic compounds and are present in *M. oleifera* leaves which showed laxative properties.

Terpenoids and steroids were detected in *M. oleifera* which were reported tom be active against *Staphylococcus aureus* [41]. These compounds also have anticarcinogenic properties [45].

3 MATERIALS AND METHODS

This chapter starts by presenting and discussing about the study area, experimental site and sampling procedure. It also goes through the detailed methodology followed in the experiment such as experimental procedure, materials and reagents used and method of data analysis. Finally, it winds up by specifying the analytical method, and software used.

3.1 CHEMICALS AND REAGENTS

Analytical grade reagents; Acetic acid, ethanol, ammonium hydroxide, $FeCl_3$, HCl, potassium ferrocyanide, aqueous ethanol, diethyl ether, aqueous sodium chloride, aqueous methanol, acetic anhydride, ethanolic acid, H_2SO_4, chloroform, concentrated H_2SO_4, glacial acetic acid, ferric chloride, and aqueous hydrochloric acid, potassium hydroxide, HNO_3, Phenophthalein, mayer's reagent (potassium mercuric Iodide), and sodum hydroxide.

3.2 EXPERIMENTAL SITE

Moringa oleifera sample was collected from Bule Hora which is located in Oromia National Regional state 467 km far from Addis Ababa to the south. And also 100 km far from north of yabello, the Administrative city of Borana zone with latitudes 5^0 $26^{'}$ and 5^0 $50^{'}$ North and longitudes $37^0 56^{'}$ and $38^0 31^{'}$.

3.3 EQUIPMENTS AND APPARATUS

The following apparatus were used in the study: Beaker, plastic bottle, volumetric flask, test tube, conical flask, separatory funnel, oven, whatman filter paper No 42 (125mm), soxhlet extractor, electronic balance, P^H meter, burette, metal stand, pipette, measuring cylinder, condenser, magnetic stirrer, hot plate, moisture disc, crucible, muffle furnace (Nabertherm), mortar and pestle.

3.4 SAMPLE COLLECTION AND PREPARATION

Plant was collected, washed and dried. Then it was grounded using mortar and pestle to fine powder and passed through a 24-mesh sieve and the extract is weighted and stored at room temperature.

3.5 PREPARATION OF EXTRACTS

Dried powder of different plant parts was continuously refluxed with methanol and ethanol separately at 40-80^0C for 3 h using soxhlet apparatus. The solvent extract was then stored in air-tight containers at 4^0C for further use.

3.6 PHYSICOCHEMICAL PROPERTIES INVESTIGATIONS

Whole plant powder of moringa oleifera were subjected for determination of physicochemical parameters such as loss an drying, ash values, P^H value in 1% and 10 % solution, ethanol and methanol extractive values were carried out according to the methods recommended by the world health organization [48].

3.6.1 DETERMINATION OF PH RANGE

The P^H of different formulations in 1% w/v (1g; 100 ml) and 10 % w/v (10 g; 100ml) of water soluble portions of whole plant powder of Moringa oleifera were determined using standard simple glass electrode PH meter [49].

3.6.2 DETERMINATION OF MOISTURE CONTENT

This step was done by placing about 1.0 g of whole plant powder of the moringa oleifera, in an accurately weighed moisture disc (Electranic measurement scale- mettler Toledo). For estimation of loss on drying, it was dried at 105 ^{0}C for 3 hour in an oven, cooled in a desicator for 30 minutes and weighed with out delay. The loss of weight was calculated as the content of in percent of air-dried material.

3.6.3 SOLUBILITY

Solubility of the extract was checked by simply by dissolving the sample in water, chloroform, ethanol & Diethyl ethyl ether.

3.6.4 DETERMINATION OF REFRACTIVE INDEX

Refractive index was measured by using Refractometer.

3.6.5 DETERMINATION OF TOTAL ASH

2 grams of the whole plant powder of the moringa oleifera, was placed in a previously ignited (350 ^{0}C for 1 hour) and tarred crucible accurately weighed. Dried material was spread in an even layer in the crucible and the material ignited by gradually increasing the heat to 550 ^{0}C for 5 hours in a maffle furnace (Naber them) until it is white, indicating the absence of carbon. Cooled in a desiccator and weighed. Total ash content was calculated in mg per g of air-dried material.

3.6.6 DETERMINATION OF SAPONIFIVATION VALUE

Saponification value was determined by mixing 1.5 g sample with 25 ml of 0.1 N ethanoic acid and KOH by gently stiring and then 3 drop of phenolphthalein indicator was added. And Titration 0.5M HCl was continued until pink color is disapperared.

Saponification value = 56.1 x N (V_b-V_a) /M

Where, N= normality of HCl soln., vb = volume of HCl soln. used in blank, va = volume of HCl used in sample, M= mass of the oil used.

3.6.7 DETERMINATION OF ACID VALUE

Take 25 ml of diethyl ether or 25 ml of ethanol and add 3 drop of phenolphthalein then Titrated with 0.1 N KOH (end point dark pink color) volume of 0.1 N KOH will be noted

Acid value = 56.1xNxV/M

Where N= normality of KOH, M = mass of the oil used v= volume of 0.1 N KOH used for titration.

3.7 PRELIMINARY PHYTOCHEMICAL SCREENING

The analysis of phytochemicals from the solvent free extract of *Moringa oleifera* was individually performed using different qualitative tests for alkaloids, flavonoids, saponins, tannins, sterodglycosides, phenolic compound, coumarins, protein, anthraquinones, quinines, fixed oil & fats.

3.7.1 DETERMINATION OF PHENOLIC COMPOUNDS

Three drops of 1% ferric chloride ($FeCl_3$) solution were added in to 2 ml portions of each extract. The appearance of deep violet color with ferric ions indicates the presence of Phenolic compounds.

3.7.2 DETERMINATION COUMARINS

Coumarins form a yellow color with 1 % KOH in absolute ethanol. 1 ml of portions of 1% solutions of each in test tubes was treated with 3-4 drops of 1% KOH in absolute ethanol.

3.7.3 DETERMINATION OF ALKALOIDS

Mayer's test: 1 ml portions of each extracts was acidified with 3 drops of 1M Hydrochloric acid and treated with 5 drops of Mayer's regent (potassium mercuric Iodide) formation of a yellow or white colored precipitate or turbidity indicated the presence of Alkaloids.

3.7.4 DETECTION OF QUININES

To the test sample, sodium hydroxide is added. Formation of blue, green or red color indicates the presence of quinines.

3.7.5 DETECTION OF PROTEIN

Xanthoproteic Test-the extracts were treated with few drops of conc. Nitric acid. Formation of yellow color indicates the presence of proteins.

3.7.6 DETECTION OF ANTHRAQUINONE

For examining the Anthraquinone derivatives prepare a specimen in potassium hydroxide solution, Anthraquinone give blood red color.

3.7.7 DETECTION SAPONINS

Foam Test: 0.5g of extract was shaken with 2 ml of water. If foam produced persists for ten minutes it indicates the presence of saponins.

3.7.8 DETECTION OF FIXED OILS AND FATS

Spot Test: A drop of concentrated extract was pressed in between two filter papers and kept undisturbed. Oil stain on the paper indicates the presence of oils and fats.

3.7.9 TEST FOR STEROIDS

Two ml of acetic anhydride was added to 0.5 g ethanolic extract of each sample with 2 ml H_2SO_4. The colour changed from violet to blue or green in some samples indicating the presence of steroids.

3.7.10 TEST FOR FLAVONOIDS

To 1 ml of the extract, a few drops of dilute sodium hydroxide were added. An intense yellow colour was produced in the plant extract, which become colourless on addition of a few drops of dilute acid indicates the presence of flavonoids.

3.7.11 DETERMINATION OF TANNINS

Ferric chloride Test-A small quantity of the extract was boiled with water and filtered. Two drops of ferric chloride was added to the filtrate, formation of a blue- black, or green blackish color in the presence of ferric chloride precipitate was taken as evidence for the presence of tannins.

4 RESULT AND DISCUSION

The average physicochemical parameters of the whole plant of moringa oleifera course powder are tabulated as table No.1 and the preliminary phytochemical screening for various functions group is tabulated as table No.2

Table 1: physico-chemical parameters of moringa oleifera

Parameters	Whole plant of Moringa oleifera	
Moisture content	0.032%	
Total ash value	96 %	
PH of 1% w/v formulation solution	6.5	
Saponification value	37.4	
Refractive index		
Ethanol extract refractive index	17	
Methanol extract refractive index	7	
Acid value	3.94	
solubility	Insoluble	chloroform
	Soluble	Water
		Ethanol
		Diethyl Ether

Table 2: phytochemical screening for ethanol and methanol extracts of Moringa oleifera

Components	Ethanol extracts	Methanol extracts
Phenolic compound	+++	+++
Quinine	++	++
Protein	-	-
Anthraquinone	-	-
Saponins	++	+
Flavonoids	+++	+++
Coumarins	++	++
Tannin	+++	+++
Fixed oil and fats	+	+
Steroid-glycosides	+++	+++
Alkaloids	++	++

+++= appreciable amount, ++ = average amount, + = trace amount, - = absent

Plant products including phelolic, quinines, saponins, Flavonoids, coumarins, tannin, steroids and Alkaloids are found in the sample. Fats and oil was found in a small amount but anthraquinones and protein were detected. So the presences of these phytochemical constituents promote rapid healing and the formation of new tissues as discussed below.

The results of the phytochemical analyses showed that Flavonoids were more in quantity than the other phytochemicals tested. Flavonoids, according to the research by may modify allergens, viruses and carcinogens thereby acting like a biological response modifier and acting on bacteria by inhibiting its protein synthesis. Also*, in vitro* studies showed that flavonoids could also posses anti-microbial [47], anti-allergic and anti-inflammatory properties [50].

Phytochemicals such as Coumarins, Saponins, Quinine and alkaloids were found to be moderate in concentration. Steroids are used in the stimulation of bone marrow and growth. It stimulates lean body mass and also play vital roles in the prevention of bone loss in elderly men [51].

Phytochemicals such as tannins, saponins, and Steroid-glycosides were found to be relatively low in concentration. Tannins could be an effective ameliorative agent of the kidney [52]. Tannins have also shown to be potential anti-viral, anti-bacterial and anti-parasitic agents [17]. Saponins are used as an adjuvant in the production of vaccines.

5 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

As there is not enough evidence for detailed physicochemical and phytochemical evaluation on whole plant of Moringa oleifera is reported. Therefore present work is taken up in the view to completely standardize the herb in accordance to parameters of world health organization (WHO) Guidelines and standard laboratory procedures. In the present study whole

plant of Moringa oleifera was thoroughly investigated for their physicochemical characters and major active constituents to analyze their quality, safety and standardization for their safe use. The generated information of the present study will provide data which is helpful in the correct identification and authentication of this medicinal plant.

The leaf of *Moringa oleifera* has been known to be used in the treatment of dental caries, common cold, Fever, Diarrhea, flatulence and Edema. There is an increasing awareness that many components of traditional medicine are beneficial while others are harmful, hence WHO encourages and supports countries to identify and provide safe and effective remedies for use in the public and private health services [53]. The present study showed that the leaf of *Moringa oleifera* have pharmacologically important chemical compounds such as Carbohydrates, Saponins, Tannins, Steroids, Flavonoids, Coumarins ,Quinine, phenolic compound and Alkaloids.

5.2 RECOMMENDATIONS

The following recommendations are made in order to benefit those who need to intervene with the result of the study under consideration.

Further study should be conducted in

- anti-oxidant activities of Moringa oleifera
- anti-helm antic activities

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PHYTOPLANKTONIC COMMUNITIES AND PHYSICOCHEMICAL PARAM-ETERS OF FISH HATCHERY PONDS AT CHILLIA AND KEENJHAR LAKE

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ABSTRACT: Chillia fish hatchery ponds and Keenjhar Lake is located at Thatta district, water samples from Chillia fish hatchery ponds and Keenjhar Lake were analyzed for physicochemical properties and phytoplanktonic population during 2004 to 2007. The Keenjhar Lake water was slightly alkaline in nature, the range of physicochemical parameters were as, 265-372 mg L^{-1}, 7.2-8.3, 159-218 mg L^{-1}, 35-70 mg L^{-1}, 18-30 °C, 50-73 mg L^{-1}, 28-330 mg L^{-1}, 7.2-8.5 mg L^{-1} and 320- 495 µS cm^{-1}, and physicochemical parameters of Chillia fish hatchery ponds were as 124-187 mg L^{-1}, 7.4-8.4, 65-86 mg L^{-1},21-25 mg L^{-1}, 16-38.5 °C, 47-65 mg L^{-1}, 18-25 mg L^{-1}, 5.4-6.4 mg L^{-1}, and 5.4-6.4 µS cm^{-1}, for total dissolve solids, pH, alkalinity, chlorides, temperature, calcium, magnesium, dissolve oxygen and electrical conductivity respectively. A total 152 phytoplanktonic species belonging 49 genera were identified, as *Cyanophyceae* (83 spp), *Chlorophyceae* (57 spp), *Bacillariophyceae* (10 spp) and (1 spp) each belongs to *Euglenophyceae* and *Xanthophyceae* from Chilliafish hatchery ponds and Keenjhar Lake. Physicochemical properties of Chillia fish hatchery ponds and Keenjhar Lake were suitable for growth of aquatic biota. Keenjhar Lake was richer in primary productivity rather than Chillia fish hatchery ponds.

KEYWORDS: Phytoplankton, physicochemical, Chillia fish hatchery ponds and Keenjhar Lake.

INTRODUCTION

The fish hatchery ponds at Chillia are spread over an area of 77 acres, with an inflow of water of from Kalri Bhaggar feeder, located (68 24 E˚ Longitude and 21 23 N˚ Latitude), and Keenjhar Lake is situated nearly 120 Km. from Hyderabad at 24 47 N˚ and 68 2 E˚ (Korai *et al*., 2008). The importance of phytoplankton as food for fish in sub- tropical water remains a neglected area of research (Sahato & Arbani, 1997) even though studies of phytoplanktonic communities are simpler for tropical water bodies than for temperate water (Saunders and Lewis, 1988). Phytoplankton constitutes significant role in the food chain, as they are the primary producers, and play a gigantic role in the biosynthesis of organic material. Quantitative analyses of phytoplanktonic species are essential for determination of primary productivity in surface water bodies (Sahato & Arbani, 1997). Phytoplanktonic species are essential components of aquatic environment, especially from primary production aspect; as they play a basic role in primary production of water reservoirs, these species are a cheap source of food, both directly and indirectly, for the fish population (Leghari *et al*., 1997). Sahato *et al*., (2004) reported 33 species of phytoplankton (*Oscillatoriaceae*) from Keenjhar Lake district Thatta. Leghari *et al*., (2006) reported 116 species of phytoplankton from Hana Lake and Urak spring from Quetta, Baluchistan. Leghari *et al*., (1999) reported 157 algal species from Chotiari Reservoir, District Sanghar, Sindh. Korai *et al*., (2008) reported142 species of phytoplankton from Keenjhar Lake district Thatta. Therefore present work was conducted to analyze physicochemical properties, qualitative and quantitative

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analysis of phytoplanktonic population in Keenjhar Lake comparatively with Chillia fish hatchery ponds, district, Thatta, Sindh, Pakistan.

MATERIALS AND METHODS

Water samples were collected from two stations at Keenjhar Lake (1) Sunheri, Inlet water source from by canal Kalri Bhaggar feeder (2), Khumbo, out let of the lake (Fig. 1). Single sample was collected from fish hatchery ponds at Chillia on monthly basis.

Keenjhar Lake water samples collected from surface via Van Dorn plastic bottles (1.5 capacities) from 2-4 spots of each station randomly and 2-3 spots of water sample from each Chillia fish hatchery pond were reserved in well stoppard polythene plastic bottles, formerly soaked 10% nitric acid for 24 hours and rinsed with ultrapure water obtained from ELGA lab water system. Sampling was usually done in the morning. The physicochemical parameters were determined in laboratory following the standard protocols (APHA, 1998). Water samples from Chillia fish hatchery ponds and Keenjhar Lake were stored in an insulated cooler containing ice and delivered to laboratory and all samples were kept at 4 °C prior advance procedure and analysis after end of each sampling exercise. Epilimnion sample from same station were mixed into a washed plastic container to make a composite sample, after this mixture was filtered through 0.45 µm filter paper with the help of vacuum pump. The filtrate was further analyzed for physicochemical parameter.

Standard titration methods (APHA, 1998; Framan, 1981) were used to determine. Total dissolved solids and electrical conductivity (TDS) were determined with a WTW LF 320 conductivity meter. pH with an Orion model 420 pH meter, alkalinity was detected with titration (Sulfuric acid). Chloride with (silver nitrate). Temperature was measured with a mercury thermometer at site. Calcium and Magnesium was determined by titration (with EDTA). Water samples for the determination of dissolved oxygen (DO) samples were collected in colored bottles and analyzed by a modified Winkler method. The analytical procedure, abbreviations, units and the range with mean and standard deviations of physicochemical variables are given at (Table I).

Phytoplankton were collected with a planktonic net (No. 55 µm) towed with a motor boat traveling at slow speed at the depth of 0.5 meter from Keenjhar Lake and collection from Chilla fish hatchery ponds were simply by said net. The phytoplanktonic samples were stored in wide- mouth plastic bottles and fixed in 4% formalin. A qualitative study of the phytoplankton was made by authentic literature (Desikachary, 1959; Ward and Whiple, 1959; Prescott, 1962; Patric and Reimer, 1966; Starmach, 1966). The classification of algae has been followed after Shameel (2001).

RESULTS AND DISCUSSION

Phytoplanktonic studies

Phytoplanktonic population belonging to five different algal groups viz, Cyanophyta comprises as 55 and 50 %, Chlorophyta comprises as 37 and 41 %, Bacillariophyta comprises as 6 and 7 %, Euglenophyta and Xanthophyta comprises as 1 and 1 % each, from Keenjhar Lake and Chillia fish hatchery ponds. Fig. 2 and 3.

In general blue- green algae were dominant over the other algal groups at Keenjhar Lake even from Chillia fish hatchery ponds. Totally 152 species of phytoplankton were indentified. The identified taxa are represented in (Table II). The Keenjhar Lake was more productive rather than Chillia fish hatchery ponds (Fig. 4). 83 species of phylum Cyanophyta were identified from Keenjhar Lake and 68 species were identified from Chillia fish hatchery ponds. In which, *Aphanocapsa* (8 and 6 Spp), *Aphanothece* (1 and none Spp), *Anabaena* (6 and 3 spp), *Anabaenopsis* (1spp each), *Arthrospira* (2 spp each), *Calothrix* (3 spp each), *Chroococcus* (3 spp each), *Coelosphaerium* (2 and 1 spp), *Gloeocapsa* (5 spp each), *Gloeothece* (1and none spp), *Gloeotrichia* (2 and 1 spp), *Gomphosphaeria* (2 and 1 spp), *Lyngbya* (10 and 9 spp), *Merismopedia* (5 spp each), *Microcystis* (12 and 11 spp), *Nostoc* (6 and 5 spp), *Oscillatoria* (6 spp each), *Phormidium* (4 and 3 spp), *Rivularia* (1 spp each), *Spirulina* (2 spp each), and *Synechocystis* (1 and none spp), from Keenjhar Lake and Chillia fish hatchery respectively, (Fig. 5, and table II). By the excess growth of plankton in the lake, the color of the water was observed as bluish green; the transparency is affected by various factors such as algal blooms in Chillia fish hatchery ponds and suspended sediments at Keenjhar Lake and Chillia fish hatchery ponds. This confirms the observation made by (Hussain *et al*., 1984; Horn and Goldman, 1994; Leghari *et al*., 2006). 57 and 53 species of phylum Chlorophyta were identified from Keenjhar Lake and Chillia fish hatchery ponds, respectively, *Ankistrodesmus* (3 spp each), *Chlorella* (2 spp each), *Cladophora* (3 spp each), *Closteridium* (1 spp each), *Closterium* (4 spp each), *Coelastrium* (1 spp each), *Closteriopsis* (1 spp each), *Cosmarium* (4 spp each), *Characium* (3 spp each), *Dispora* (1 and none spp), *Euastrum* (2 spp each), *Kirchneriella* (2 spp each), *Microspora* (1 spp each), *Nephrocytium* (1

and none spp), *Oedogonium* (1 spp each), *Oocystis* (4 and 3 spp), *Pediastrum* (7 and 6 spp), *Scenedesmus* (7 spp each), *Spirogyra* (1 spp each), *Staurastrum* (3 spp each), *Tetraedron* (4 spp each) and *Ulothrix* (1 spp each), (Fig. 6 and table II). 10 species of phylum Bacillariophyta were collected, each from Keenjhar Lake and Chillia fish hatchery ponds, *Amphora* (2 spp each), *Cymbella* (4 spp each), *Cyclotella* (3 spp each), *Nitzschia* (1 spp each), Fig. 7. Furthermore, phylum Euglenophyta comprises only single specie *Botryococcus braunii* form Keenjhar Lake and Chillia fish hatchery ponds. Single specie *Euglna accus* belonging to Xanthophyta was recorded from Keenjhar Lake and Chillia fish hatchery ponds as well.

Nazneen and Bari, (1979) published a systematic account of the diatoms of the family *Epithemaceae* and also reported detailed information on seasonal distribution of phytoplankton in Haleji Lake, (Nazneen and Bari, 1984). Leghari and Sultana, (1992) reported 42 species of Blue green algae from Keenjhar Lake, Sindh. Arbani and Sahato, (1995) reported a few species of the family Chlorococcales in fish pond at Chillia, Sindh. Javed and Hayat, (1995) assesses water quality in the River Ravi and its influence on different plankton taxa. Leghari *et al*., (2001) reported 46 species of Chroococcus for Sindh. Sahato and Lashari, (2005) studied the genera causing phytoplankton bloom in fish hatchery ponds at Chillia, Sindh. Our results are not agreement with those of (Leghari *et al*., 2001; Sahato and Lashari 2005; Korai *et al*., 2008.

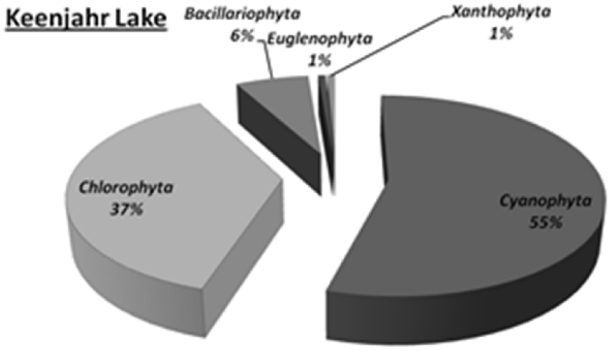

Fig. 2. Composition of algal phyla from Keenjhar Lake.

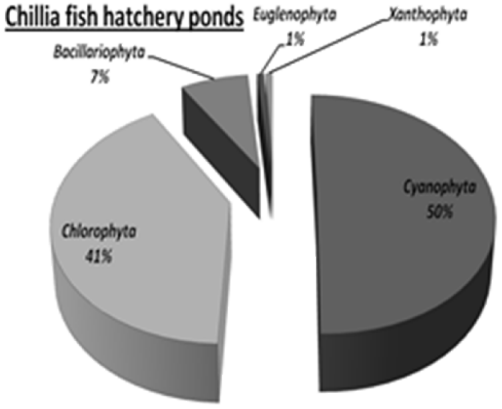

Fig. 3. Composition of algal phyla from Chillia fish hatchrey ponds.

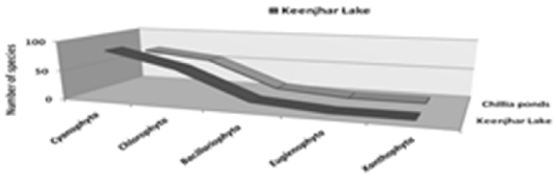

Fig. 4. Number of algal species with their concren phyla encountered from Keenjhar Lake and Chillia fish hatchrey ponds.

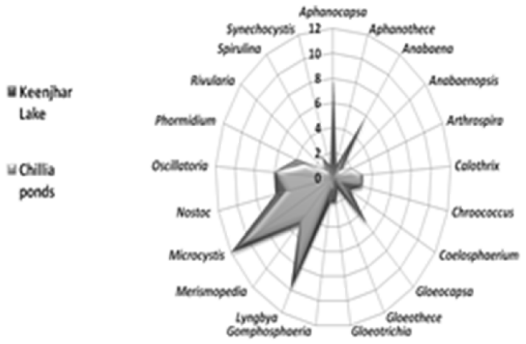

Fig. 5. Species composition of Cyanophyta from Keenjhar Lake and Chillia fish hatchery ponds.

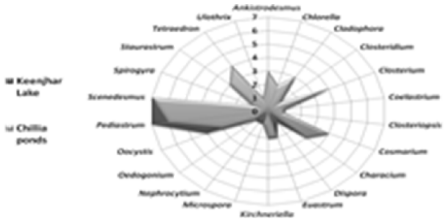

Figure 6, Species composition of Chlorophyta from Keenjhar Lake and Chillia fish hatchery ponds.

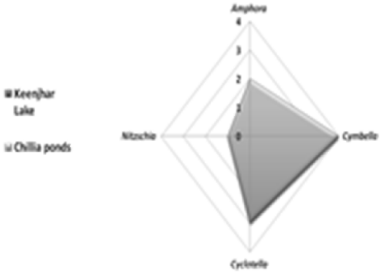

Fig. 7. Species composition of Bacillariophyta from Keenjhar Lake and Chillia fish hatchery ponds

Physicochemical parameters

The range of total dissolve solids from Keenjhar Lake were as 265-372 mg L^{-1} and from Chillia fish hatchery ponds were as 124-187 mg L^{-1} (Table I). Keenjhar lake has high TDS in winter and low TDS in autumn (Khatoon 1994), in contrast to ponds and smaller water bodies, where as TDS were maximum in autumn and minimum in winter. This may be due to the size of the water body, inflow of water, consumption of salt by algae and other aquatic plants, and the rate of evaporation. Our data coincide with those of Khatoon (1994) but disagree with observations of Kumar *et al*., (2000).

pH is a measure of the acidity or alkalinity of an aqueous solution. The variation in pH is due to the presence or absence of free carbon dioxide and carbonate and planktonic density during various months. It is well documented that pH is directly related to CO_3 and inversely related to free carbon dioxide (Nazneen *et al*., 2000). The pH range was 7.2- 8.3 from Keenjhar Lake and 7.4- 8.4 (Table I) from Chillia fish hatchery ponds. Among biotic factors, high photosynthetic activity due to increased production of phytoplankton may support an increase in pH. This type of observation has also been reported by Nazneen and Bari (1984).The capacity of water to neutralize a strong acid is known as alkalinity and is characterized by the presence of hydrogen ions; most of the alkalinity of water is due to dissolution of carbonate. The range of alkalinity was 159-218 mg L^{-1} (Table I), was noted at station I and II in March from Keenjhar Lake. Increase in alkalinity value may be due to decrease in the water level. Bicarbonate increase with decrease in water levels have also been reported by Singhal *et al*., (1986) and Rutne, (1963), reported that the accumulation of lesser quantities of carbonate during summer results in the

liberation of free Co3 during decomposition of bottom deposits, which possibly converts insoluble $CaCO_3$ into soluble Ca $(HCO_3)_2$. The range of alkalinity was 65- 86 mg L^{-1} from Chillia fish hatchery ponds. The Keenjhar Lake was more alkaline than that of Chillia fish hatchery ponds. Natural water generally contains low concentrations of chlorides and higher levels always originate from contamination by sewage. Range of chlorides was as 35-70 mg L^{-1} from Keenjhar Lake and range from Chillia fish hatchery ponds were as 21-55 mg L^{-1} (Table I). The increase in chlorides in winter is in agreement with the observations of Munawar (1970). Kumar *et al*., (2000) suggested that this is probably because organic matter does not accumulate at a particular spot in flowing water and is washed away before it is broken down. The chlorides concentration depends on the water level, when the water level decreases, the chlorides concentration increases. They further observed that when water level rises due to rain, the consequent dilution decreases the chloride concentration. The chlorides content in Keenjhar Lake was high rather than Chillia fish hatchery ponds due to continue flow of water, ultimately increases the productivity of Keenjhar Lake water.

Temperature is important in terms of its effect on aquatic life. Temperature fluctuations are evident seasonal patterns in aquatic ecosystems. Its influence on limnological phenomena such as stratification, gas solubility, pH, conductivity and planktonic distribution are well known Singh *et al*., (1980). Temperature measurements are useful in indicating trends for various chemical, biochemical and biological activities. An increase in temperature leads to faster chemical and biochemical reactions. The growth and death of microorganisms and the kinetics of the biochemical oxygen demand are also regulated to some extent by water temperature Khuhawar and Mastoi (1995). Water temperature in the study lake closely followed air temperature, with maximum in summer and minimum in winter. Air and water temperatures showed a very characteristic annual cycle, with higher values during the day, and lower values in the dry season. The range of temperature from Keenjhar Lake was 18- 30 ˚C and from Chillia fish hatchery ponds were as 16-38.5˚C (Table I), due to low water volume at the Chillia fish hatchery ponds. The hardness of the natural water is mainly caused by the presence of carbonates, bicarbonates, sulfates and chlorides of calcium and magnesium. Other cat ions that affect the hardness are iron and magnesium. Carbonate and bicarbonates are the predominant anions in the lake, with calcium the major cation. Singh & Singh (2000) inferred that changes in the concentration of oxidizable organic matter in tropical waters did not influence the development of blue–green algae, as its concentration reaches a limiting factor for algal growth. The range of calcium was 50- 73 mg L^{-1} and 47- 65 mg L^{-1}, from Keenjhar Lake and Chillia fish hatchery ponds respectively. The range of magnesium was 28- 330 mg L^{-1} and 18- 25 mg L^{-1} (Table I) from Keenjhar Lake and Chillia fish hatchery ponds; it was apparently observed that the Keenjhar Lake has broad range of calcium and magnesium.

The concentration of dissolve oxygen was 7.2- 8.5mg L^{-1} from Keenjhar Lake and DO of Chillia fish hatchery ponds was ranged as 5.4- 6.4 mg L^{-1} (Table I). Keenjhar lake is exclusive source of fisheries potential, irrigation intention, picnic spot and broad range of biodiversity while contamination in Keenjhar Lake is accelerated by anthropogenic, imprudent activities of visitors and fisher folks, ultimately which increases the rate of biodegradation, hence increases the dissolve oxygen content. Electrical conductivity of Keenjhar Lake during present studies was 320- 495 µS cm^{-1} and conductivity of Chillia fish hatchery ponds were as 142- 260 µS cm^{-1}(Table I), during present studies the Keenjhar Lake water was more conductive rather than Chillia fish hatchery ponds. Keenjhar Lake is more productive than Chillia fish hatchery ponds, due to presence of high nutrients and their recycling, ultimately which increase the conductivity of water. Most of the salts dissolved in water are in ionic form, and thus can conduct electricity. The change in water conductivity followed the same seasonal pattern as that of salinity, the conductivity of Keenjhar Lake was similar than that of Kawar Lake, thus in agreement with (Kumar *et al*., 2000; Leghari *et al*., 2006; Korai *et al*., 2008).

CONCLUSION

Keenjhar Lake is richer in production of Cyanophyta 55 % rather than Chillia fish hatchery ponds, in contrast of rest of algal phyla Chlorophyta 41 %, and Bacillariophyta 7 % at Chillia fish hatchery ponds, hence shows good production in comparison with Keenjhar Lake. In account of Xanthophyta and Euglenophyta Keenjhar Lake and Chillia fish hatchery ponds were similarly productive. In Keenjhar Lake water broad range of physicochemical parameters were observed, however the Chillia fish hatchery ponds were in narrow range. Keenjhar Lake is slow moving water body with inconsistent depth because of this the range of various physicochemical parameters were extended. Conclusively the Keenjhar Lake water is good for the production of aquatic fauna and flora, besides of that Chillia fish hatchery ponds are feed with similar input, however they are low productive in account of higher aquatic animals.

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STUDY ON EFFECT OF DIFFERENT PARAMETERS ON ADSORPTION EFFICIENCY OF LOW COST ACTIVATED ORANGE PEELS FOR THE REMOVAL OF METHYLENE BLUE DYE

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ABSTRACT: Activated orange peels as an adsorbent was prepared by agitating in H_2SO_4 for 12 hours and washed with distilled water and again socked with2%$NaHCO_3$ solution over night to remove excess acidity. It was calcined at a temperature of 350^oC for 2:30 hours. Then the effect of adsorbent dosage, initial dye concentration, and contact time and particle size on the adsorption efficiency of the sample was tested using methylene blue as a target pollutant. The adsorption efficiency of the adsorbent for the removal of methylene blue was found as follows. adsorbent dosage and contact time was found to be directly proportional to the efficiency of adsorption of the prepared sample but up to a certain optimum value (82, 88.01 respectively) while initial dye concentration and particle size was found to be inversely related but still up to optimal amount or size.

KEYWORDS: Activated orange peels, Adsorption, Methylene blue, Operational parameters.

1 INTRODUCTION

The chemical industries make products with much beneficial usage; however, they do also have negative impacts on human health and the environment. They release hazardous, calcitrant and toxic chemical substances such as phenolic compounds, high molecular weight polymeric surfactants, herbicides and pesticides from industrial wastewater effluent which are well known to be not easily biodegradable [1]. Traditionally, industrial wastewater treatments for these effluents include different techniques such as biological treatment, reverse osmosis and activated carbon adsorption [2].

Adsorption is the transferring of adsorbate (dye) from the gas or liquid phase on to the surface of solid. Basically there are two types of adsorption, namely:

- Chemical adsorption (chemisorptions) and
- Physical adsorption (physisorption)

Physical adsorption occurs when weak antiparticle bonds such as Vander Waals, hydrogen bond and dipole-dipole interactions exist between the adsorbate and adsorbent. Chemical adsorption occurs when strong enter particle bonds such as covalent and ionic bonds are present between the adsorbate and adsorbent due to exchange of electrons. A molecule that undergoes adsorption is referred to as the adsorbate and the solid that adsorbs is the adsorbent. During adsorption, there is the formation of layer of gas, liquid or solid to the surface of solid or less frequently a liquid [3]. The term adsorption is often confused with absorption. Absorption refers to a phenomenon when something is taken up throughout the bulk such as sponge absorbs water. Adsorption refers to a phenomenon where something is taken up only at the surface, such as carbon powder adsorbs a dye. The general term for adsorption and absorption is sorption.

Adsorption can occur between solid-solid, gas- solid, liquid-liquid and liquid-gas interfaces. The removal of colored and colorless organic pollutants from industrial waste water is considered as an important application of adsorption process. The

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most efficient and also commonly used absorbent is commercially activated carbon which is expensive and has regeneration problems. Activated carbons are prepared from coal (anthracite or brown coal), lignite, wood, nut shell, petroleum and sometimes synthetic high polymers [14].

Therefore, it is important to use low cost absorbents and less expensive to generate and use. In this project Methylene blue was chosen as target pollutant Methylene blue is basic aniline dye [13]. It is cationic dyes having molecular formula of $C_{16}H_{18}N_3Scl$ with molecular weight of 319.85. At room temperature, it appears as a solid, odorless, dark green powder. When hydrated ($C_{16}H_{18}N_3Scl.\ 3H_2O$) gives deep blue colour. The chemical name of methylene blue dye is 3, 7- bis (Dimethyl amino) phenothizin- 5- ium chloride or tetra metheyln thionine. Metheylene blue is the most commonly used material for dying cotton, wood and silk [10].

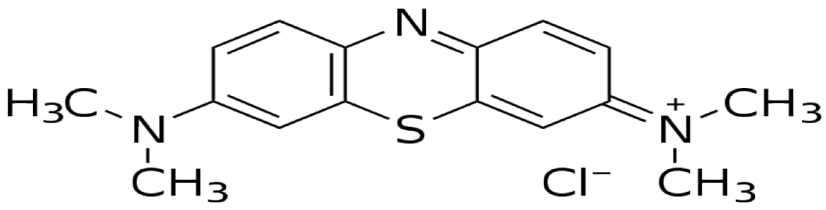

Figure. The chemical structure of methylene blue

Table 1: Properties of methylene blue (Velmurugan, 2011)

Chemical formula	$C_{16}H_{18}N_3SCl$
Molecular weight	319.85 g/mol
CI number	C.I. 52015
Type of dye	Basic blue
Melting point	100 – 110 °C
Boiling point	Decomposes
λmax	665 nm

So the aim of this work is to see the adsorption efficiency and effect of different parameters on adsorption efficiency of low cost activated orange peels for the removal of Methylene blue.

2 MATERIALS AND METHODS

2.1 2.1. EXPERIMENTAL SITE

The experiments were carried out at Adigrat University Chemistry Laboratory

2.2 EQUIPMENT AND APPARATUS

The equipment and apparatus used in this study were: UV/vis spectrophotometer, Furnace, centrifuge, analytical balance and test tubes and flasks.

2.3 CHEMICALS AND REAGENTS

In this study the following chemicals were used:

Methylene Blue dye ($C_{16}H_{18}N_3SCl$) (M.W. 319.85 g/mol), Concentrated H_2SO_4 , 2% sodium bicarbonate [$NaHCO_3$]

All were analytical grade and used with no further purification.

2.4 EXPERIMENTAL METHODS

2.4.1 SAMPLE PREPARATION

The sample that was used to conduct this project was low-cost activated orange peel. This sample was collected from different shops in Adigrat and then it was washed and dried in oven at 105^{o}c over night. Then it was agitated by 1:1 of H_2SO_4 and distilled water for 12 hours. Then it was washed with distilled water until it attained neutral PH and it was again socked with 2% $NaHCO_3$ over night in order to remove excess of acid present in it. Then it was washed again with distilled water and dried in oven at 105^{o}c. then it was calcined 350^{o}c in a muffle furnace for 2:30 hrs [19]. Finally the sample was grinded depending on the desired size and it was sieved by using appropriate mesh size (5mm, 10mm, 15mm and 20mm).

2.4.2 EFFECT OF VARIOUS PARAMETERS ON REMOVAL OF METHYLENE BLUE DYE

In order to see the effect of different parameters; a stock solution of 50 ppm solution was prepared by dissolving 50 mg of methylene blue dye in 1000 ml of distilled water and then desired amounts were taken in each step.

2.4.2.1 EFFECT OF ADSORBENT DOSAGE

To evaluate the effect of the amount of catalyst loading on the adsorption efficiency of the activated orange peels for removal of methylene blue; the experiment was carried out by varying the amount of catalyst to be loaded from 0.125-2g in 150 ml of the prepared solution [18] . Then the mixture was agitated and mechanically shacked for 6 hrs and then it was filtered using centrifuge at 150 rpm at room temperature. The adsorption efficiency was then determined by spectrophotometer. The percentage adsorption was calculated and other parameters were kept constant [18].

2.4.2.2 EFFECT OF INITIAL DYE CONCENTRATION

To evaluate the effect of the amount of initial dye concentration on the adsorption efficiency of the activated orange peels for removal of methylene blue; the experiment was carried out by varying the initial concentration of the dye from 10 - 50 ppm. Then the mixture was agitated with 0.5g of the sample and mechanically shacked for 6 hrs and then it was filtered using centrifuge at 150 rpm at room temperature. The adsorption efficiency was then determined by spectrophotometer. The percentage adsorption was calculated and other parameters were kept constant.

2.4.2.3 EFFECT OF CONTACT TIME

0.5 g orange peel was mixed with 50 ppm dye solution for various intervals of time (5 hrs, 8 hrs, 12hrs and 24 hrs) at room temperature. Similarly the adsorption efficiency was then determined by spectrophotometer. The percentage adsorption was calculated and other parameters were kept constant.

2.4.2.4 EFFECT OF PARTICLE SIZE

To evaluate the effect of particle size on the adsorption efficiency of the activated orange peels for removal of methylene blue; the experiment was carried out by using 5mm, 10mm, 15mm and 20mm particle size of the adsorbent . Then the mixture was agitated with 0.5g of each sample and mechanically shacked for 6 hrs and then it was filtered using centrifuge at 150 rpm at room temperature. The adsorption efficiency was then determined by spectrophotometer. The percentage adsorption was calculated and other parameters were kept constant

3 RESULTS AND DISCUSSION

3.1 EFFECT OF VARIOUS PARAMETERS ON REMOVAL OF METHYLENE BLUE DYE

To test Effect of various parameters on removal of methylene blue dye and the adsorption efficiency of the prepared sample the experiment was carried out as follows in a sequential manner. The percentage adsorption of the activated orange peels were measured and the percent adsorption was calculated for each case using the following equation

Adsorption (%) = [A0-At / Ao] X 100 (eq 3.1)

Where, Ao is the initial absorbance of the solution

At is the absorbance of the solution after adsorption

3.1.1 EFFECT OF ADSORBENT DOSAGE

To evaluate the effect of the amount of catalyst loading on the adsorption efficiency of the activated orange peels for removal of methylene blue; the experiment was carried out by varying the amount of catalyst to be loaded from 0.125-2 g in 150 ml of the prepared solution. The results were found to be follows.

Table1 Effect of dosage on adsorption efficiency of activated orange peels for removal of methylene blue

Amount of Adsorbent in gram	% of absorbance
0.125	40
0.25	55
0.5	82
1	71
2	50

The adsorption efficiency of the activated orange peels for removal of methylene blue increases with increasing the loading from 0.125 g - 0.5 g as shown in table1 above. But further increase up to 2 g was found to decrease the adsorption efficiency. Such patterned results have been reported from previous studies for other dyes [18]. This observation can be explained by the number of active sites as the main cause for the differences. Indeed, the total number of active sites increased with increasing adsorbent dosage. But further increase up to 2 g was found to decrease the adsorption efficiency. This may be due to the fact that as the adsorbent increase above the optimal amount the active sites may close with each other [19]

3.1.2 EFFECT OF INITIAL DYE CONCENTRATIONS

Table 1. Effect of initial dye concentration on adsorption efficiency of activated orange peels for removal of methylene blue

Amount of methylene blue dye in soln in ppm	% Absorbance
10	88
20	86.6
30	85.2
40	83.5
50	82

Based on the result shown in table 2, it is possible to conclude that percentage adsorption of methylene blue was found to decrease with increase in initial dye concentration. But the actual amount of methylene blue dye adsorbed per unit mass of carbon increased with increased in dye concentration of dye [8]. Basically this phenomenon can be explained interns of available active sites. At low adsorbate concentration, the ratio of surface active sites to total dye is high. Hence the dye ions could interact with the sorbent to occupy the active sites on the carbon surface sufficient and can be removed from the solution [5]. But with the increase in adsorbate concentration, the number of active adsorption sites is not enough to accommodate dye ions and this agrees with the literatures.

3.1.3 EFFECT OF CONTACT TIME

0.5 g orange peel was mixed with 50 ppm dye solution for various intervals of contact time (5 hrs, 8 hrs, 12hrs and 24 hrs) at room temperature. The percentage adsorption was as follows

Table1. Effect of contact time on adsorption efficiency of activated orange peels for removal of methylene blue

Agitation time (contact time)	%Absorbance
5 hrs	78`
8 hrs	85
12 hrs	88
24 hrs	88.01

The extent of dye removal by activated orange peels was found to increased with the increased of contact time. The removal of dye by adsorption using activated orange peels was found to be rapid at the initial period of contact time and then become slower with the increase of contact time [8]. This may be due to the strong attractive forces between the dye molecules and the adsorbent. As contact time increased, initially percentage removal also increased, but after some time it gradually approached almost constant value at after equilibrium was reached [12]. The changes in the rate of removal with time might be due to the fact that initially all adsorbent sites were vacant and the solute concentration gradient was high.

3.1.4 EFFECT OF PARTICLE SIZE

Table 4.Effect particle size on adsorption efficiency of activated orange peels for removal of methylene blue

size of Adsorbent	%Absorbance
20mm	40
15mm	74.65
10mm	83
5mm	70

From the result in table 4, it is possible to conclude that as the mesh size decrease, the efficiency increase up to optimal point. This may be due to the presence of large number of smaller particles which provide the sorption system with larger surface area available for the dye adsorption [8].

4 CONCLUSION AND RECOMMENDATION

4.1 CONCLUSION

In this piece of work, activated orange peels was prepared as adsorbent and used for removal of methylene blue dye. The effects of

Some selected operating parameters (effect of dosage of adsorbent, initial dye concentration, and contact time and particle size) have been studied. It was found that adsorbent dosage and contact time was found to be directly proportional to the efficiency of adsorption of the prepared sample but up to a certain optimum value (82, 88.01 respectively) while initial dye concentration and particle size was found to be inversely related but still up to optimal amount or size.

Therefore, optimizing the various operational parameters is of paramount importance from the design and the operational as well as economical points of view as these could affect the degree of adsorption efficiency of the adsorbent.

4.2 RECOMMENDATION

Since there are different peels which are thrown through out every streets which may be used as adsorbents, other researchers should study such kind of work. Other operational parameters should also be optimized.

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