CONTENTS

The Relationship between Power Bases of Sports Federations' Presidents with Employees Job Performance and Job Satisfaction

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Abstract: The purpose of this study was to investigate the relationship between power bases of sports federations' presidents (PBSP-other) with employee's job performance and job satisfaction (both from the viewpoint of employees). The population in this study consisted of the employees of sports federations including experts, chiefs and vise chiefs of federation committees, among whom 288 people were selected as the statistical sample. The POSP-other questionnaire (with 15 questions in 9-point Likert scales) and employees' job performance and job satisfaction questionnaires with 4 questions and 6 questions , in 5-point Likert scales respectively, were confirmed after being translated and approved by 30 experts in the fields of language, management and physical education. Internal consistency of the questionnaires was estimated using Cronbach's alpha which obtained $\alpha=0.95$, $\alpha= 0.83$ and $\alpha= 0.66$ for power , employee's job performance and job satisfaction from their points of view, respectively. Pearson correlation coefficient and hierarchical multiple regression analyses were used to analyze all the hypotheses. The results indicated that employees believed that presidents of sports federations had legitimate, referent, expert, reward and coercive power bases, respectively, and a significant relationship was found between PBSP-other with job performance ($r=0.158$) and job satisfaction ($r=0.155$). Hierarchical multiple regression analyses revealed that, among power bases of sports federations; referent power base was a better predictor for employees' job performance and job satisfaction.

1. Introduction

According to Russell (1938), similar to energy as a fundamental concept in physics, power is a fundamental concept in social sciences (37). The definition of Hersey and Blanchard (2005) for leadership as the ability of the person for influencing and affecting others to reach the goals reveals that having power tools is the required capability for this purpose (16). Rahim (1989) considered power the capability of the person to change and control behaviors, attitudes, beliefs, goals and needs of others in order to obtain the goals of the organization (33). Miner (1998) defined power as the ability in having another person do something while s/he would not otherwise (13). According to him, influence has a broader concept than power and power is in fact a form of influence. Imam Mohammad Ghazali (1058-1111) also used four stages of human desires including instinctive, nervous, sinister and divine for presenting the concept of power (14). Hilland and Yousp (1999) believed that real power is obtained when people eagerly help their manager or organization in reaching the goals (17). Monduate and Medina (2004) and

Barksdal (2009) presented two important characteristics of power as ability in using power and its communication aspects; in the first case, a person may have power but does not use it; in the second case, a person may use power depending on the relationship between people and situations in which they are placed (26, 3). The process of influencing others as the most important tool available for managers takes place through power imagination, the generation of which requires accessing power sources (8). Etziony (1961) divided power sources into two official and personal groups and believed that the directions of official and personal powers were from top to bottom and from bottom to top, respectively. Official power depends on the level of reward, coercion and sanction which are imposed by the manager or leader on their followers; however, personal power is the level of obtaining trust and assurance of those people who are important in terms of influence (19). The most important categorization of power bases was done by French and Riven (1959) who referred to five intrapersonal power bases including reward, coercive, expert, referent and

legitimacy power types. Considering this categorization, official power and personal power are related to reward, coercive and legitimacy and to referent and expert powers, respectively (9, 2, 6). Coercive power (punishment, force): is the idea resulted from the required ability for punishing and reprimanding due to the lack of performance of employees and is the negative aspect of coercive power (10, 11). If this power is constantly used by the managers of the organization, it could generate feelings like discouragement, despair, fear, reduction in efficacy, performance and effectiveness, dissatisfaction, turnover, resentment and hostility among the employees (12, 2, 13, 9). Reward power: is the idea of the ability for providing what is desirable to be owned by others. Excessive reliance on this kind of power leads the employees to think that they are means for the ends of their managers. Also, they may lose their motivation and tendency to work and this kind of power loses its influence (12, 7, 2). Legitimate power (legal): is the idea of manager's efficiency in decision making based on ranking or organizational level (10, 2). Constant use of this kind of power causes discouragement and indifference of employees and invalidates this kind of power, especially when it is awarded without any expertise. In such a case, it wastes human forces and, finally, leads to the dissatisfaction and unwillingness of employees (14, 12). Referent power (authority): is the notion resulted from creating attraction and charisma among the followers. This kind of power has an emotional nature in which employees benefit from states like attraction, infatuation, loyalty, commitment, imitation and effort (6, 13). Expert power: is the idea of having experience, expertise, knowledge and power for analyzing conditions. This is what the group members are lacking (11). Expertise is one of the most important power sources in the organizations. As a result of task specialization, people highly depend on the expert to reach their goals. Having power bases for organizational managers is a tool for influencing and generating obedience in employees. Appropriate and timely use of power bases by managers leads the behavior of organizations' employees toward fulfilling the organizational objectives. The closer the organization to its (individual, group and organizational) objectives, the more effective the organization could be called (15, 16, 2). Different variables are involved in the studies related to organizational behavior and in the dimension of employees' effectiveness. The effectiveness-dependent variables which have been studied include job satisfaction, job performance, job stress, leaving the job and so on (14, 8, 44). Job satisfaction means tendency level or positive feeling and love of the person to his/her job. Locke (1976) defined job

satisfaction as arising when an individual perceives his or her job as fulfilling values that is considered important to that individual (21). Spector (1997) described job satisfaction is simply how people feel about their jobs and different aspects of their job (40). According to Lawler (1990), Satisfaction refers to people's feeling about the rewards they have received (21). The earlier Likert (1961) identified that job satisfaction is linked to supportive, friendly and also helpful leaders. He also concluded that quality leadership creates a work team where trust and confidence are central, communication is effective and conflict, if any, is constructive (2). However, this hypothesis is not well supported, as job satisfaction is not the same as motivation or aptitude, although they may be clearly linked. A primary influence on job satisfaction is the application of Job design, which aims to enhance job satisfaction and performance using methods. Job performance means the efforts and behaviors of individuals for fulfilling organizational objectives (9). Many pointed out use performance appraisals as a regular managerial procedure (25). Researchers assume that leadership behaviors and influence affect outcomes, such as group performance and goal attainment, by influencing the behaviors of subordinates (47). Bass (1990) and Yuki (1994) also found that leaders sometimes could pose a strong influence on employees and on organizational outcomes (4).. This suggests that the leader has influence on his/her followers by using different leadership styles or by using power bases. In spite of different studies on the power bases of French and Riven (1959) thus far, there are few studies on the application of these bases and their effects on the employees' job satisfaction, job performance. Mozafari and Tabaeyan (2004) demonstrated that power bases of the presidents of physical education faculties included expert, information, reward, personal, relational, legitimate and punishment in order and effectiveness of managers increased with the increase in power of expert, information and reward (29). Ramezaninejad et al. (2010) concluded that couches should use power of expert and referent more than other power-imposing methods in order to increase satisfaction among individual and team athletes. Reward, legitimate and coercive powers were in the next positions (35). Moreover, legitimate power had no effect on personal performance. Elangovan and JialinXie (2000), Ivancovich (1970) and Burk and Wilcox (1971) found a positive relationship between the dependent variable of job satisfaction and expert power of the manager (12, 18, 6). In addition to the dependent variable of job satisfaction, this kind of conclusion was found by Bachman et al. (1968) in terms of performance of employees (1). Cope (1972) found a weak relationship between legitimate power

and job satisfaction while Rice et al. (2005) found that legitimate and expert powers had priority among the five power bases of French and Riven (9, 36). Verhost (2004), Student (1968), Lutans (1995), Tworoger and Preziosi (2004) obtained a significantly positive relationship between powers of referent and expert of managers and performance of employees (48, 42, 24, 19). Wan et al. (2003) reported power of coaches and managers of physical education programs from the viewpoints of athletes as follows: coaches had more legitimate and expert powers while managers had more legitimate and punishment powers and less referent power (42). Nourbakhsh and Mohammadi (2004) concluded that power sources of managers of physical education faculties all over the country included expert, legitimate, referent, coercive and reward (31). KarimiTorqabeh (2004) found that managers of Physical Education Organization in Mashhad used personal power source and especially expert power to a more extent (19). Bachman et al. (1966) conducted a study and found a weakly positive relationship and a negative relationship between expert and referent powers of the managers of faculties on the one hand and their job satisfaction and intent to stay on the other, respectively (2). Slocum (1970) reported a high, positive relationship between expert and referent power and employees' performance and a low positive relationship between legitimate power and performance (39). Rahim et al (2001) believed that performance can be increased by reward, legitimate, expert and finally referent powers (34). Thamhain and Gemmill (1974) reported low positive, significantly positive, low negative, negative and negative relationships between power bases of referent and performance, expert and performance, reward and performance, legitimate and performance and coercive with performance and job satisfaction, respectively (43). Dunne et al. (1972) found no relationship between reward power and job satisfaction (11). Bateman (1999) attributed power of reward and expert to the performance in a positive way (5). Gupta and Sharma (2008) believed that soft power sources (expert, referent, information) would lead to broader obedience of organizational employees compared with hard power sources (reward and coercive) (15). A significant relationship was found between expert and reward power of couches and satisfaction of athletes in Turman (2006) (45). According to Lee (2008), application of referent, expert and reward powers leads to both higher influence of managers over lower-ranking managers and their satisfaction (23). Klocke (2004) considered encouraging power along with soft influencing tactics (expert, reward and referent) more influential than limited control and hard influencing tactics (coercive and legitimate) in group performance and tendency toward team knowledge (20). Chen

(2004) investigated employees' effectiveness in his doctorate dissertation and classified them in four subscales of job stress, job satisfaction, job performance and intend to stay in or leave the job and found no significant relationship between different types of leadership and these effectiveness factors (8). Nobakht et al (2012) found significant relationship between job satisfaction and managerial roles (31).

Although various studies have been done on the relationship between power sources of managers and variables like job performance, job satisfaction in organizations and offices between managers and employees, there has been few studies in the field of sports organizations including presidents of sports federations; specifically, when job satisfaction, job performance is considered a multi-dimensional and complicated variable which is seemingly closer to the power sources available to the managers. The variables which can facilitate or challenge obtaining personal and organizational goals by themselves or along with each other should be investigated in order to clarify the issue. Furthermore, it is important and necessary to consider sports managers who are seeking for the success of their organizations and have influence and power tools and the employees who have a direct relationship with federations' presidents and follow them; via this common interaction, their effectiveness and ineffectiveness would be determined in terms of the mentioned variables. Thus, the main question is this: Is there a relationship between power sources of presidents of sports federations with job satisfaction and job performance? Which power source can be an appropriate predictor for these variables?

2.Materials and methods

2.1. Research Method

This research had a correlational design which was done in the field.

2.2.Population, Samples and Sampling Method

The research population included all employees of sports federations. The employees were all experts of sports federations with at least a Master's degree or a level-2 coaching certificate who had worked for one year (full-time or part-time) at the time of the study (committee chiefs of the federation and their vice chiefs were in this group as well). The employees determined power bases of presidents of sports federations and their effectiveness. They were 700 people at first and 248 people were selected as the sample size according to Morgan's table. 300 questionnaires were distributed in the stratified sampling method due to the possibility of lack of return and carelessness in filling out the questionnaires; finally, 288 thoroughly completed questionnaires were analyzed

2.3. Research Tools

Two questionnaires were used for doing this research.

Power bases of sports federations' president (PBSP-other) questionnaire from Wan et al. (2000) which included 15 questions in the form of 9-point Likert scale from very correct (1) to very incorrect (9). All three questions measured the same power base.

The questionnaire employees' job satisfaction and job performance obtained from Chen (2005) which included 6 questions and 4 questions in the form of 5-point Likert scale from strongly disagree (1) to strongly agree, respectively (5).

2.4. Evaluating Reliability and Validity of the Research Tools

Content and face validity: After translating the questionnaire, the ideas of 30 experts in the fields of language, management and physical education were considered for determining and approving the content and face validity of the questionnaire.

Reliability: To evaluate the reliability of the questionnaire, internal consistency (Cronbach's alpha) was applied. The alpha of power bases, job satisfaction and job performance were r= 0.95, r= 0.83 and r= 0.66 respectively.

2.5. Research Methodology

300 questionnaires were distributed among the participants; however, only 288 perfectly completed questionnaires were collected during a four-month period.

2.6. Statistical Methods

To analyze the data, the $SPSS_{16}$ software was sued. Descriptive statistics was used for calculating frequency, mean, standard deviation and percentage. To test the hypotheses, first, Kolmogorov-Smirnov test was used to determine the normality of data distribution and the parametric test of Pearson correlation was applied for specifying the relationship between the research variables. Then, the criterion variables were predicted using hierarchical regression analysis.

3. Results

Descriptive Findings

Men and women constituted 70.8% and 29.2% of the participants, respectively. 11.1% had high school diploma, 52.4% Bachelor's degree, 16% Master's degree and 5.9% Doctorate degree. The age of 35.4% of the research participants was between 31 and 40 years old, 23.6% between 41 and 50 years old, 21.9% over 50 years old and 19.1% below 30 years old. In terms of job experience, 22.9% had 6 to 10, 20.5% between 1 and 5, 16.7% more than 20, 14.6% between 16 and 20 and 14.6% between 11 and 15 years of experience. Only 10.8% had one year job experience. As far as coaching was concerned, 21.2% had international, 18.1% level-one, 17.7% national, 13.5% level-2 and 6.2% level-3 coaching certificates.

Table 1. Mean and standard deviation of components of power bases of sports federations' presidents from employees' viewpoints

Variables	Mean	St. dev	K-S	sig
Reward	5.90	2.01	1.21	0.11
Coercive	4.88	2.17	1.42	0.09
Referent	6.42	2.03	1.51	0.08
Expert	6.03	1.89	1.29	0.07
Legitimate	6.95	1.87	1.57	0.06

According to Table 1 which shows mean and standard deviation of sports power bases of federations' presidents from the viewpoints of the employees, the mean of legitimate power (6.95) was more than other components of sports power bases. Mean of punishment power (4.88) was lower than other components.

Table 2. Mean and standard deviation of employees' job satisfaction and job performance

Variables	Mean	St dev	K-S	Sig
Job Satisfaction	3.92	0.73	1.31	0.056
Job Performance	4.20	0.95	1.42	0.051

According to Table 2 which indicates mean and standard deviation of job performance (4.20) was more than of mean of job satisfaction (3.92).

Testing the Hypotheses

There was a relationship between power bases of federations' presidents with employees' job performance and job satisfaction.

Table 3. Pearson correlation coefficients for the relationship between total sport power bases and employees' job performance and job satisfaction

Variables	Mean	Sig
Job Satisfaction	0.155	0.008
Job Performance	0.158	0.007

In Table 3, Pearson correlation coefficients demonstrate a significant relationship between power bases of federations' presidents with employees' job performance and job satisfaction ($P<0.01$). Therefore, the null hypothesis was rejected and the alternative hypothesis was confirmed. Power bases of federations' presidents had a significantly positive relationship with job performance and job satisfaction.

Table 4. Pearson correlation coefficients for the relationship of each sports power bases with employees' job performance and job satisfaction

Variables	Job Satisfaction	Job performance
Reward	.057	.094
Coercive	.062	.134[*]
Referent	.246[**]	.100
Expert	180[**]	.255[**]
Legitimate	.150[*]	.078

Table 4 demonstrates Pearson correlation for job performance, job satisfaction and power bases. There was a significantly positive relationship between job performance on the one hand and coercive and expert on the other; however, it did not have any significant relationship with reward, referent and legitimate. Job satisfaction had a significantly positive relationship with referent, expert and legitimate powers but no significant relationship with reward and coercive ones. Power bases of federations' presidents (reward, coercive, legitimate, referent and expert) were proper predictors for factors of employees' job satisfaction and job performance

Power bases and job performance: Using hierarchical regression, legitimate and referent powers were entered into the equation and 8.8% of changes in job performance were explained. Since F (2.258) =13.83, P<0.001 was obtained after the analysis of sum of squares in hierarchical regression analysis, the relationship between the above variables and job performance was significant. The following table demonstrates the square of multiple correlations (R2) and regression analysis.

Table 5. Hierarchical regression analysis for the relationship between power bases and job performance

Components	B	St co	t	R^2	Sig
Referent	0.222	0.441	4.95	0.065	0.001
Legitimate	-0.113	-0.240	-2.69	0.023	0.007

The results of the above table showed that prediction equation consisted of:
Job performance= 0.113 (legitimate) – 0.222 (referent) + 5.179
The summary of regression analysis showed that referent was a better predictor for the job performance. 6.5% of job satisfaction determined through referent and legitimate explained only 2.3% of changes in the job performance.

Table 6. Hierarchical regression analysis for the relationship between power bases and job satisfaction

Components	B	St co	t	R^2	Sig
Referent	0.126	0.352	77.4	0.060	0.001
Reward	-0.061	-0.168	-27.2	0.017	0.024

The results in the above table showed that prediction equation was as follows:
Job satisfaction = 0.061 (reward) – 0.126 (referent) + 3.46
The summary of regression analysis showed that referent was a better predictor for job satisfaction. 6% of job satisfaction determined through referent and reward explained only 1.7% of the changes in job satisfaction.

4. Discussions

The main axis of each organization's efforts is a competent manger who believes in the role of his/her influence and power. Power of each manager is the key and main principle in every organization since no organization can be established and no order can be implemented without power (17, 2). If a manager is the effectiveness mastermind of every organization, the employees are the beating heart and stout hands of that organization for fulfilling its effective goals and paving this way via their own efforts and actions. Among the smoothing variables of this challenging way, power bases of the manager with job performance and job satisfaction of employees can be referred to. According to the findings of the present research:

The employees of sports federations considered power bases of federations' presidents in the following way and order: legitimate, referent, expert, coercive and reward. Similar to most of other governmental and official organizations with a hierarchical structure, in sports federations, organizational rules and regulations play a main and powerful role; the higher the legitimate power and manager status, the more his/her influence on the employees would be. Seemingly, in sports federations, it is the manager's legitimate power (more than his/her referent and expert ones) which necessitates the obedience and acceptance of his/her orders and this is awarded to every manager by the organization. The reason can be the weak and rigid relations between the federations' presidents and employees, which is merely based on objectives, and this leads to more effect of legitimate power compared with expert, technical, knowledge, referent, charisma, attraction and even reward powers. Another reason may be that employees, especially at the level of chiefs and vice chiefs of committees, perform their duties only according to the official and written orders and rules of their managers. This result was confirmed in the findings by Wann et al. (2000) and Rice et al. (2005) while the findings of Mozafari and Tabaeyan (2004), Nourbakhsh and Mohammadi (2004), Ramezaninejad et al. (2010), Burk and Wilcox (1977), Batman (1996), Lee (2008), Karimi 2004)and Rahim (1989) did not approve that.

The relationship between power bases of sports federations' presidents with employees' job performance and job satisfaction showed that: job performance had a significantly positive relationship only with expert and coercive power bases. As far as expert power of the manager and its positive relationship with employees' performance is concerned, it can be said that the employees may feel that their managers have skill, expert, knowledge and experience in that specific field and they do not have

these elements or have them at lower levels. Thus, they require themselves to follow their managers and as a result increase their job performance (12, 13). In terms of the relationship between coercive power and increase of job performance among the employees, the argument can be somehow complicated. Probably, the employees do not have the feeling of responsibility, capability, preparation and interest in their duty and work and may be only required to do their activities by the coercive power of their superiors (17, 13). Since they do their tasks in contrast to their propensity and by force, an increase in performance may happen at first; however, the emphasis on this type of power in a long run can lead to resentment, hostility, frustration, despair and discouragement and probably decrease in their performance (11). Another analysis with regard to this result can refer to the positive aspect of punishment. Some researchers believe that coercion of employees may cause modification of their attitudes, behavior and performance at both levels (17, 18, 13). In terms of the increase in job performance as a result of the application of expert power, these results were confirmed by the findings of Ramezaninejad et al. (2010), Mozafari and Tabaeyan (2004), Batman (1999) and Lee (2008) (35, 30, 5, 23). They were not confirmed by the findings of Sheridan and Verdenburgh (1978), Thamhain and Gemmill (1974) and Student (1968).The positive relationship of applying coercive power and increase of job performance, which was found in the current work, was also confirmed by the findings of Bachman et al. (1968) and Student (1968); however, the results of Ramezaninejadet al. (2010), Bachman et al. (1966), Sheridan and Verdenburgh (1978) and Verhost (2004) did not confirm them. Another finding of this research was on the correlation of job satisfaction of employees and power bases of managers which was in the following order: referent, expert and legitimate. For the interpretation of this result, it can be said that an organization's manager may be accepted by the employees, generate positive attitudes among them and result in job satisfaction due to having referent power, i.e. popularity, reliability, attraction and respect. On the other hand, the employees may perform their tasks and duties with complete satisfaction and in correct and timely manner due to the existence of technical, knowledge and expert, precise recognition of objectives, obstacles and challenges, sensible judgment in the evaluation of affaires, i.e. expert power, among presidents of the federations; this can somehow indicate job satisfaction. This result that legitimate power of a manager generates job satisfaction among employees is not a far-fetched issue. Perceiving legitimate behaviors in the organization such as promoting, training, paying and improving which are subsidiary factors of job satisfaction and are paid and

implemented for the legal responsibilities of the person may affect job satisfaction (17, 16). These results were also observed in the findings by Dunne (1978), Ramezaninejad et al. (2010), Burk and Wilcox (1977), and Elangovan and Jia Lin Xine (2000). Rahim (1989) found that increase in job satisfaction can be only achieved by referent and expert powers and had a negative relationship with legitimate power. In the findings by Slocum (1970), there was a positive relationship between job satisfaction and referent and expert powers and a very weak relationship with legitimate power. Moreover, Cope (1972) reported a very low positive relationship between all three power bases and criterion variable of job satisfaction.

The results obtained from hierarchical regression showed that referent power and legitimate power were proper predictors in terms of job performance and power bases in order. As far as the relationship between job satisfaction and power bases is concerned, referent power and reward power were proper predictors. The interpretation of this important finding that referent power is a proper predictor for the relationship with job performance and job satisfaction reveals that having the spirit of charisma, acceptable behavior, being a model in terms of behavior, attitude and thought and respectable personality of the manager influence employees in the first place; second, it can probably predict the outcome variables of employees' job performance and job satisfaction in the positive direction. Probably, it is better to return to the idea of Bertrand Russell (1938) in terms of the dimension of referent power; he believed that referent power of the manager comes from persuasion capability of the individuals and is a function of honesty, attraction, popularity, mutual reasoning power and considering individual freedom in presenting ideas. With the power of knowledge and referent as the most popular tool of influence, success horizons of the organization would be expanded, which is an emphasis for the final finding of the present research that referent power was a better predictor for employees' job performance and job satisfaction.

5. Suggestions Based on the Results

The findings of this study showed a positive relationship between power bases of sports federations' presidents with employees' job performance and job (both from the viewpoint of the employees). Also, referent power was a more proper predictor for job performance and job satisfaction. Therefore, it is recommended for the employees of organizations, especially sports organizations, to choose the managers who are expert in their related fields and have personal and attractive attributes and characteristics which can generate voluntary obedience and respect, not obligatory and legal ones, in the employees. Considering the significant and non-

significant relationship between coercive and expert powers and referent, reward and legitimate powers in order, it is recommended for the employees to choose those managers who tend to encouragement and legal tools since obligatory and punishment tools would be useless and generate tension in a long run. Considering the positive relationship between coercive power and job performance and the positive relationship between legitimate power on the one hand and job satisfaction on the other, it is suggested to conduct this study in other governmental and sports organizations (such as Physical Education Organization) and non-governmental organizations in order to determine that the dependence of employees on governmental systems has created such results and that, in some organizations, the first reason for job performance and job satisfaction is the referent and expert powers of the manager.

Considering that this study investigated power bases of the presidents and employees' job performance and job satisfaction, it can be theoretically recommended to study the variable of employee readiness along with these variables.

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The Study of Factors Pertaining to Administrators' Empowerment Kaleibar schools, Iran

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Abstract : The purpose of the present descriptive study was to analyze the factors associated with empowering administrators in Kaleibar schools, Iran. The population of the study includes all 114 administrators in Kaleibar region. The sample comprises 86 administrators who were selected based on stratified random sampling. Thomas and Woolthoss' empowerment questionnaires, as well as a questionnaire, measuring the factors influencing the empowerment, were employed to collect the data. Pearson Correlation Coefficient was used for analyzing the data. The results show that there is a significant relationship between education, job satisfaction, and information technology and administrators' empowerment. However, no significant relationship was observed between motivation and cooperativeness and the administrators' empowerment.

1. Introduction

Nowadays, the survival and existence of any organization depends on the empowered, motivated and efficient personnel. Therefore, most organizations try to adopt different approaches to empower their personnel. For example, Stead and Lee (1996) have used two historical approaches for training their personnel. The first approach for training human resources is a sort of development in education, and its main focus is on organizational learning which contributes to the betterment of the skills, knowledge and cognition. The second approach has much deeper and widespread root and focuses on the mutual effects of the immediate organizational, national and global needs. Training human resources includes organized learning experiences offered to the personnel to bring about the possibility of improving their performance and/or their personal growth (Nadler, 1989). According to Horwitz et al. (1995), training human resources is closely related to using processes that help a nation attain knowledge and prerequisite skills to fulfill their specific professional duties and other social, cultural, political and intellectual roles. In modern organizations, administrators are responsible for not only providing the prerequisites, resources and opportunities for learning and empowerment, but also they aim at self-development and continuous development. Self development emphasizes on the main responsibility of the learner in identifying the needs, determining goals, selecting methods, instruments, place and time of learning, as well as assessing the results (Peddler, 1994). Training manpower either by the organization or by a person himself/herself should be aimed at empowering individuals.Though no single comprehensive definition

has been offered for empowerment so far, it may be categorized into two sets. The first set includes the views of scholars who consider empowerment as a process of creating occupational motivation in an individual (Zimmerman, 1990). In the second set of definitions, empowerment is considered as an intellectual psychological pattern. Conger and Kanungo (1998) believe that any approach that promote the right for determining destiny and the feeling of being capable among employees would lead to their empowerment. Different approaches have been offered for empowering employees. In their field study, Quinn and Spreitzer's (1997) categorized them into mechanical and organic approaches. According to mechanical approach, administrators can empower employees if they share information with them, create appropriate organizational structure, replace traditional hierarchy with unity, provide educational opportunities and reward risks, innovations and creativities. In the organic approach, empowerment includes the following five dimensions: the sense of fitness, independence, effectiveness, significance and self-confidence.

Due to the significant role of education and training in educating the new generation for taking social responsibilities in the future, there is an urgent need to pay more attention to human resources involved in education and training. The improvement of working conditions and increasing the workers' satisfaction and sense of security and coordinating the efforts to organize the available facilities and resources in order to achieve the goals and reinforcing the morale of the workers and preparing them for flourishing creativity and innovation in the students' potential talents are among the responsibilities of

school administrators (Behrangi, 2004). An effective school comprises a group of innovative and thoughtful people who have common goals and cooperate with school sincerely via sharing their experiences and knowledge with their colleagues and school administrators. Moreover, the capable administrators do know that the employees' peculiar talents and capabilities can have a key role in increasing the learners' and school members' mental, moral, cultural and behavioral improvements. Thus, such administrators try to exploit all capabilities of their employees, teachers and students through creating an open organizational atmosphere and co-operational organizational culture.

Several factors are involved in empowering the personnel and administrators including education, motivation, participation, job satisfaction, and information technology.

The employees need new skills. They have to keep on learning and have opportunities for learning in order to be considered as the real stakeholders in the organization (Scott and Jaffe, 2004, p. 128). The only way to ensure success in long term is to teach people to grow in a mutual learning environment (Tichy and Cohen, 2002, p.128.). At schools, the administrators continuously improve their capabilities and skills by creating knowledge; they learn to change in the course of time and continuously improve their performance.

Generally, education has always been considered as a reliable means in improving the quality of operations and solving administrative problems, lack of which is considered as one of the basic and problematic issues in any society. Thus, in order to equip the personnel with the needed abilities, training them is among the most significant measures and factors constituting the improvement of the organizational affairs (Beheshti Ruy, & Shariatmadari 2010, p. 99). Studies by Abdoli (2010), Azizi et al. (2010), Sagnak (2011) and Karimi et al. (2011) indicate that there is a high correlation between education and increasing the capabilities of the personnel.

The human resources of an organization are capable of learning, innovation and creativity. If the motivation and interest are created in them in appropriate ways, long term survival of the organization is ensured (Bontis et al, 1999). Therefore, one of the most important duties and goals is the management of organizations in order to employ skillful, committed and motivated personnel and to retain them. Adelnejad (2007) mentions that respecting people is the best way to motivate them to do something. In a similar vein, Hodavand and Sadeghian (2007) state that respecting employees and treating them as a respectable human being as well as being flexible in meeting their needs can lead to the

motivation. The results of study by David (2002) and Hanifi, & Rahimi (2009) confirm that there is a positive correlation between motivation and the administrators' empowerment. The organizations that encourage their employees' participation in different activities and create a sense of proprietorship and responsibility in them create commitment to their organization and increase the probability of their independence; such organizations continuously empower their employees and increase their capabilities at all organizational levels (Gillespie et al, 2007).

The empowered people posses authority, creativity and capability to manage their own affairs; the empowerment creates a sense of proprietorship and responsibility in the organization (Beach, 1996). Studies by Rasooli (2009), Spritzer (1992), (Emam Gholizadeh et al, 2010). and Zarei and Bargayi (2009) indicate that there is a significant and positive correlation between participation and administrators' empowerment. Job satisfaction refers to a sense of positive attitudes and feelings that people develop towards their jobs; such a feeling creates a positive feeling towards their psychological and emotional attitudes (Moghimi, 2006).

An individual's satisfaction affects his/her commitment which, in turn, affects his/her attempts and final performance; job satisfaction is a prerequisite for organizational commitment (Kuhestani, 2007). Job satisfaction accelerates individual effectiveness, creates satisfaction and helps the learner learn new job skills quickly (Asgari, 2006). Several studies have indicated that job satisfaction is among the most effective factors in productivity and the employee's commitment to the organization, their sense of belongingness to the working environment, increasing the quality and the quantity of the job and showing interest in their job (Human, 2003). Studies by Rasooli (2009), Gill et al. (2010), Rinehart et al. (2005). Bitmis and Ergenelj (2011) and Mir Kamali et al. (2009) indicate that there is a correlation between job satisfaction and administrators' empowerment.

The 21'st century is called 'the age of information' (Ebadi, 2005). Thus technical and technological skills are essential for the administrators' success. School administrators have to learn information technology, computer communications, virtual education and web-based planning to work in society and train effective learners for performance in international spheres. The administrators' mastery of information technology and their use of different virtual channels for improving and developing school management system enable them to make deep changes in teaching and learning strategies in the classroom. The more the administrators' competence

and capability in this area, the more dynamic and prosperity school we would have.

Studies by Graham. (2001) and Dawson, & Newman (2002) show that there is a correlation between skill in information technology and the administrators' capabilities. Following the review of literature presented here, the present study attempts to gain more information by identifying and studying the factors affecting administrators' empowerment at school

2. Material and Methods

The present study is an applied study in pursuing its goals/objectives and a descriptive (correlational) one in its data collection. The population of the study included all 114 school administrators (academic year 2011-2012) in Kaleibar in East Azerbaijan, Iran. Using Morgan table, the sample was estimated to be 86. The selection of the participants was based on stratified random sampling.

The data for the study were collected using two questionnaires: A. Tomas and Woolthos empowerment questionnaire: It includes 19 questions in which the responses have been arranged in a 5 point Lickert scale. Scoring of the questions ranges from 1 to 5 (5 means 'I completely agree', and 1 means 'I completely disagree'). Reliability of the questionnaire was estimated to be 0.82 using Cronbach Alpha. B. The second questionnaire was used to collect the data regarding the factors involved in administrator' empowerment: This questionnaire includes 38 questions in which the questions have been arranged in

a 5 point Lickert scale. The scoring ranges from 1 to 5 (5 means 'very much' and 1 is 'very little'). This questionnaire has already been used in Niazi's research with a reliability of 0.81.

For data analysis descriptive statistics and Pearson correlation were used

3. Results

Table 1: Statistical description of administrators' empowerment and the related factors

Factors	M	SD	Min	Max
Empowerment	63.72	8.17	50	90
Education	18.33	3.26	11	25
Ability to participate	22.82	3.61	12	32
Job Satisfaction	47.79	5.43	35	61
Motivation	26.36	4.45	16	35
Information technology	16.56	1.97	9	21

As illustrated in Table 1, the highest average is in job satisfaction with a mean of 47.79 and a standard deviation of 5.43, and the lowest average belongs to information technology with a mean of 16.56 and standard deviation of 1.97. The average of 63.72 with a standard deviation of 8.75 indicates that respondents believe in their empowerment more than average.

The results of the hypotheses 1-5 testing are summarized in Table 2 below:

Table 2: Correlation coefficients among the factors of administrators' empowerment

Results	Sig	r^2	Hypotheses
accept	0.004	0.344	education and empowerment
reject	0.344	0.119	motivation and empowerment
reject	0.770	0.038	participation and empowerment
accept	0.001	0.438	job satisfaction and empowerment
accept	0.000	0.423	information technology and empowerment

As Table 2 shows, the correlation coefficient between education and empowerment has been estimated as 0.344 which is significant at 0.005. Moreover, correlation coefficient between the factors of job satisfaction and information technology is significant at p≤0.005. No significant relationship was observed between the factors of motivation and ability to participate and the administrators' empowerment.

4. Discussions

One of the important health problems in many developing countries is cervical cancer [7] which is the second most common cancer among women worldwide [8,9] so that approximately 450,000 new cases of cervical neoplasm are diagnosed each year in the world [10].

The cervical cancer incidence is higher in countries where screening programs are poorly [11,12]. One of the major causes of cervical cancer remains the most common cause of cancer deaths among women in developing countries is failure of screening programs in these countries [13].

Many cases of cervical cancer are preventable by screening programs. Some studies in deveioped countries demonstrate can be reduced by screening [14-18].

There are several methods to screen for cervical cancer. One of these methods is direct visual inspection of the cervix after the application of 5% acetic acid (DVI).

Because of its ability to in detecting cervical cancer is nearly equivalent to cervical cytology some studies have recommended this method [19-23]. This

method is cost effective and justified for screening [24]. Another successful method for cervical cancer screening is Pap smear [9].

The current study was designed to compare the DVI and Pap smear in diagnosis of precancerous lesions of cervix.

Recent studies have shown direct visual inspection (DVI) has high sensitivity for detecting the premalignant cervix lesions [6,13,25] for example, in Denny et al survey, 2754 women were screened by DVI that can be diagnosed 70% of cases of high-grade SILs (CIN Grade 2, 3) in this study [13].

Another study with equivalent design has done in Egypt; DVI had a sensitivity of 85% for pre-malignant lesions compared with 16.9% for cervical cytology [25]. However, sensitivity of DVI was reported from 75% to 100% in several studies [6,13,25-27]. Our results confirm these finding because in our study, sensitivity of DVI was 88.8%.

Sensitivity of the Pap smear in detecting pre-malignant lesions has been reported between 16 to 85 percent [6, 25, 27-29]. In this study, sensitivity of Pap smear was 37.5%.

The specificity of the Pap smear is more than DVI, although its sensitivity is less than DVI [6, 25]. In De Vuyst et al survey, specificity of Pap smear (94.6%) was higher compared to that of DVI (80%) [30]. In our study, specificity of Pap smear and DVI were 99.06% and 99.9%, respectively.

In several studies, positive predictive value of Pap smear has been reported lower than direct visual inspection (DVI) [25, 29]. Our results confirm these finding because in our study and PPV of DVI is better than Pap smear (PPV of Pap smear and DVI were 42.85% and 88.8%, respectively).

Sensitivity and specificity of DVI is higher than Pap smear and its cost effective [13, 25 26]. In our study, these results obtained, so we suggest direct visual inspection can be used as a primary screening tool with a satisfactory low biopsy rate in developing countries.

5. Conclusion:

Current survey shows that we can use a simple and inexpensive method to find malignant and pre-malignant lesions of cervix. Especially in the societies which there are not all the conditions resulting in effectiveness of screening methods such as Pap smear, in reducing the prevalence and mortality of cervix cancer, using a simple diagnostic method like DVI for all cases and referring the suspected ones to get final diagnose and be treated is critical. Direct visual inspection (DVI) is feasible and easy to perform with superior sensitivity and specificity to Pap smear in detecting cervical premalignant and malignant lesions.

It seems that the important and basically problems which if be solved can reduce the cervix cancer are unconsciousness of most society people ,with any socioeconomically levels ,about the importance of screening and its method also the risk factors of this cancer such as smoking and unsafe sexual relations.

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Relationship between Manufacturer Product Strategies and Supply Chain Inventory in a Company

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Abstract: The purpose of this study was to review the relationship between manufacturer product strategies with supply chain inventory an Iran Company. For this purpose the relationship between manufacturer product strategies with hierarchical structure and flexibility manufacturing strategies with supply chain inventory were investigated. This study is of applied and survey type. The statistical society used in this research include, marketing managers, production and financial managers and industry engineers that work in Company. The number of mangers mentioned above is 25 that were chosen as our statistical society.   The capacity of sample statistic is equal of 20 that, is selected by class accidental sampling.The methods of gathering of information in this research is questionnaire. Also designed on the basis of 5 selection Likert scale. The Crombach was equal a=0.855 and it has enough credit.   In this research the relationship between manufacturer product strategies and supply chain inventory collection from among the scholars in different parts of the   industry who are working in production management, financial management, industrial management and marketing departments of different firms and the case sample comprised warehouse suppliers' chain of the firms. The hypotheses of this research are analysed by Chi-square test and variance analysis (ANOVA) of statistic exam. The results of research show that there is no relationship between the manufacturer product strategies and hierarchical structure but there is a relationship between supply chain inventory and hierarchical structure. Similarly, there is a relationship between flexible manufacturing strategies and supply chain inventory.

1. Introduction

The main purpose of determining organization strategy is product and activity market selection. In other words, the aim of supply chain is defining that which of the existing products of an organization must be characterized as main and strategic purpose of the organization in terms of existing markets and is aligned with the organization's mission. Producers have benefited of on time production and other management initiatives to improve the effectiveness of their production. So selecting the most appropriate strategies to produce products with inventory supply chain in any manufacturing organization is necessary. Integrated global economy has required companies to use more appropriate tools. Generally, the definitions introduced during the last three decades are due to the introduction of production strategy, and different definitions have been offered by theorists. The first definition of the production strategy was offered by Skinner (Skinner) in 1969 and he defined product strategy as exploiting the manufacturing features and capabilities as a competitive weapon, and defined the strategy of producing like this: "Production Strategy is a series of coordinated decisions

in the manufacturing sector that is in line with business strategy and causes long-term competitive advantage in the company." Meanwhile, in the warehouse supply chain management, orders were created only by modified data of companies, but now information technology allows companies to share on demand and valuable and faster data are gained by inventory. In determining warehouse supply chain, always the producer is the decision-maker. Also, Product manufacturer's strategies should be taken into consideration in inventory supply chain designing. Companies using the results of this study can use it to select the appropriate strategy to develop their markets. It is also used as a template in selecting methods to develop its activities in relation to their internal and external suppliers. Eventually, it can use these results in its strategic decision-makings.

2. Research Literature

Theoretical review of this study includes the definition and classification of three strategic levels and three flexible levels of companies in the manufacturing system. Then, by providing concepts and attitudes of supply chain, conceptual framework of supply chain

inventory; it has explained the relationship between supply chain inventory communication and manufacturer product strategies. Below are brief outlined definitions of each concept:

2. 1. Strategic levels:

Three levels are defined in the company for strategic planning, according to figure (1) as follows (Jafarnejad, 2009): The company strategy: strategy covers the major decisions in the company. These cannot be decided decentralized or by lower level managers. Based on the firm's strategy, the decision was made due to the scope of operations and businesses that our company wanted to participate. In this level of firm's strategy, the decision was made about horizontal and vertical mergers of company and growth or downsizing of companies.

Table 1. Central and distribution indices of questions about first hypothesis

Residual	Expected N	Observed N	
-54.0	78.0	24	Very low
22.0	78.0	100	Low
37.0	78.0	115	Average
35.0	78.0	113	High
-40.0	78.0	38	Very high
		390	Total

Business strategy: This strategy, how to compete in any business is considered. Business managers make decisions on competitive advantage of any business according to company's overall strategy.

Functional strategies: functional strategies focused on creating capabilities that guarantee business strategy success. Company's functional strategies include: (financial, human resources, technology, purchasing, production, marketing and R & D). A strategic vision of functional parts means that these sectors can be coordinated better with higher level strategies than competitors. According to this view, the production strategy is considered as a functional strategy that is designed to support the company's business strategy. The first definition of the Skinner about production strategy was produced in 1969. He defined production strategy as benefiting of exploiting the product features and manufacturing capabilities as a competitive weapon. But theorists have offered different definitions afterwards. In general, the production strategy definitions can be classified into two categories. Basis of this classification is related to the role of strategic production. Based on these concepts, it can be said that: the production strategy is a series of coordinated decisions in the manufacturing sector that is in line with business strategy and causes long-term business advantages in the company and at the same time, production strategy is a vision that differentiates a company from other companies in the industry and creates stability in decisions and gives orientation to organizational activities. (Jafarnejad, 2009).

2.2. Flexible levels in manufacturing system:

There are three different levels according to Figure 2 in flexibility of manufacturing system:

Table 2. Central and distribution indices of questions about second hypothesis

	N	Mean	Sd.deviation	Sd.Erro	Lower Bound	Upper Bound	Mimimum	Maximum
Organic Strategy	20	6.700	1.26074	.28191	6.1100	6.1100	4.00	9.00
Flexibility Strategy	20	12.0500	1.50350	.33619	11.3463	11.3463	8.00	15.00
Process Strategy	20	7.0500	1.39454	.31183	6.3973	6.3973	5.00	10.00
Focus Strategy	20	3.6000	.88258	.19735	3.1869	3.1869	1.00	5.00
Differentiation Strategy	20	6.7000	1.68897	.37767	5.9095	5.9095	4.00	10.00
Total	100	7.2200	3.04704	.30470	6.6154	6.6154	1.00	15.00

2.3. Strategic level, production system level and production sources

In Strategic level, the external flexibility manufacturing system is considered, i.e. the flexibility of company in dealing with customers and suppliers is considered. Strategic flexibility (external) can be divided into two groups of outputs and inputs flexibility. Output flexibility is related to company's products and input flexibility is related to primary sources. Lack of proper understanding of the company's flexibility levels leads to assessment criteria interference and ultimately, leads to incomplete or incorrect evaluation of flexibility. Researchers have introduced different dimensions for each level which include: A - Outputs flexibility that includes product flexibility, product mixture flexibility, product volume flexibility and delivery flexibility; B - production system flexibility includes capacity, physical size, production pack size and total delay time c - manufacturing resources flexibility includes multi product machines, machine setup time, labour force skills and materials management system. In Production system level, rate of flexibility of production system to achieve external flexibility is assessed. In fact, in the first level, flexibility is discussed regarding the external environment, while in the next two levels, the internal features are considered to achieve flexibility. (Same source)

2.4. Manufacturer Product strategies:

In Figure 3, the status of manufacturer product strategies are shown. In this regard, R. David has provided strategies that are as below (David, 2005):

Table 3. central and distribution indices about questions of third hypothesis

	N	Mean	Sd. dev	Sd. Err	Lower Bound	Upper Bound	Min	Max
Organic Strategy	20	6.700	1.26074	.28191	6.1100	7.2900	4.00	9.00
Flexibility Strategy	20	12.0500	1.50350	.33619	11.3463	12.7537	8.00	15.00
Process Strategy	20	7.0500	1.39454	.31183	6.3973	7.7027	5.00	10.00
Focus Strategy	20	3.6000	.88258	.19735	3.1869	4.0131	1.00	5.00
Differentiation Strategy	20	6.7000	1.68897	.37767	5.9095	7.4905	4.00	10.00
Total	100	7.2200	3.04704	.30470	6.6154	7.8246	1.00	15.00

1) **Integration strategies**: This strategy includes integration strategies (vertical upper, vertical lower and horizontal). The aim of vertical upper integration is that a company tries to add its quality by buying distribution companies or retail companies and also tries to obtain ownership or increase control over the distribution system or retailers. Vertical lower integration is one of the strategies in which the company tries to add to its property and control materials suppliers. Horizontal integration is implementation of one of strategies in which companies try to get the ownership of rival companies and add their control over them.

2) **Centralized strategies**: these strategies include strategies focused on penetrating the market, market development and product development. Manufacturers try to penetrate market by introducing new products or services to geographic areas and implement strategies based on market penetration. Product development means the implementation of one of strategies in which a manufacturer aims to add on its sales through improving or modifying products and present services.

3) **Diversity strategies**: Diversity strategies include several different strategies (homogeneous, horizontal and heterogeneous). By homogeneous strategies we mean that a company tries to add new products and services but they are related to old ones, and offers them to current customers. Heterogeneous diversity means that a company provides new products and services which are irrelevant (regarding their own products and services) to the market.

4) **Competitive strategies**: Competitive strategies get help from analysis of industry structure in future to determine competitive advantage. In this regard, Michael Porter's competitive strategies are considered as a benchmark. Strategies that Porter offers need different procedures, control processes and incentive systems (cost leadership, focused and distinct). By cost leadership we mean achieving resources and benefits by using leadership strategies. Also, we want to achieve superiority in competition, using products or services with the least possible cost compared with our rivals. In centralised strategies, focus on

specific groups of our customers, or part of the industry is enough or it benefits potential growth. Distinct strategies also offer special products or services. (David, 2005, pp: 132-136; jurisprudence, 2006, pp: 133-137; Jean and Dunnett, 1999, pp: 131-143).

2.5. Supply chain:
The concept of supply chain emerged when manufacturers experienced strategic partnerships with their suppliers directly (Haji Tarkhani, 2005). Supply chain requires all parts, including parts of a direct and indirect impact on a customer's request. As shown in Figure 4, Supply chain network includes not only Producer and provider, but also material handling, warehouses, retailers and their customers. Supply chain includes some attitudes as follows

Table 4. Chi- square test of first hypothesis

97.359	Chi-Square(a)
4	Df
.000	Asymp. Sig.

2.5.1. Supply chain processes attitude
There are two different ways of viewing formed processes in a supply chain, including push and pull phased press attitude. Push press phased attitude focuses on the processes that were formed within a range of supply chain courses in point of intersection between two consecutive points of each supply chain that has been formed and divided. Pull press attitudes consider processes that have been divided into two categories within the supply chain run by a customer order while push processes have been run and have been formed on the basis of customer orders' anticipation.

2.5.2. Supply chain processes phased attitudes:
Supply chain includes a string of processes and the flow that occurs inside and outside the different growth stages and also it includes a combination of response to customer needs for production. In the five stages of a supply chain that is shown in the figure (5), all supply chain processes have been divided into the four-stage processes of order, replacement, construction and buying.

Table 5. (ANOVA) variance analysis test of second hypothesis

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	627.638	3	209.213	116.698	.000
Within Groups	136.250	76	1.793		
Total	919.160	79			

All of the processes in a supply chain have been divided into the binary categories of one or two of the respective components that ultimately depends on customers' demand. Pull processes are run in order to achieve a response to customers' order. The run time of a push process is not a recognised demand and must be anticipated. A supply chain looks like a mail order to a company like LL.Bean that is shown in figure (6) (Chopra and Mi Dale, 2004).

Table 6. (ANOVA) variance analysis test of third hypothesis

	Sum of squares	df	Mean Square	F	Sig.
Between Groups	740.060	4	185.05	98.137	.000
Within Groups	179.100	95	1.885		
Total	919.160	99			

2.5.3. Organization's strategy against supply chain:

Organization strategy against supply chain is fully connected and related to the overall strategy of the organization and its subsystem. So, firstly the structure of organization's strategy should be determined according to its focus on the market or operations, product or process and then according to this strategy structure, organization's strategy against supply chain should be determined (especially activities related to supplying materials).

In general, the strategy structure can be described as four attitudes bellow: A. Action-oriented strategy: In this type of attitude we try to overcome problems of the organization by changing or improving conditions in the process of innovation (technology) and improvement or innovate in the product; B. Market-oriented Strategy: In this view, the organization constantly reviews and analyzes situations and opportunities in the market; C. Bureaucratic dynamics (product-oriented): In this view, organizations emphasize on product, they are identified and isolated based on the importance of activities and responsibilities conferred to the personnel. D. Group dynamics (Process-oriented): In this view the emphasis is on a process in which the organization's activities are based to be performed; E. Relationship with suppliers: Regarding the capability and interference with the chain of suppliers, there are three categories of: traditional providers, related suppliers and colleague suppliers, and then the needed decisions are made (Farshchi, 2006).

2.6. Supply Chain Inventory:

Supply chain inventory includes a separate communication between the external activities of organization and decisions that lead to the alignment of the Stock (Gerard and Marshal, 2000). Some parts and concepts of warehouse supply chain are as follows:

2.6.1. Supply chain inventory Management:

It includes the use of information technology in order to give shares to companies in demand and inventory control in the warehouse.

2.6.2. Information sharing:

Information technology is a significant effect of the supply chain. Sharing the whole information provide data for all suppliers as listed below: A - improvement and quantity of order policies B – improvement in decisions. Also, sharing information can make the best policy to order (Gerand & Marshal, 2000).

2.6.3. Inventory optimization applications of stock:

This application is in the supply chain for required change in inventories, to serve the total demands of customers by using full capacity and inventory.

2.6.4. Inventory optimization applications in warehouse:

Warehouse Optimization is a part of analytic applications to choose a supply chain to support and make decisions in different times. So that in optimizing the design of the value chain, changes in demand for products, manufacturing or transporting or delay, the threat within the supply chain based on an internal factor can be used. Also a lot of capabilities have already been considered to support multiple programming to optimize the supply chain for a wide range of investment and the stock.

2.6.5. Performance applications Optimization of warehouse:

For each primary commitment to form warehouse optimization data there is an optimization analysis. Internal data are commonly used to anticipate domestic production or demand design in scheduling; overall design and layout value chain (suppliers, manufacturers, distribution centres and customer locations), plus replacing repetitive work; cost data (products, production transportation and storage); the purpose of service levels or punishment factors and budgets limits are applied (Simonellis et al, 2009).

2.6.6. Dependence of supply chain inventory:

Supply chain inventory examines interactions between different decisions in planning and deals with three types of dependency resulting from the nominal demand, time delays and services. Demand dependency is depended to three types of up and down rings of the supply chain demand. (Yung Hufu, 2004).

A selection of applied researches that were done on the subject is as follows:

Martin et al (2001) have investigated highlighted points of multiple strategies in a research entitled "customer-friendly production and production strategy", regarding flexible production strategy literature, swift production and aspects of industrial marketing. In identifying customer-friendly problem solving situations and different kinds of customized product selection some factors are taken into consideration. Showing significant relationships

between designing activity and production volume and excellence among the products that customized products are selected from among them have been studied. Stone - Jay et al (2003) conducted a research entitled studying Effect of strategies in tools application of supply chain. In this research the objective was the analysis of determining the strategies used in management tools of supply chain during the supply parts. Analyses are based on internal interviews of two supply chains in Hungarian automatic industry, where the results of the topic protect the relationship between supply chain strategy and tools (composition and participation). Also alongside the main aim, an attitude about the past, present and future Hungarian automatic industry was presented. (Jenci, 2003). Rotori et al (2005) provided a research entitled "an algorithm for evaluating different warehouse supply chain planning in Sri Lanka". This research studies the purpose of warehouse supply chain planning that includes a manufacturer, distributor and retailer. An algorithm is given in order to evaluate the whole system based on minimal costs of development. This algorithm includes investment in warehouse supply chain, supply chain ordering / set external costs and supply chain storing. The study findings indicate an algorithm to different evaluations of order, production quantities and inventory, and measure the level of service by any number of inventories that is maintained in the supply chain (Rotor et al, 2005). Yong Hui et al (2004) provided a research entitled "a framework for supply chain alignment". The purpose of this study was a traditional warehouse supply chain, which in most cases express a separate communication between the external activities of organization and a week which led to the warehouse supply chain alignment and this relationship depended to a large number of non-alignment. The results of this study indicate an index for the coordination of supply chain through the maintenance costs (Yong Hui, 2004).

Gerrard Bi et al (2000) provided a survey entitled "supply chain inventory management and sharing in value of information". In traditional supply chain inventory management, orders are done from modified corporate data, but now they allow cheap sharing of order to gain technology information quickly to share the demand. The study mentioned includes a unilateral processing. Warehouse maintenance costs and extra costs incurred due to the return of the products are present in this supplying chain inventory. This research was done to compare the present policies with the traditional ones in which it was impossible to share the overall policies but it was possible to make benefits from the data. Also, it is determined that sharing the data with new information technologies causes the cheap and convenient access to ordering processes which causes shorter delays in deliveries of small amount orders. The results suggested that fostering the implementation of information technology and lowering the physical transformations of the goods through the use of a supply chain is more meaningful than the present technology in current data.

3. Research questions

The questions of this research are as follows:

1) Is there any relationship between manufacturer product strategy and hierarchical (push) structure?

2) Is there any relationship between manufacturer product strategy and supply chain inventory?

3) Is there any relationship between flexible manufacturing strategy and supply chain inventory?

4. Methods

The statistical society used in this research include, marketing managers, production and financial managers and industry engineers.

The samples in this research were chosen from among the scholars in different parts of industry who are working in production management, financial management, industrial management and marketing departments of different firms and the case sample comprised warehouse suppliers' chain of the firms. The number of mangers mentioned above is 25 that were chosen as our statistical society. Since our sample in this research includes marketing, production, financial and industrial engineering managers, we can achieve 95% assurance of the resulted findings which is applicable for all of our statistical society.

$$ n = \frac{N \left(Z\frac{\alpha}{2} \right)^2 pq}{e^2 (N-1) + \left(Z\frac{\alpha}{2} \right)^2 pq} = 20 $$

Also, it should be mentioned that our sampling method among statistical society has been random. We have used questionnaires to collect data. The questions related to questionnaires were posed regarding problem statement, research goals and its hypotheses (Hamidi, 2008). In this research Kronbach alpha coefficient was used to identify questionnaires' consistency. Thus, the questionnaires were distributed among management, production, marketing, financial and distribution managers and they were collected after completion. Then the results were analyzed using SPSS16 software in a table shown in appendix 2. The calculated result of Cronbach alpha coefficient for this research was 0/855 which shows the strength of our questionnaires' consistency.

5. Results

In order to analyze the resulted data, main criteria and the distribution of questionnaires' questions and statistical hypotheses' tests were calculated as follows:

5.1. Central criteria and questionnaires questions' distribution:

Central criteria and questionnaires questions'

distribution of each question of hypotheses of 1 to 3 have been shown in tables 1 to 3, respectively. According to data presented in tables 4 to 6, it can be seen that based on viewpoints of those who responded the questionnaires in different parts of production, marketing, financial and industrial engineering department who took part in this research, the average questions related to the first, the average of Observed 115 and Expected .
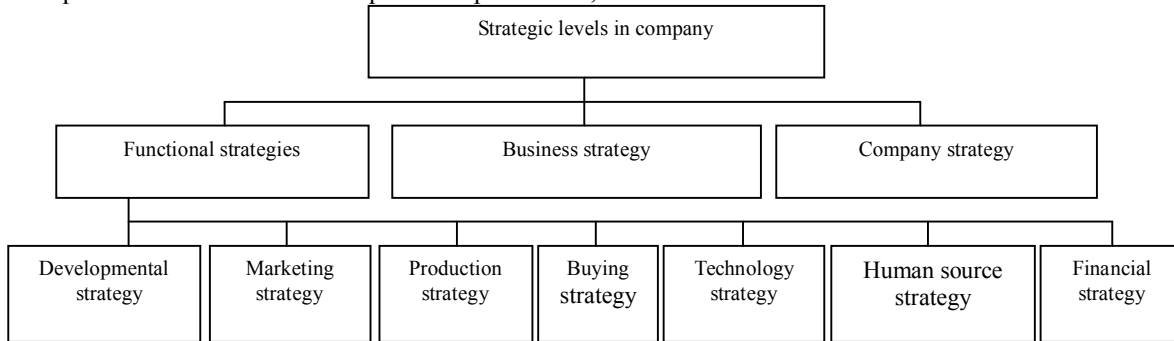
Figure 1. Strategic levels in company
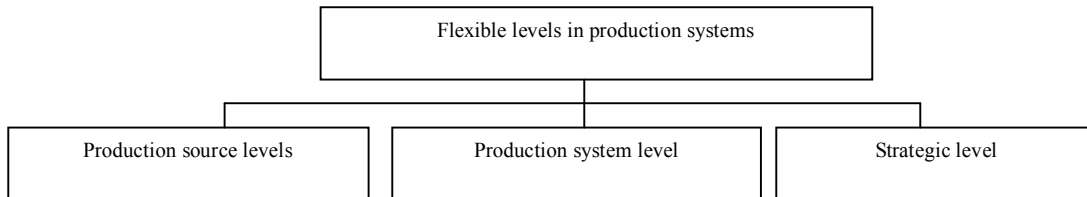
Figure 2. Flexible levels in production systems
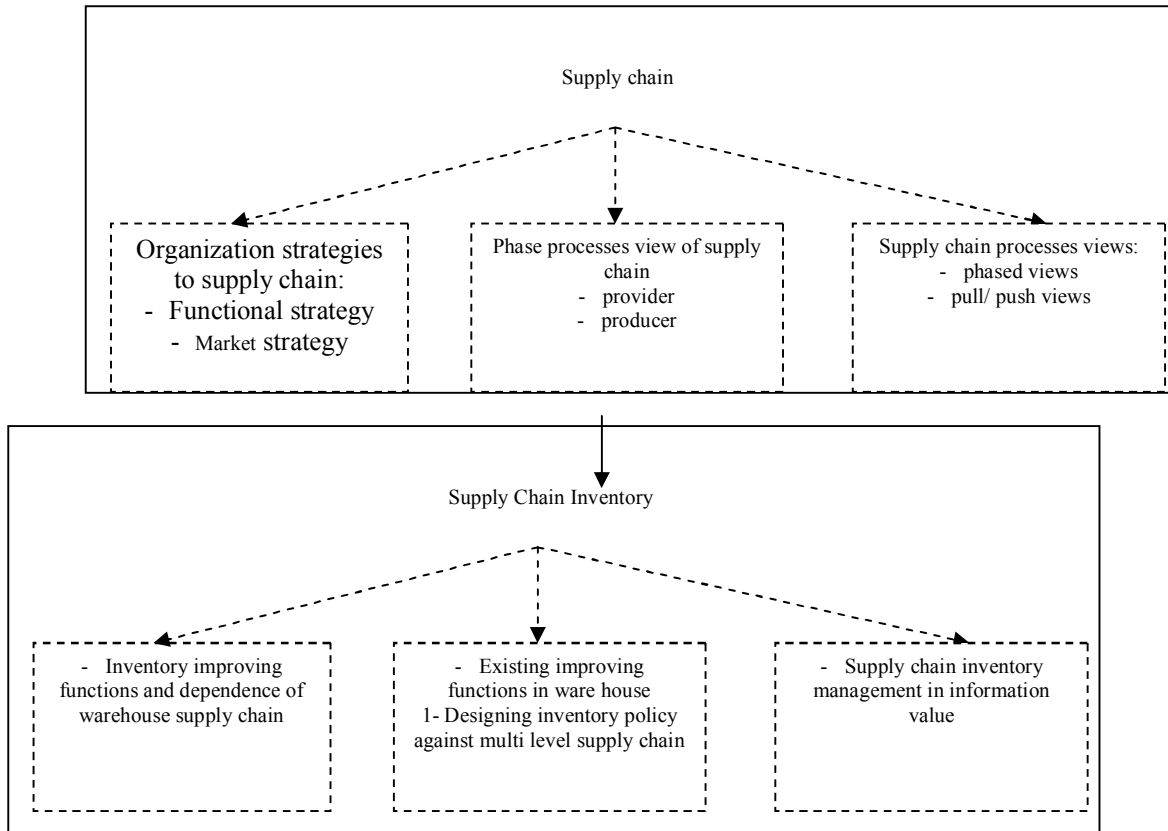
Figure 3. Theoretical frame of survey

0.78, and second and third hypotheses average mentioned the 8/86, and 4/16 with standard deviations of 1/9, 2/02, and 5/05, respectively.

5.2. Testing statistical hypotheses:
First each of the three research hypotheses mentioned above were defined as (H_o, H_1). To test the first hypothesis, Chi-square test was used and in order to test the second and third hypotheses, variance analysis test (ANOVA) was used.

5. 2.1. Testing the first Hypothesis:
H_o: There is not any relationship between manufacturer product strategy and hierarchical structure.
H_1: There is a relationship between manufacturer product strategy and hierarchical structure.
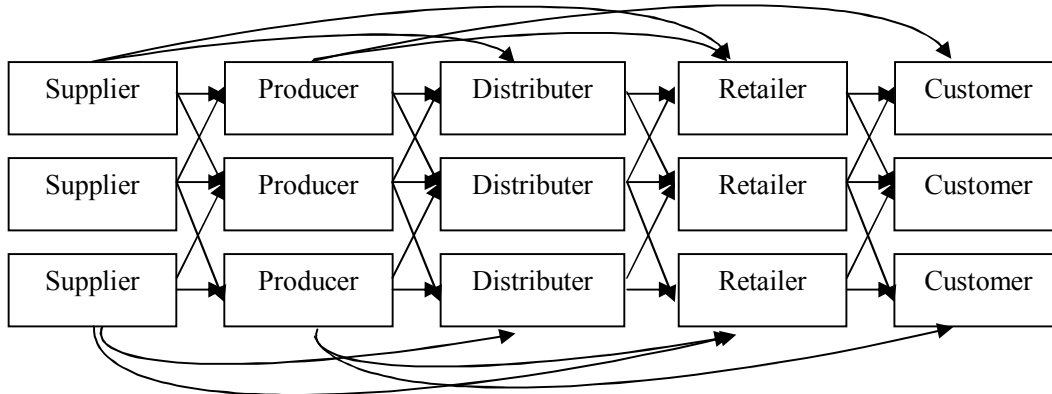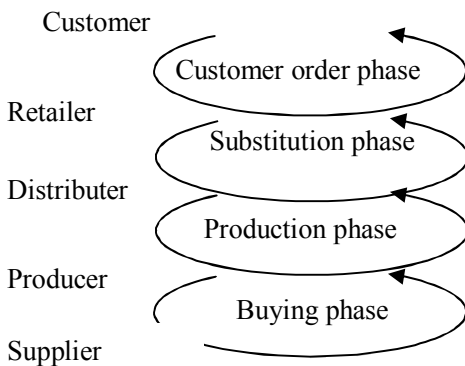According to the data shown in the table 4, it can be seen that based on Chi-square test 97.359, and the meaningfulness level equals P=0.000. Regarding the fact that meaningfulness level is above %5, H_o is rejected and H_1 is accepted.

Figure 4. Supply chain network

Accordingly, Iran Pump Company should consider team work very important and use this strategy to achieve success. Thus, Iran Pump Company should not use cost leadership strategy which emphasizes on the protection of its competition development compared with other rivals which produce products with lower costs.

seen that based on variance analysis test, the F calculated for the second hypothesis equals 93/137 and the meaningfulness level equals 0/000. Regarding the fact that meaningfulness level is below %5, H_o is rejected and H_1 is accepted.

5.2.2. Testing the second Hypothesis:
H_o: There is not any relationship between manufacturer product strategy and warehouse supply chain.
H_1: There is a relationship between production manufacturer strategy and warehouse supply chain.
According to the data shown in the table 5., it can be seen that based on variance analysis test, the F calculated for the second hypothesis equals 116/698 and the meaningfulness level equals 0/000. Regarding the fact that meaningfulness level is below %5, H_o is rejected and H_1 is accepted.

Thus, Iran Pump Company should permanently use this strategy in order to optimize its warehouse supply chain to share the supply chain and share the information.

Figure 5. Pull/ Push view of supply chain processes

5.2.3. Testing the third Hypothesis:
H_o: There is not any relationship between flexible (pushing) production strategy and warehouse supply chain.
H_1: There is a relationship between flexible (pushing) production strategy and warehouse supply chain.
According to the data shown in the table 6., it can be

Thus, Iran Pump Company should permanently use group dynamics strategy which emphasizes on activities in which the organizational structure is organic in it and the internal responsibilities are delivered to groups and the personnel participation in improving production process design to satisfy customers' needs is significant. On the other hand, this prevents compiling the materials in the warehouse and there would be no problems between firm's suppliers in

warehouse supply chain and the firm, so time delays and maintenance costs will be removed.
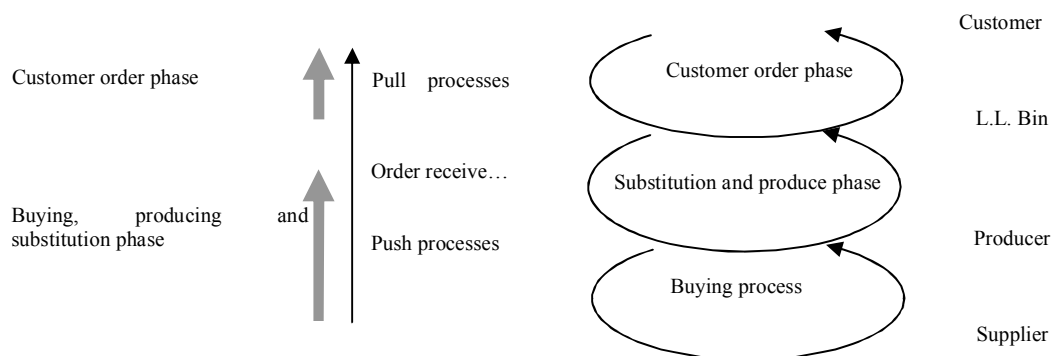
Figure 6. Pull/ Push view of supply chain processes

6. Conclusion and suggestions

Based on the analyses, it is concluded and suggested that:

There is not any relationship between manufacturer product strategy and hierarchical (push) structure; It is suggested that the firm should use production timing processes in order to maximize the orders and to lower its costs it should use phased supply chain processes. There is a relationship between manufacturer product strategy and warehouse supply chain. Accordingly, the firm should use process-oriented strategy with variable conditions in the two cases below: improvement or innovation in product process (technology) and improvement or innovation in product. Thus, it is suggested that using more of this strategy will create innovation and creativity among the staff and scholars in production part and it consistently will try to change the status of manufactured products and will present a product to the market which will surprise the consumers. And this product will achieve the highest level regarding the quality and novelty of its usage. Also the firm will benefit flexibility in its production program and finally it will move forwards both in production technology process and also in product innovation. In such a situation, the firm suppliers' chain is included in a network structure in which is adjusted with decision-making processes vertically and horizontally with high levels of isolation. There is a relationship between flexible (pushing) manufacturing strategy and supply chain inventory . Regarding the fact that flexible strategy application is common among a vast variety of the products, the introduction of new products and the rapid change of products and satisfying the customers' demands is very effective. Thus, the firm should use long-term contracts with its suppliers, deliver products in line with the production pace, permanently decrease the warehouse inventory and delivering time (for both purchaser and suppliers), permanently and cooperatively improve the quality, designing the quality needs cooperatively, designing the

products and the process by the cooperation of the suppliers, and it is suggested that it is better for the firm to use these strategies rather than using product-oriented strategy which emphasizes on the products and all predetermined activities. Also, the firm should use more strategic (external) flexibility which includes the flexibility of outputs in relation with the firm's products. Because if the firm is flexible dealing with the tastes of its consumers, firstly the customers will show more eagerness to purchase the products manufactured by the firm and secondly its products will be more noticed by the customers compared with the products manufactured by other similar firms.

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Artificial Intelligence and Medical Guidelines

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Abstract: Paper guidelines are still the preferred format for the delivery of medical knowledge and recommendations to healthcare professionals. Although their current format and development process have limitations, these can be solved with Artificial Intelligence approaches. The paper presents a comprehensive and up to date review of Computer-Interpretable Guideline approaches, namely Arden Syntax, GLIF, PROforma, Asbru, GLARE and SAGE. It also provides an assessment of how well these approaches respond to the challenges posed by paper-based guidelines and addresses topics of Artificial Intelligence that could provide a solution to the shortcomings of medical guidelines. Among the topics addressed by this paper are Expert Systems, Case-Based Reasoning, Medical Ontologies and Reasoning under Uncertainty, with a special focus on methodologies for assessing Quality of Information for managing incomplete information. Finally, an analysis is made of the fundamental requirements of a guideline model and the importance that standard terminologies and models for medical data have in the semantic and syntactic interoperability between a guideline execution engine and the software tools used in medical settings. We also propose a line of research that includes the development of a new guideline ontology and a decision model for a guideline-based Expert System that manages noncompliance with medical guidelines and incomplete information.
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1. Introduction

There is an increasing pressure in healthcare professionals to standardize their medical practice in order to prevent undesired variations. Medical guidelines are developed in order to achieve this purpose(Kurniawan et al., 2009a). In recent years there has been an explosion of interest in medical guidelines, with initiatives to stimulate guideline development promoted by many countries and healthcare institutions. In fact, medical guidelines are, currently, the best way to convey information to healthcare professionals, to ensure that their medical practice follows the rules of medical procedures. This is a very important matter, if one takes into account the consequences that may arise from a poorly conducted medical process. The prevalence of medical errors is significant in hospitals across the world (Saba and Rehman, 2012; Kalra 2004). Putting aside the human cost, which is immeasurable, the economic cost from lawsuits and other legal issues resulting from medical error has a deep impact in the budget of healthcare institutions. However, an overzealous practice, like defensive medicine, may have equally undesired consequences (Chawla and Gunderman 2008). The prescription of exams and treatments without scientific proof or basis also has a great economic impact and may seriously undermine the confidence that patients have in their physicians. This has consequences in the mental health of patients, as well. The primary objective of medical guidelines is to provide a

scientific support to medical procedures, thus mitigating the occurrence of these situations. However, healthcare professionals still show some resistance towards the compliance with medical guidelines. The arguments used to justify this behaviour are that guidelines stifle change and innovation and restrain medical practice, preventing healthcare professionals from adapting their practice to their social, economic and cultural contexts (Thomson et al. 1995). Guidelines evolved in order to address some of this criticism, through the development of mechanisms to smooth updating processes and to accommodate justified variations in medical practice. Currently, we live in the age of information and, once again, medical guidelines should evolve to keep up with the rapid growth of scientific knowledge. Research in the field of computer-interpretable guidelines is booming, due to the need to deliver information to healthcare professionals in a faster way and to support them in decision making (Bekhti et al., 2012).

In this paper, we start by providing some background information on medical guidelines and how they are developed. Then we address some AI techniques with the objective of determining how AI can improve the current state of the art, the development and the execution of medical guidelines. In the final sections of the paper we give a general presentation of the research line we are following and how it integrates the conclusions extracted from the analysis we made. It goes without saying that a paper

format cannot be compared to a computerized guideline, since the first cannot be processed electronically. The perspective we intend to show is how a digital format can be more advantageous and provide a new set of tools to facilitate the work of healthcare professionals.

2. Medical Guidelines

2.1. What are Medical Guidelines?

Medical guidelines are systematically developed statements to assist healthcare professionals and patients about appropriate healthcare in specific medical circumstances (Miller and Kearney 2004). This is the most widely accepted definition of medical guideline, provided by the Institute of Medicine, of the United States (US). There are other terms used as synonyms of medical guidelines, such as protocols, practice policies, medical policies, practice parameters and medical pathways. Usually, the name given to these documents is a matter of personal preference rather than a reference to a standard nomenclature and it can change across healthcare institutions and countries. Despite these differing nomenclatures, there are common objectives associated (Miller and Kearney 2004) with all of them, such as:

- Help healthcare professionals and patients in decisions about medical
- Procedures;
- Describe appropriate care based on scientific evidence;
- Act as the focus for quality assessment and activity improvement,
- including audits.

Medical guidelines are decision tools devised to shorten the distance between real medical practice and optimal medical practice (Mead 2000). The potential benefits from the implementation of medical guidelines include the reduction of morbidity and mortality, efficiency improvement and cost containment. They also provide their users a reference by which they guide their medical practice and measurable criteria to assess their performance. The evidence contained in medical guidelines is used, at the same time, to inform healthcare professionals of the latest developments in scientific knowledge and to justify their decisions during the medical process (Thomson 2000). The format of these documents is not standardized and shows variations according to the organization producing the guideline and the medical area it addresses (Saba et al., 2011a).

2.2. Development of Medical Guidelines

Each organization follows its own guideline development process. However, the different development methodologies have common phases and follow similar principles.

Initially, guidelines were only based on the consensus of groups of experts, but with the growth of evidence-based medical practice, other techniques were included in guideline development. The Delphi and nominal group techniques are some of the methodologies that were later included in the development process and are still used today (Rehman and Saba, 2011a). Currently, guideline development is more focused on an extensive research of the literature and thorough analysis of empirical evidence. The process usually starts with the choice of the guideline topic or subject, based on the problems that motivate the development (Rosenbrand et al. 2008; Rosenfeld and Shiffman 2006). Medical guidelines can be developed to a wide range of subjects and medical areas, including health conditions bound to diseases and economical costs. To choose the topic, it is necessary to do a preliminary check of the available evidence in order to ascertain the validity of the theme.

The composition of the work group is the following step (Rosenbrand et al.2008; Rosenfeld and Shiffman 2006). The efficiency of the guideline highly depends of the nature of the group producing it. The work group must be multidisciplinary, in a way that includes participants from all the areas affected by the topic of the guideline. Once the group is gathered, the analysis of the underlying problem, to which the guideline must provide a solution, starts. The work group must search for other guidelines concerning the topic, whose existence does not invalidate the creation of a new one, since the existing ones may be outdated. The result from the analysis of the problem should be a set of key-questions that clearly identify the population being studied (the group of individuals who will be the target of the diagnosis or intervention), the type of control used and the efficiency measures that will be used to evaluate the interventions.

The objective of the literature research is to find the best available evidence, capable of answering the key-questions formulated in the previous step. The development group has to define some search constraints (e.g., to privilege a published work over an unpublished one) in order to assure the quality of the evidence. Once all the information sources are gathered, the work group does a critical appraisal of the evidence, based on the methodologies used to do the studies that generated the evidence. The reviews are summarized in evidence tables, with a grade being given to the medical trials that were selected (Rosenbrand et al. 2008; Rosenfeld and Shiffman 2006). Healthcare institutions that produce guidelines do not have a common grading system, which is inconvenient when one has to compare the evidence of similar guidelines. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) (Kavanagh 2009) workgroup was created with the objective of developing an approach to evidence grading that can be used by different organizations.

The GRADE system has been adopted by an increasing number of organizations and it is in continuous development.

After the evidence grading, the workgroup must elaborate a sketch of the guideline and submit it to external revision. Usually, this revision is performed by independent entities in conferences or healthcare-related gatherings. This is an iterative process in which the guideline is altered according to the reviews and then proposed for another external revision, until it reaches a stable version. Then the guideline is published and disseminated through conferences and newsletters to healthcare professionals.

2.3. Shortcomings of Current Medical Guidelines

In the final phase of the development process, the development group has to choose suitable means for disseminating guidelines (Thomson et al. 1995). The usual ones are newsletters to healthcare professionals, disclosure at medical conferences and through online PDF repositories of guidelines (Rahim et al., 2011; Dennis et al. 2004). However, these means do not provide the desired coverage and sometimes fail in the delivery of knowledge to healthcare professionals. This is an important aspect, since feedback from the medical community is the best mechanism through which guidelines are improved.

Guideline documents have a structure that makes them difficult to consult. Usually they are long texts and the recommendations are contained in the body of that text. This aspect interferes with the retrieval of relevant information by healthcare professionals and makes the consultation for real time application rather complicated. Moreover, these long documents are difficult to update, which is a great drawback in the evolution of a guideline, since it has to accompany the development of medical knowledge in a specific medical area (Rosenbrand et al.2008).

Another issue is the ambiguity of the content of guidelines (Woolf et al. 1999). Ambiguity can be classified into syntactic, semantic and pragmatic (Codish and Shiffman 2005). Syntactic ambiguity occurs when the structure of a statement is not clear, thus impeding its correct interpretation. Misplaced (or lack of) punctuation and wrongfully applied boolean connectors are some of the causes of syntactic ambiguity. The classic definition understood generically by people as ambiguity fits the category of semantic ambiguity, characterized by situations in which terms can be interpreted in more than one way. Misuse of abbreviations, such as the case of the word "cold", which in the context of a guideline can mean "common cold", "cold sensation" or "Chronic Obstructive Lung Disease", fall in the specter of semantic ambiguity. As for pragmatic ambiguity, it happens when the recommendations of medical guidelines are not consistent or conflict with each other.

The vocabulary used in medical guidelines may also denote vagueness (Codish and Shiffman 2005). Sometimes the boundaries of a term are not completely understood by healthcare professionals. To show an example, temporal vagueness is frequent in guideline recommendations, with the use of terms such as "rare" or "common". The under specification of terms is also frequent, with terms like "moderate", "elderly" and "adequate" being used without sufficient detail for clear interpretation. The texts often have occurrences of probabilistic terms to describe the frequency of events, namely "impossible", "certain", "unlikely" and "probable", whose interpretation falls upon the subjective perception of the reader. The same situation occurs with some of the quantitative terms that are used (Rehman and Saba, 2011b).

Healthcare professionals often complain that, rather than offering support for medical practice, medical guidelines restrain it, the argument being that they do not consider the social, cultural and economic conditions of the context in which they are applied (Woolf et al. 1999). Healthcare professionals may need to adapt their medical practice according to the origin of their patients, but the steps for doing so are not described in medical guidelines. This lack of context-awareness is one of the major causes for noncompliance (Rahim et al., 2012).

Currently, medical guidelines do not cope with preference-sensitive decisions, for instance, between scientifically valid treatments that may be applied to the same situation. In this case, there should be a group decision that takes into consideration the preferences and goals of the medical team responsible for the medical case as well as those of the patient (Weidjen et al. 2011). What usually happens, in these cases, is that the decision is made by one healthcare professional only, without consulting the other parts involved. The level of uncertainty and incompleteness of the information upon which decisions are made, during application of guidelines, is also a matter of concern (Logan and Scott 1996). A symptom is a somewhat uncertain indication of a health condition, since it may or may not occur together with the disease. Thus, it is necessary a measure of the uncertainty associated to the observation of a symptom and the risk of the occurrence of a disease. During medical encounters, healthcare professionals have to collect the values of relevant medical parameters that build the patient's state. The observations made by healthcare professionals, in order to obtain these values have a subjective nature, since a human being is doing them, thus the information they generate may be contradictory/inaccurate and sometimes the values of these parameters may not be obtainable due to the lack

of technical means to do so. These cases of contradictory, inaccurate and missing information fall under the designation of incomplete information.

3. Artificial Intelligence and Medical Guidelines

AI is a field of study that aims to explain and emulate intelligent behaviour in computational processes (Schalkoff, 1990). It is the branch of computer science that is concerned with the automation of intelligence. The ability to make machines think like human beings creates new possibilities in many areas. Research in AI helped the development of new technologies that nowadays are the basis of many big systems. These technologies are primarily used to automate tasks and perfect knowledge-based processes, such as decision making.

The application of AI in medicine can be traced back to the middle of the 1970s and early 1980s, and led to the appearance of a subarea in AI, called Artificial Intelligence in Medicine (AIM). Research in this new field was pioneered by research groups in the US. An early definition of AIM was provided by Shortliffe (1990), stating that the primary concern of this research area was the construction of AI programs that perform diagnosis and make therapy recommendations. This definition reflects the primary focus of AIM at that time, which was the understanding and automation of the medical encounter. Nowadays, AIM is more focused on giving support to healthcare workers rather than trying to replace them, thus the identification of the right areas of medicine in which this support can be given is the key aspect that dictates the acceptance of AI technologies by clinicians.

The variety of roles AI programs may play in medicine is great. The use of medical knowledge is one of such roles, namely the support to human cognition that can be implemented, for instance, as reminder systems that alert healthcare professionals of medical events or contradictions in treatment plans. AI programs can also be used to create new knowledge by discovering new phenomena through data analysis, pattern discovery and associations. Machine learning is the subfield of AI that deals with the generation of new knowledge and includes different techniques to produce systems capable of providing a description of medical features. Case-based Reasoning (CBR) is one of such techniques. Based on past medical cases, CBR is able to generate recommendations to new ones. The form in which these recommendations are provided varies, but rules and decision trees are among the most commonly used. An example of this type of system is KARDIO, for interpreting ECGs (Bratko et al. 1989). Another application of machine learning in medicine is the use of data-mining in the construction of pathophysiological models and drug discovery. AI systems containing medical knowledge, usually about a specific domain, are capable of reasoning and reaching conclusions based on data. The array of functions AI programs can perform includes: alerts and reminders, diagnostic support, agents for information retrieval and image recognition/interpretation. DXplain (Rehman and Saba, 2012c) and HELP (Gardner et al. 1999) are examples of these knowledge-based decision support systems and are among the first ones to be developed.

In the remainder of this section, the focus will be placed on some topics and technologies of AI that may provide effective responses to the shortcomings of medical guidelines and help the development of medical practice.

3.1. Group Decision Making

Group decision is a common phenomenon in human decision making activities. It is an arduous task, since it implies the aggregation of individual alternatives to yield a decision that is acceptable to the group as a whole (Robert et al. 2008). The group explores a number of alternative solutions, answering "what-if" questions and the participants may have different roles in the decision process according to pre-established criteria by the organization.

During the application of medical guidelines, there are moments when this type of decision is required. The selection among scientifically valid options during the medical process must be done based on the opinions of the parts involved (healthcare professionals and patients). Technology-assisted decision making may help the generation of ideas and actions, the choice of alternatives and the negotiation of solutions. The existence of CIGs and a tool for execution of medical guidelines enables the implementation of automated group decision making.

The work of Karacapilidis and Pappis (1997) summarizes some of the aspects that must be taken into account when developing a framework for group decision. The first one is the spatial distance between decision makers and the electronic communication facilities that enable them to communicate with each other. In the medical setting, it is not uncommon for a medical case to be treated by a medical team whose members are from different healthcare institutions, so the development of a virtual environment that enables the communication between them may be an advantage to the discussion of guideline recommendations, as shown in previous works with successful knowledge exchanges (Mohamad et al. 2012; Househ et al. 2011). The type of environment influences the goals of decision makers. The goals are different in an environment where the group wants to solve a common problem cooperatively from another in which bargaining takes place. Typically, in a medical environment both situations can occur, a medical team may be discussing the diagnosis of a patient and their members may have different opinions based on

different evidence. The implementation of techniques in a virtual medical decision environment to extract information about the actors (e.g., stress level) (Novais et al. 2012), would assist the definition of the type of interaction between the group members and consequently the selection of a suitable decision model. However, the development of mechanisms that enable them to express their preferences is necessary. The type of control over the decision process is also important. The group members may follow a democratic process in order to reach a solution (e.g., voting) or they may follow a hierarchical model in which the system is supported by a mediator, capable or not of imposing decisions to the other members.

A group decision environment with a decision model will help healthcare professionals and patients clarify their position in the decision making process and assure that their perspectives and preferences are heard.

3.2. Expert Systems

An Expert System (ES) is a computer program capable of performing at the level of a human expert, or above it, in some knowledge domain (Nikolopoulos 1997). This type of systems uses knowledge and inference procedures to solve difficult problems. They have to mimic the adaptation capabilities of human beings in order to find solutions to new problems (Jackson 1990). There are four fundamental aspects of the construction of ESs (Nikolopoulos, 1997): the knowledge acquisition module, the knowledge base, the inference engine and the interface. The knowledge representation in an ES applies concepts of logics to create structured formalisms and inference rules, as well as ontologies to define the domain context. The knowledge itself may be introduced in the system by human experts as rules, obtained from past experience through learning algorithms or both.

Expert systems not only apply knowledge to situations but also generate new knowledge for new situations. The advantage of these systems, namely in healthcare, is that they are able to justify the decisions they make and provide confidence measures in their decisions. One of the problems healthcare professionals are faced with is the efficient use of all the information concerning medical cases that they have. ESs provide means to treat large amounts of information and extract knowledge to be used in the future.

The applicability of ESs in healthcare has been proven through cases such as those of MYCIN (Melle 1978), for the diagnosis of infectious diseases; and NED (Zhou et al. 2002), which is used for the detection of lung cancer cells in the images of the specimens of needle biopsies. The usefulness of ESs in healthcare is evidenced in the work of Seto et al. (2012) that comprises the development of a rule-based ES for the monitoring of heart failure. The development of an ES

based on medical guidelines will enable the implementation of guideline acquisition tools based on domain ontologies that represent the different aspects of the medical process. Such a system will also enable referencing the evidence and medical trials that are responsible for a recommendation, in order to provide healthcare professionals the support they need to justify their actions. Inference rules are a fundamental feature of the system. Initially, they must be based on the available evidence researched during the guideline development process by human experts, but afterwards, learning techniques, such as CBR, may be used to reinforce the rules of the system or offer alternatives to the recommendations of guidelines. Such an ES will also enable healthcare professionals to give their feedback of the recommendations of guidelines, according to the outcomes of their application, producing data that may be used to improve them. The issue of guideline contextualization may also be addressed by the ES through the use of information retrieval techniques to search for news and articles that fit the scope of the health conditions addressed by a guideline. Such a feature may be useful when dealing, for instance, with flu outbreaks, since the healthcare professional may consider relevant the information about new virus strains that are currently active and characteristics of the population that make them particularly vulnerable to those strains, adapting his medical practice accordingly.

Currently, web applications are growing fast. They present some advantages to their desktop counterparts that make them the ideal support for ESs (Duant et al. 2005). They require no installation and updating and are accessible from anywhere on the internet. The data is stored remotely and they do not require high specs from the devices in which they run. This portability makes them accessible to low spec PCs, smart phones and tablets.

A web-based ES for the application of medical guidelines would allow healthcare professionals to access the information they need when they are in contact with their patients, filling in any knowledge gaps they might have. It would also provide decision support during the medical process and solve the problem of guideline delivery to healthcare professionals. Although there is a widespread research in the field of healthcare ESs, their application in real life is not so widespread. Among the reasons for this situation is the fact that in many of them, developers do not consider the cognitive necessities of healthcare professionals when designing their interfaces (Johnson and Turley 2006). Intelligent interfaces reflect the user's goals, tasks and processes in order to make human-machine interaction a collaborative experience.

As such, they provide an abstraction level of the processes that occur in the internal structure of the

system that resembles the cognitive process of the users. This is beneficial to the implementation of medical guidelines, since it enables the development of user-friendly tools consisting of graphical interfaces that support primitives for drawing the control information within the guideline, windows for acquiring the internal properties of the objects, facilities for browsing medical guidelines and an environment for consistency checking. To achieve these purposes, the interface needs specific data about the medical domain that is being addressed, as well as models for the representations of the knowledge of medical guidelines, their rules and processes.

3.3. Case-Based Reasoning

CBR is an artificial intelligence approach that makes use of past experience to solve current problems (Aamodt and Plaza 1994). The applicability of CBR in health sciences is vast, given the similarities this research method has with the cognitive process of healthcare professionals: it is a natural process for them (Bichindaritz and Marling 2006). Case histories are the main training tool for clinicians and the medical literature is filled with accounts of the treatments of individual patients. Moreover, some diseases still remain a mystery to the medical community, which impedes the definition of generic models to manage them. The approach to these medical cases requires background knowledge recorded in practice cases. These background cases complement guidelines and help to interpret them. The human body is a complex biological system that is difficult to describe and even in well-known health conditions (e.g., hypertension and heart disease) several diagnoses interact to produce a given set of symptoms.

Typically, a CBR process is composed of four sequential phases: retrieve, reuse, revise and retain (Aamodt and Plaza 1994). The first phase consists of retrieving one or more previously experienced cases that are relevant. The relevance of the cases corresponds to a similarity measure, (e.g., the difference of the sums of the different attributes that build the case). During the reuse phase, the solutions of the retrieved cases are mapped to the new case, which may involve adapting the solution in order for it to fit specific requirements of the new problem, since it is unlikely that a an exact match of the new case exists in the case memory. In the third phase, revise, the best matching solution is tested in order to predict the results of its application. If the result does not meet the expectations, the action taken is revised. In the last phase, retain, the solution of the new case is stored in the case memory, contributing to its enrichment. Among the applications of CBR systems in the health sciences domain, CASEY is one of the earliest (Koton, 1988). This system diagnosed heart failure patients by comparing them to earlier patients whose diagnoses

were known. CASEY also integrated an earlier model-based system and pioneered the combined use of CBR and another reasoning methodology. PROTOS (Bareiss, 1989) is another early CBR system that assigned patients to pre-defined diagnoses based on past cases (Bichindaritz and Marling 2006). Since the debut of these systems, CBR has been used for other tasks, such as nursing diagnosis (e.g., FLORENCE system (Bradburn and Zeleznikow 1994)), radiation therapy design (e.g., ROENTGEN system (Berger 1994)), diagnose of degenerative brain diseases through image segmentation of CT and MR brain images (e.g., HPISIS system (Perner 1999), Kurniawan et al., 2009b), to name a few.

CBR may be used to manage non-compliance with medical guidelines. When executing a medical guideline in an ES, the healthcare professional may have to face a situation that was not predicted by the guideline or in which his professional opinion is different from the recommendations provided by it. Moreover, the unavailability of relevant patient data or resources, and the existence of data that is outside the range foreseen by the guideline may also require a deviation from the protocol by healthcare professionals. When faced with these situations, the ES may allow the healthcare professional to edit the guideline in order to fit the current case. With the help of CBR, the system may construct a case memory of these deviations, where the description of the cases (the pair attribute/value of the medical parameters) and their solution (the alteration made to the guideline) are stored for later retrieval to solve similar cases. This way, the system could grasp the constraints (social, economic and cultural) of the medical practice of physicians and provide useful feedback of the applicability of a certain guideline. An elevated number of cases in the memory case for a specific guideline are an indicator that a step of the guideline or the guideline itself is not fit for medical application.

3.4. Medical Ontologies

In the context of AI, an ontology is a formal representation of knowledge as sets of concepts and the relations between them within a domain (Gruber 1993). An ontology defines a vocabulary that contains all the concepts that may be used to model the domain and how they relate to each other. This conceptualization is achieved through the definition of classes and subclasses of individuals along with the properties of the individuals in a class.

Ontologies have a key role in the Semantic Web (Berners-Lee et al 2001), since they structure underlying data for the purpose of comprehensive and transportable knowledge and machine understanding. Besides allowing machines to read and interpret information, ontologies present other advantages to

knowledge engineering such as automated validation and consistency checking.

In a complex domain such as the medical one, ontologies provide significant advantages in the formalization of medical guidelines. The vagueness and ambiguity that, sometimes, is present in guidelines can be removed through the use of controlled vocabularies, thus eliminating fuzzy relations between the concepts of the domain. It would also allow the extraction of rich patterns, that would go unnoticed otherwise, and the construction of inference mechanisms in the domain. The guideline ontology can be shared in ontology repositories for widespread use. Currently there is a growing interest of medical guideline researchers in ontology-driven execution of medical guidelines (Isern et al. 2011; Rehman and Saba, 2012d).

The Unified Medical Language System (UMLS) (Bodenreider 2004) reflects the efforts of the US National Library of Medicine to remove ambiguity and vagueness from the medical setting. It is an ontology that aggregates terms used to describe the same concept from existent knowledge sources (e.g., SNOMED CT, LOINC, ICD-10, MeSH) under the same identifier. The UMLS has three main components: the Metathesaurus, the Semantic Network and the SPECIALIST Lexicon (Rehman and Saba, 2012e).

3.5. Reasoning under Uncertainty

AI provides some techniques that deal with uncertainty and incomplete information in decision making scenarios. They can be classified in qualitative and symbolic methods (Clark 1990). The advantage of symbolic methods is that they bring some "common sense" validity, present in approaches such as non-monotonic logics, default logic and unfeasible reasoning. There are also other symbolic methods, often called reason-based (Fox et al. 2001; Rehman, 2012), that use informal endorsements for multiple options and formalizations of everyday strategies for reasoning about competing beliefs, argumentation being one of these techniques.

However, the health sciences are, currently, more interested in the numeric methods such as Bayesian Networks, Dempster-Shafer Theory or Fuzzy Logic (Clark, 1990).

Bayesian Networks were derived from probability theory and appeared for the first time in the middle of the 1980s (Pearl 1986). It is a statistical model defined by two components: a qualitative component and a quantitative component (Clark 1990). The qualitative component is an acyclic orientated graph, whose nodes represent a random variable that may assume any value from a given set and is associated with a probability distribution. The existence of an arch between two variables means that they are statistically dependent.

The quantitative component is a conditional probability distribution. The essence of this approach is the representation of hypotheses and relations in the domain under consideration. In the medical domain, the relation of causality between medical parameters and diseases may be effectively represented through Bayesian Networks and it is possible to obtain these relations from medical guidelines (van Gerven et al. 2008; Rehman and Mohamad, 2008).

Moreover, the prior probabilities for the different variables (which is one of the drawbacks of the approach), as well as the conditional probabilities, may be gathered from the empirical evidence displayed in the guideline. Thus, the combined used of Bayesian Networks and medical guidelines adds value to the medical process and provides quantitative measures that enable healthcare professionals to assert the solidity of their decisions. The work of Lucas (2004) is heavily focused on the combined use of medical guidelines and Bayesian networks for medical decision support systems. The Dempster-Shafer Theory of evidence was initially developed by Dempster in 1967 (Dempster 1967) and later extended by Shafer in 1976 (Shenoy and Shafer 1986). It relies in degrees of belief to represent uncertainty. This approach allows the assignment of degrees of belief to sets of hypotheses (e.g., {gastric cancer, gastric ulcer}) instead of individual medical parameters, like Bayesian networks. For this reason, it is considered that Dempster-Shafer Theory is better able to represent the process of the narrowing of hypotheses with the accumulation of evidence. This process is claimed to mimic diagnostic reasoning.

Dempster-Shafer Theory can deal with ignorance and non-exhaustiveness, since it identifies a set of solutions that reflects any other options that are not discretized. However, it receives some criticism concerning the computational complexity that generates for large sets of hypotheses (Clark 1990). Despite these shortcomings, Dempster-Shaffer Theory has been used efficiently for the representation of medical knowledge and uncertainty in some critical areas (Straszecka 2004).

The Fuzzy Sets approach was initially developed with the objective of quantifying imprecise classes in natural language (Kurniawan et al., 2011). It is most useful when sets are defined by vague concepts and variables are continuous (e.g., height, warmth, age). Natural language is full of examples of fuzzy classifiers, like predicates (e.g., small, large, young), quantifiers (e.g., most, many, few), probabilities (likely, unlikely) or truth values (e.g., very true, quite true, mostly true). The quantification in this method is provided by membership functions that attribute a value in the in the interval [0,1] to the relevant elements. Fuzzy Logic was derived from fuzzy sets and

is based on the notion of truth degree of a preposition. It defines operators that express the disjunction and conjunction of prepositions, independently of their meaning. Just as it is difficult to estimate the prior probabilities of a Bayesian Network, the production of membership functions is complex (Clark 1990). Many disciplines of medicine already use Fuzzy Sets in ESs, for tasks such as diagnostic and imaging analysis (Abbod et al., 2001). Fuzzy Sets are being researched for the representation of operational guideline knowledge and the definition of threshold values for medical parameters.

In fact, currently, Fuzzy Logic is being integrated with the Arden Syntax (Vetterlein 2010) guideline model in order to produce a continuously graded applicability of statements. All these approaches deal with uncertainty from a perspective of causality and interdependence, but do not address the aspects of incomplete information and the different forms it can assume. Further in this paper we will present a methodology called the Quality of Information (QoI) (Neves et al. 2012) that provides ways of dealing with this information and making it useful to the decision making process.

4. Computer-Interpretable Guidelines
4.1. Living Guidelines

As a response to the challenges presented by medical guidelines, the concept of Computer-Interpretable Guideline (CIG) emerged (de Clercq et al. 2008). CIGs are representations of medical guidelines in a digital format, suitable for being interpreted by machines. A digital format of medical guidelines may be a game changer in all the aspects that revolve around them, namely development, dissemination, implementation and execution.

There is a set of features that guideline researchers would like to see guidelines acquire (Rosenbrand et al. 2008). Features such as modularity, dynamism and interactivity are gathered under the concept of living guidelines (Seyfang et al.2007), which basically is translated into guidelines that are easy to update and modify and have an active role in providing knowledge to healthcare professionals. The objective of researchers is to change the static and passive nature of guidelines. CIGs are, currently, the best way to achieve this purpose.

The development of a standard model of CIGs may provide a deeper understanding of the medical process and may have significant benefits. A depiction model for medical guidelines can be used to identify the different requirements that must be accomplished before making a decision, to establish decision criteria and thus helping healthcare professionals in this critical moment of the medical process (Elkin et al. 2000). Having a model also enables the definition of methods to verify the semantic and syntactic structures of

guidelines, providing a way to distinguish a well formed guideline from a poorly made one (Elkin et al. 2000). If the model enables the definition of modular components, like for instance medical procedures that are common to different guidelines, it may be possible to reuse this knowledge when building a new digital guideline (Elkin et al. 2000).

The creation and use of CIGs offer a better description and recording of patient states and may provide selective access to background knowledge to be used in specific circumstances. The use of automatic reminders according to the recommendations of guidelines may also be implemented (Fox et al. 2008).

4.2. The Document-centric and Model-centric Approaches

Decision support systems based on medical guidelines may support healthcare professionals in following the best medical practice in a consistent way. Formalization of guidelines in a guideline representation language may follow two different approaches (Sonnenberg and Hagerty 2006): document-centric and model-centric.

The document-centric (Kaiser and Miksch 2009) approach consists in using mark-up tools on the original guideline documents. The original document is either marked up or annotated, to produce a more structured format with defined semantic elements. Usually, this process is carried out in stages. First, the mark-up is used to identify elements in the text of the guideline. Then, using a specialized tool, a semantic tag is assigned to the elements and the connections between them are made. The advantage of this approach lies in enabling the encoding of CIGs without the need to have a profound knowledge of a specialized computer language. However, the current tools that perform this process are not perfected yet and it is difficult to construct long and complex guidelines using this method. On the other hand, in the model-centric approach (de Clercq et al. 2004), a depiction model is formulated by domain experts and the relationship between the new model and the original document is indirect. The acquisition of guidelines in the model-centric approach is done directly by healthcare professionals into the new model. Through this process, it is possible to develop friendlier interfaces for healthcare professionals to encode their guidelines and at the same time, they become more knowledgeable of the different steps that compose the medical process.

GEM Cutter (Shiffman et al. 2000), Stepper (Ruzicka and Svatek 2004) and DELT/A (Votruba et al. 2004) are some of the most relevant markup-based tools that generate semi-formal models of marked guideline texts. GEM Cutter was one of the first tools to apply a document-centric approach and transform guideline information to an ad hoc format, called

GEM. Stepper is a tool that segments the initial text in multiple user definable steps coded in XML. DELT/A stands for Document Exploration and Linking Tool/Addons and, as its name indicates, it supports the translation of HTML documents into any XML language, among which is the Asbru guideline representation model. There are methodologies (e.g., LASSIE (Kaiser and Miksch 2009)) for document-centric approaches that use information extraction techniques that rely on databases of medical terminologies to acquire guidelines in a semi-automatic way, thus eliminating the requirement of having an healthcare professional manually tagging the terms in the original document. We will present some applications for model-centric acquisition of medical guidelines when presenting the different representation models for medical guidelines, further in this paper.

4.3. Aspects of CIG-based Systems

In the conception and development of CIG-based decision support systems, researchers identified four aspects that must be taken into consideration in the development process (de Clercq et al. 2004): guideline representation and modelling, guideline acquisition, guideline validation and testing, and guideline execution.

The model is the fundamental feature of a CIG-based decision support system (Peleg et al. 2003). It has to provide enough expressivity in order to accommodate every step of a guideline. Normally, the models created exclusively for guideline representation have a set of construction units (e.g., tasks or steps) that are used to build a guideline (de Clercq et al. 2004). These building blocks are given the designation of representation primitives (e.g., decisions, actions) and are used according to a Task Network Model (TNM). Some works consider the adaption of business process models, such as Petri Nets (Quaglini et al. 2000), to the modelling of medical guidelines. However, these approaches are lacking in expressivity, since they were developed to support business organizations and processes rather than medical organizations and processes. The possibility of using them in medical settings is being actively studied in order to define higher abstraction layers, capable of expressing the different steps of the medical process, on top of the basic model.

Whichever model is chosen, the degree of complexity the representation is able to accommodate is an important factor. Different models may differ in terms of the abstraction levels they allow, for instance, in the nesting of guidelines inside other guidelines. Medical guidelines possess two different types of knowledge (Rosenbrand et al. 2008), the declarative (scientific knowledge about the domain) and procedural (the inference methods and the decision model), which have to be formalized through a language in the representation model. The language should provide an objective vocabulary, syntax and semantics, so that an inference engine can be developed. In a complete representation, there should be also triggering criteria, which include initial screening to assess if a patient should enter a protocol or not and connect the different elements of the guideline according to the output of decisions. Another indispensable feature is temporal patterns, since guideline recommendations depend mostly of the state of the patient in a given moment. Knowing this, it is essential for a guideline model to provide mechanisms to define durations, repetitions and cycles of tasks. An acquisition tool must be developed, in order to help healthcare professionals structure the knowledge according to the guideline model that was defined (deClercq et al. 2004). The tool must take into account the approach followed for guideline acquisition, if it is either document-centric or model-centric.

The precision, the syntactic correctness and the semantic coherence are extremely important in the acceptance of CIGs by healthcare professionals and in their integration in daily practice (de Clercq et al. 2004). As such, the inclusion of mechanisms for guideline validation and testing, in the guideline execution engine, is necessary. During the execution, the guideline execution engine should have access to a database containing the values for the medical parameters that build the patient's state and thus enabling the application of medical guidelines in real time (Saba et al., 2011b).

4.4. Current Approaches to Guideline Modelling and Execution

Currently there are few CIG systems available and they lack application in real medical settings. In this review we will address them by their depiction models and mention the execution engines available for each one, as well as the underlying platforms. The selection of the approaches we will address was based on opinions collected from the literature that deemed them the most relevant. Table 1 shows a summary of the available software tools and models as well as their main features.

4.4.1. Arden Syntax

Arden Syntax (Hripcsack 1994) was developed in 1989 and is now a standard of Health Level 7 (HL7). The current version of Arden Syntax is Arden Syntax 2.8. The primary aim of this approach is the sharing of simple and independent guidelines as modules. Each medical guideline is modelled as a Medical Logic Module (MLM), which comprises relevant knowledge for only one judgment. Initially, each MLM was an ACII file divided in three partitions: maintenance, library and knowledge.

The maintenance and library partitions possess administrative information about the guideline, namely

authoring and version number. The constructs of the maintenance partition are title, (file)name, author, version, institution, date of last modification and validation status. The validation status contains information about the approval of the guideline in a local institution and it may have three possible values: testing, research, production and expired. The transition from testing to production means a shift of responsibility from the institution that developed the MLM to the local institution where the guideline will be applied. The library compartment contains constructs used for a detailed description of the guideline and among them the attribute purpose enables the expression of the medical objective of the MLM.

The main constructs of the knowledge compartment are data, evoke, logic and action. The data construct is used to obtain the values of the concepts referred in the MLM from the information system of the healthcare institution. The evoke construct contains the events that trigger the execution of the MLM and these events are related with the medical parameters in data. The decision criteria are expressed in the logic construct through if-then-else rules and sets of logical, mathematical and temporal operators. When a rule is assessed to the value true, a given procedure of the construct action is proposed. These procedures may include messages/alerts or the execution of other MLMs. This approach reveals great modularity and gives transparency to the decision making process, but given its simplicity, the ability to capture the full content of a medical guideline is compromised. Arden Syntax is mainly used in alert and monitoring systems, like the ones provided by the Regenstrief Institute. It is defined in Backus-Naur Form (BNF), a notation technique used to describe the syntax of computation languages. Currently the development of Arden Syntax by HL7 is based on XML (Haron et al., 2011).

There is a myriad of tools to acquire and execute guidelines in Arden Syntax. We will highlight the Arden Syntax IDE (Samwald et al. 2012), which is a simple development environment that provides syntax highlighting and testing functionalities for MLMs. The Arden Syntax IDE contains a compiler that generates java classes from MLM code. These classes are then executed by an Arden Syntax Rule Engine that works together with another component, the MLM manager, which gives the rule engine the access to the available MLMs in the system. Arden Syntax is a highly portable format, conceived to be integrated in Medical Management Systems (CMs).

4.4.2. Guideline Interchange Format (GLIF)

The Guideline Interchange Format (GLIF) (Ohno-Machado et al. 1998) represents an effort of Intermed Collaboratory in the development of a sharable medical guideline representation model. The first published version of GLIF was released in 1998 and its current version is GLIF3 (Boxwala et al. 2003). This approach was developed in order to reflect a flowchart of steps and consists of a set of classes that describe the fundamental characteristics of a guideline and constructs that contain the medical parameters. Through this flowchart representation, GLIF3 provides a better understanding of the medical process to healthcare professionals.

A guideline in GLIF3 is an object that contains different steps, namely: decision steps, patient state steps, branch steps, synchronization steps or action steps. This approach follows the Task Network Model (TNM), so that every moment of the medical process is labelled as a step.

Decision steps model decision points in a guideline and direct the care flow from one to alternative steps. There are two subclasses in decision: case step and choice step. A case step contains a set of logical expressions that initially corresponded to an excerpt of Arden Syntax. Currently, GLIF3 uses an OCL (Object Constraint Language) expression language called GELLO (Sordo et al.,2003) that has more expressive power than the previous. As for choice steps, they contain only a set of options for the next step in the medical process and the selection is made by an external agent (e.g., the user).

Patient state steps function as labels that have constructs used to describe the patient's health condition. These steps are used as data entry points in the system. When the state of the patient is updated, the guideline that possesses the corresponding patient state is executed.

The tasks of the medical process are modelled in the action steps through three distinct constructs: medical actions, activity oriented actions (e.g., messaging, retrieving of patient data) and control actions (invocation of structures such as sub-guidelines).

At Columbia University, GLIF is being integrated with the Medical Event Monitor and the Computerized Physician Order Entry systems to provide medical decision support (Peleg and Wang 2006) for post-CABG (Coronary Artery Bypass Grafting) (Zheng et al. 2010). Encoded GLIF guidelines are also being used in Israeli clinics for the management of injuries in the feet of diabetics. The GLIF3 Guideline Execution Engine (GLEE) (Wang et al. 2004) is a tool for executing guidelines in this format. It defines three layers of abstraction: data, business logic and user interface. The data level contains the Electronic Medical Record (EMR) and a guideline repository. The execution engine is in the business logic layer and includes a server that interacts with the data layer and clients that interact with the users. Applications

exchange data with the other two layers through the user interface layer. GLEE may be linked with a medical event monitor, thus enabling event-driven execution of medical guidelines, responding to alterations in the state of the patient. This software tool also defines a set of methods to connect it to CMSs and

uses representations like the Resource Description Format (RDF) and HL7 as a general patient data model (Schadow et al. 2006) to support medical guidelines and encode medical data in order to share information across different institutions.

Table 1 Software tools for guideline development (adapted from Isern and Moreno (2008)).

Tool	CG Repository	CG Editor	CG representation language	CG basic elements	Run-time engine	Access to EMR	Access to CMS	Standards used
Arden Syntax IDE	Yes	Yes	Arden Syntax	MLMs	Rule-based	No	No	XML
GLEE	Yes	Yes	GLIF3	Decision, action, patient state, branch, synchronization steps	Event-based and rule-based	Yes	Yes	RDF,HL7
Arezzo	Yes	Yes	PROforma	Plan, action, decision, enquiry	Rule-based	Yes	Yes	No
DeGeL	Yes	Yes	Asbru	Preferences, intentions, conditions, effects, plan body	Rule-based	Yes	Yes	XML, ICD-9, SNOMED CT, CPT, LOINC
GLARE	Yes	Yes	Graph-like	Query actions, work actions, decision actions, conclusions	Rule-based	Yes	Yes	XML, ICD-9
SAGE	Yes	Yes	SAGE model	Context, action, decision, routing nodes	Event-based	Yes	Yes	HL7, UMLS

4.4.3. PROforma

In 1998, the Advanced Computation Laboratory of Cancer Research of the United Kingdom initiated the development of the PROforma (Sutton and Fox 2003) depiction model. The objective of this model is the development of guidelines as flowcharts where the nodes are instances of pre-defined classes of tasks. The classes are plans, actions, decisions and enquiries. Each class has a set of attributes that reflect its information needs. The syntax of PROforma was initially defined in BNF in an ASCII file (Elarbi-Boudihir et al., 2011).

Every task of a guideline derives from a common task called root task. A root task contains several guidelines encoded as sets of tasks called plans. On the other hand, a plan contains any number of instances of atomic tasks, such as actions, decisions and enquiries. A plan also has constructs that enable the definition of medical objectives (that reflect the objective of a guideline), abort and termination conditions and scheduling constraints on the atomic tasks. It is also possible to define temporal constraints on plans, such as cycles, durations and number of repetitions. One of the core features of PROforma is the possibility of nesting plans inside other plans.

An action in PROforma is a task whose execution has to be performed by an external agent. Typically, these tasks consist of sending messages, calling external programs and medical procedures.

The enquiry task defines data entry points in the guideline as questions to the patients or internal procedures to retrieve the relevant information from the patient's EMR. This class contains data definition constructs that specify how a value for a medical parameter must be stored (e.g., data type, unit).

Perhaps the most important class in PROforma is decision. Among all the CIG formalisms, PROforma was the first to offer a support to deal with uncertainty during the decision process. A decision contains

constructs to express candidate solutions to the decision problem, as well as logical expressions that endorse or refute each candidate. Each expression, in favour or against a candidate, is associated with positive signs (represented by a plus sign +) and negative signs (represented by a minus sign -). The weight of an argument in the overall score of its candidate depends of the number of positive and negative signs it has. This is a symbolic method of endorsement that uses a mathematical function to convert the signs in numeric values for calculating the scores of each option. Then the options are presented by descending order of scores. According to the results of a decision task, the next task in the care flow is the one that has a construct called trigger condition matching the output of the decision (Rahim et al., 2011).

PROforma has been used in a few prototypes for medical management, namely CAPSULE for general practice and Bleed link for advice on laboratory tests and management of chronic diseases (dyspepsia, asthma and depression). Among the software tools for PROforma, Arezzo (Fox et al. 2006) is arguably the most disseminated. It has an architecture composed of three elements: a composer, a tester and a performer. The composer is responsible for providing an acquisition suite of guidelines in PROforma. The tester verifies the syntactic integrity of the PROforma guidelines before deployment by the performer, which is an inference engine. The performer can be linked to existing EMRs and CMSs to acquire data related to patients and also defines different states of guideline execution (e.g., waiting for data, suspended, finished).

4.4.5. Asbru

Asbru (Shahar et al 1998) is the result of collaboration between Stanford University and Vienna Technology University. This formalism presents a notion of plan similar to PROforma in that it represents

a collection of items. The knowledge required to perform a plan is defined by its knowledge roles, which include preferences, intentions, conditions, effects and plan body. The content of a plan body is composed of other plans until they are no longer decomposable, reflecting a parent-child structure. The plans that cannot be decomposed are called actions. The functionalities of plans and actions are defined by the remaining knowledge roles. The plan body is the layout of a given plan.

The restrictions on the execution of a plan, in order to achieve a given objective are defined by preferences. The categories in preferences that define these restrictions are select-method, resources and strategy. The objectives of plan are represented in the intentions knowledge role. The definition of intentions helps the selection of an adequate plan and is crucial in decision support. Intentions are defined as temporal constraints on the actions of healthcare professionals. There are four types of intentions: intermediate state, intermediate action, overall state pattern and overall patient pattern. Intermediate state refers to patient states that must be maintained, reached or avoided (e.g., the control of levels of substances in the blood) during the execution of the plan. On the other hand, intermediate actions define the actions the healthcare professionals must perform during the plan. The overall state pattern is the state of the patient that must be verified at the end of the execution of the plan and the overall action pattern is the pattern of actions of the healthcare professional that should result from the plan.

There are different types of conditions, namely filter-preconditions and setup conditions, suspend conditions, and abort conditions, that are used to express the respective following situations: conditions that must hold for a plan to be considered applicable, conditions that determine the suspension of a plan and conditions that determine the abortion of a plan.

Effects describe the expected behaviour of the execution of a plan. It is composed of the following two constructs: argument-dependency and plan-effect. The first is used to describe the functional relationship between the plan arguments and the measurable parameters, describing how they influence each other. The second describes the relationship between the overall plan and its expected effect.

Asbru id heavily focused on temporal aspects of medical guidelines and that is evident in its temporal annotations, which specify four points in time for the execution of plans and verification of conditions, with the particularity of allowing the expression of uncertainty in starting time, ending time and duration of a time interval. The temporal annotations of Asbru are earliest starting shift (ESS), latest starting shift (LSS), earliest finishing shift (EFS), latest finishing shift (EFS). It is also possible to specify two types of

durations: minimum duration (MinDu) and maximum duration (MaxDu).

This model has been used in the Asgaard project in the development of prototype applications for the management of diabetes, jaundice and breast cancer (Zheng et al. 2010). Acquisition and execution of Asbru guidelines is possible through DeGeL (Shahar et al. 2004), a tool being developed at Ben Gurion University, in Israel, and is a web-based architecture that facilitates the conversion of textual guidelines to Asbru guidelines. This distributed architecture has some key components responsible for the creation of new guidelines, guideline retrieval from an XML repository, testing and execution of guidelines. The execution module is called Spock and it incorporates an inference engine that can retrieve data from the patient's EMR. It is a modular client-server application that consists of a set of classes to store guidelines, a parser to interpret their content and a synchronizer that establishes the communication with external systems. DeGeL also has a vocabulary server for supporting guideline specification and establishing mappings between the standardized terms and each medical database vocabulary.

The set of standard terminologies that is used includes International Classification of Diseases (ICD-9), Standard Nomenclature of Medicine (SNOMED-CT), Current Procedural Terminology (CPT) and Logical Observation Identifiers, Names, and Codes (LOINC).

4.4.6. GuideLine Acquisition, Representation and Execution (GLARE)

The GuideLine Acquisition, Representation and Execution (GLARE) (Bottrighi et al. 2006) project includes a guideline depiction model and a system to acquire and execute medical guidelines. It was developed by the Computer Science Department of the University of Piemonte Orientale, Alessandria, Italy. The depiction model does not use a standard representation. Instead, it defines a proprietary graph-based complaint, where a medical action is represented by a node. It is possible to define atomic actions that represent simple tasks like queries to obtain external information, work actions that represent medical procedures, decision actions with sets of conditions to select alternatives and conclusions that describe the output of a decision. Decision actions are specific types of actions that contain the criteria used to select from alternative paths from a guideline. These criteria are represented as sets of triplets in the form <diagnosis, parameter, score> and, in turn, a parameter is another triplet <data, attribute, value>. It is also possible, in GLARE, to define composite actions, which are collections of atomic actions or other composite actions. GLARE was designed to cope with different

types of temporal constraints and implements specialized temporal reasoning algorithms.

The GLARE execution engine (Bottrighi et al. 2006) distinguishes between the acquisition phase and the execution phase of guidelines. Similarly to GLEE, GLARE defines three architecture levels, namely System, XML and DBMS. The System level encompasses the acquisition and execution modules. The XML level is responsible for the data exchanges between the System level and the DBMS level. The DBMS is the bottom level, responsible for establishing a physical connection between the top levels and the databases where the information for creating and executing guidelines are stored. This information includes open instances of guidelines, a repository of guidelines and medical records of patients. GLARE uses ICD-9 as a terminology standard.

4.4.7. Standards-Based Sharable Active Guideline Environment (SAGE)

The Standards-Based Sharable Active Guideline Environment (SAGE) (Ram et al. 2004; Tu et al. 2007) project is a collaboration of six research groups (IDX Systems, University of Nebraska Medical Center, Intermountain Health Care, Apelon, Inc., Stanford Medical Informatics and the Mayo Clinic). SAGE includes a guideline depiction model and a guideline authoring and execution environment and is perceived as an evolution of GLIF3 and EON. Its objective is to establish an infrastructure to enable sharing guidelines in heterogeneous medical information systems. SAGE is involved with standards organizations to bridge the gap between guideline logic and real life implementations.

In this depiction model a guideline is a recommendation set, which is composed as a graph of nodes. These nodes can be context, action, decision and routing nodes. Context nodes describe the environment in which the guidelines are applied (e.g., a physician in an emergency room). The action nodes represent activities of the information system that support the execution of a guideline. The control of the careflow is performed by the decision and routing nodes. The patient state is retrieved directly from the electronic health record of the healthcare entity. So far, application of SAGE in practice is very limited. However the Mayo Clinic has plans to apply it in the implementation of guidelines for immunization, diabetes and pneumonia in controlled environments (Zheng et al. 2010). The SAGE system consists of an execution engine, an event listener and a set of services (terminology, patient record and general applications) (Ram et al. 2004; Tu et al. 2007). The execution engine is called SAGE Desktop and it interprets the content of the context, action decision and routing nodes. The event-listener communicates with the CMS and the EMR with the objective of detecting sudden alterations in a patient's state and notifies the execution engine if that is the case.

There is also a terminology server that was added to customize terms used in local applications. The communication between the CMS and the execution engine is facilitated by and API developed specifically for this purpose, which hints to the main focus of SAGE, interoperability. Semantic and syntactic interoperability of medical data requires the use of standard data types, terminology, information models and conventions for expressing medical statements. SAGE puts this to practice through the use of HL7 version 3 and the UMLS.

5. Active Guidelines in a Medical Setting

After the analysis of some of the existing projects in the field of CIGs, it is our conviction that there is still room for improvement. Our work will focus mainly in guideline modelling and decision support during guideline execution. Concerning guideline modelling, there are some issues that may be pointed out, namely the fact that the available models lack real life application outside the academic environment and are still in the development phase. As such, there is not a reference standard for CIG representation that can be used when developing a system for acquisition and execution of medical guidelines. None of the models was largely adopted by the health informatics community. The degree of complexity the different models can accommodate is also a matter of discussion: the model cannot be too simple risking not being able to represent all the information contained in a guideline. A paradigmatic example of this case is Arden Syntax, perhaps the model with the highest number of implementations, with its MLMs capable of only representing a decision point in a guideline. At the other end is PROforma, which defines a number of proprietary specifications for data that may be difficult to use and apply to real practice. The challenge is to develop a model capable of representing complex guidelines, yet simple enough to do it with a minimal set of components. Most models and tools do not use terminology and data model standards, which makes the transition to medical applications in a medical setting difficult and impairs interoperability with other software tools already used in such environments. Moreover, some of the models require some proficiency in languages to formalize logical rules, numerical expressions and temporal constraints (e.g., BNF, GELLO), which non-expert clinicians do not have, thus precluding the correct acquisition of medical guidelines. Furthermore, the software tools provided for editing, visualizing and executing guidelines are often too complex and not user-friendly. The ontology and related tools should be developed in order to allow clinicians with no advanced programming knowledge to revise and customize the guideline representations.

Most of the existing models are specialized in certain disease domains, which limits the capability of these models to represent other knowledge domains and their applicability to other areas of medicine.

Decision support has also been neglected in the current CIG approaches. The current systems do not complement the decision schemes proposed by their models with techniques to infer the confidence in the outputs of the decision process. Furthermore, the problem of incomplete and uncertain information mentioned in previous sections of this paper remains unaddressed.

Next we will mention our efforts towards the development and implementation of active medical guidelines, by extracting elements from the current CIG representations and applying the above mentioned techniques of AI. Ultimately, we aim at the creation of truly interactive and living guidelines by building upon the work done so far and through the introduction of new technologies, models and methods.

5.1. Ontology for Medical Guidelines

The approach to guideline modelling we intend to develop presents an abstract view of decision making processes and task management during a medical procedure (Oliveira et al. 2012). The model is depicted in Fig. 1. The main objective is the development of an ontology capable of accommodating any medical guideline. To do so, the model should be generic in order to adapt to the context and necessities of different guidelines and, at the same time, allow the definition of constraints characteristic of medical workflows. There are certain aspects to take into account when developing the model, namely scheduling constraints of the recommendations, time constraints, medical parameter constraints, terminology and the modularity of the model.

Every task described in a medical guideline is modelled as a task displayed in an oriented graph. The task is the basic unit of the model. As so, a guideline is viewed as a plan, which is a collection of tasks represented by the following constructs: action, question, decision, and aggregation module. A plan has any number of instances of these constructs and their ordering and sequence inside a plan will be expressed as a form of a linked list that connects the different instances.

Actions represent tasks that must be performed during the execution of a guideline. They can either be medical procedures, exams, medication prescription, simple recommendations or internal data operations (e.g., calculation of the body mass index from the available medical parameters).

To feed inputs to the system we use the question task. A question is a task to obtain data about the patient's state, in the context of a guideline. It is a data entry point that acts as the substratum for the execution of the other tasks, since it is the mechanism through which one feeds information to the CIG system. It also contains a series of constructs to describe the medical parameters and the data types for their values. When a decision point is reached in the guideline workflow, we use the decision task, which contains rules that associate options to the parameters of the patient's state. This task has constructs to express the conjunction and disjunction of conditions.

The aggregation module aims at controlling special cases in guidelines and groups tasks that are part of a cycle or iteration, creating the conditions for the user to define their periodicity, duration and objective. It also enables the representation of tasks that belong to alternative pathways of the medical workflow, like the ones that follow a decision task, in which the system chooses the next step of the medical process according to the conclusion reached at the decision. One more requirement is the representation of simultaneous tasks that should be executed in parallel.

Another relevant aspect of the model is the terminology construct of a plan. Terminology comprehends the terms used in all the tasks of the plan along with their Concept Unique Identifier (CUI) (Bodenreider 2006), which is a code used in the UMLS Metathesaurus to identity a concept and associate the different terms that can be used as synonymous. This controlled vocabulary is an answer to the ambiguity and vagueness of medical guidelines.

The version construct contains administrative information about the guideline and its authoring, as displayed in Fig. 1. Also in Fig. 1, it is visible a construct called plan reference whose function is to make a reference to other plan that must be executed in the context of the current one. To capture the knowledge of the domain and thus create the guideline ontology we will resort to the Ontology Web Language (OWL) (Antoniou and Hamerlen, 2009) since it is the emerging modelling paradigm of the Semantic Web and a standard of the World Wide Web Consortium (W3C). More specifically, the OWL undertaking to be used is OWL-DL, which uses description logics to formalize its classes, individuals and properties. There are a several reasons to verify the semantic correctness of OWL ontologies (e.g.,HermiT, Fact++), which is an advantage of using this language for modelling guidelines. Moreover, the underlying support of OWL is provided by RDF and XML, which are well known standards.

The set of tools that support the ontology are crucial and they greatly determine the adoption (or not) of the model by the medical community. Knowing this, the ontology will be integrated in a web-based ES, whose advantages were already mentioned in this paper. The importance of the interface in such a system is paramount, mainly because the interface is often the

factor of exclusion of a system by clinicians. The system must possess a patient data model and it is essential that the data model is compliant with HL7, namely HL7 version 3 (Konglingren 2009).
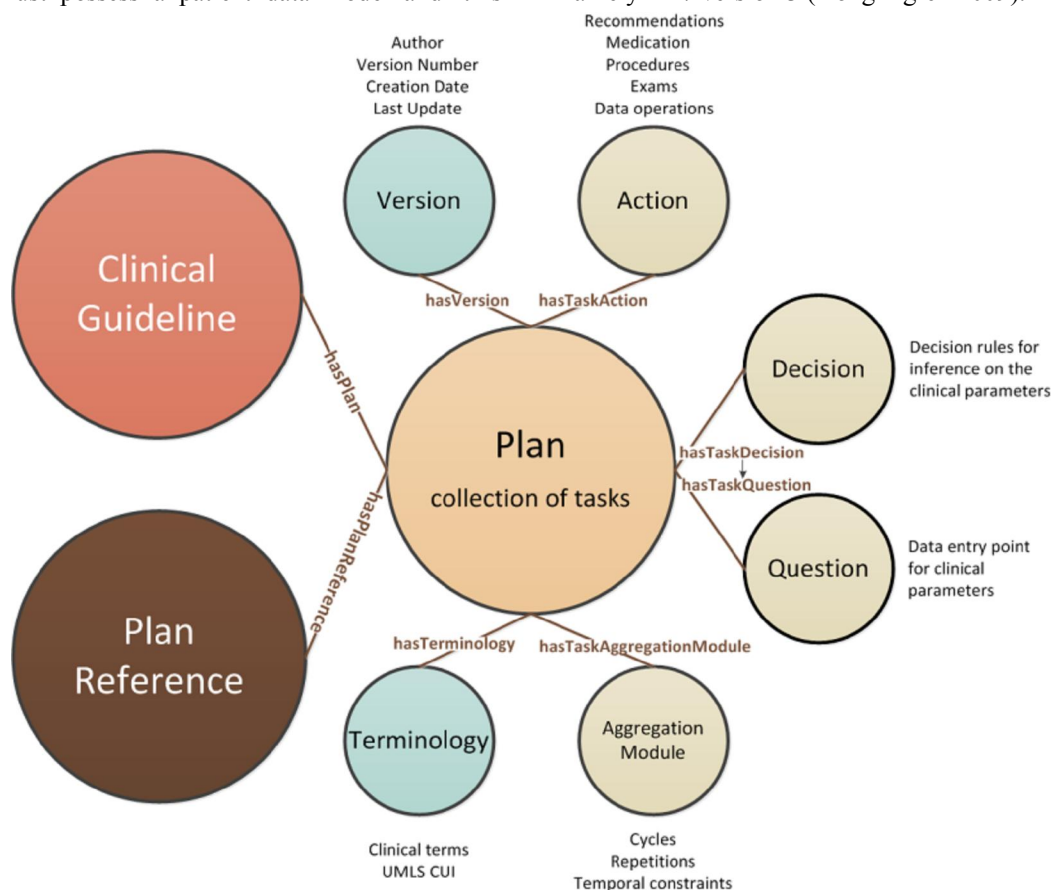

Fig. 1 Representation of the ontology proposed for guideline modelling.

5.2. Medical Decision Model

Before applying a medical decision model that contemplates incomplete information, it is necessary to represent this information in an appropriate way. The Extension to Logic Programming (ELP) (Neves et al. 2012; Novais et al. 2010) is one of the few techniques that enable this representation, using Mathematical Logic. ELP uses two types of negation: default negation and classic (weak) negation. The use of these two types of negation is the core feature that enables the association of ELP programs to sets of abducibles, represented as exceptions to the extensions of the predicates that represent the medical parameters. This representation technique augments the usual truth values that are assigned to information (true and false), by adding the truth value unknown, and allows one to represent explicitly negative information. For instance, in cases of in exactitude where there are different possibilities for the value of a medical parameter, these possibilities are represented as abducibles or exceptions. In cases of uncertainty, if the value of the medical parameter is unknown, this is represented as a null value.

Decision making in these situations requires the use of an information quantification method. The QoI (Neves et al. 2012; Novais et al. 2010) is a methodology associated with ELP. It is defined in terms of truth values taken in the interval [0, 1] that are attributed to the medical parameters of the patient according to their number of abducibles and null values. Knowing this, it is possible to calculate the QoI of each condition in a decision and calculate scores for each option with the relative weights of its conditions.

By assimilating the concepts of CBR and contextual information with the ELP and the QoI in the context of a runnable medical guideline, it is possible to devise a decision model that focuses on preeminent matters of guideline execution, noncompliance and inadequacy (Oliveira et al. 2012). Such a decision model is depicted in Fig. 2. Starting with the retrieval of relevant information about the medical parameters of the patient, this data is presented to the healthcare professional along with a feed of contextual information. This newsfeed is composed of recent news and articles retrieved by an agent from relevant online sources (e.g., the website of the Center for

Disease Control and Prevention). Then, based on this information, the healthcare professional assesses the adequacy of the guideline to the case in hand and defines if it is a compliance situation with the guideline he is following or, on the contrary it is a non-compliance situation. In the compliance situation, the decision process moves to the core stages of the decision model. These core stages start with the Formulation of Medical

Hypotheses, where the system carries out a survey on the available options in a decision task. The following stage is Voting, where for each option, and consequently the rules that dictate their choice, the system performs an Evaluation of Conditions, to see if they hold true. Next, in the Evaluation of the QoI, the system assesses the state of the information responsible for validating each rule and assigns a score to each option. In the following stage, the Selection of the Medical Option, the output of the decision is generated. The selected option will be used as a trigger condition of the following tasks in the medical process. In the Medical Task Assignment, the next task of the medical process is selected according to its trigger condition. On the other hand, before a non-compliance situation

the system may perform one of two things: retrieve a similar case from the case memory or suggest that the healthcare professional alters the current guideline in order to fit the current case. The case memory contains the previous alterations made to the guideline, the medical parameters of the patient that made him alter it and the output of the process generated by the alteration. If a similar case does not exist, the healthcare professional alters the guideline accordingly and this alteration will enter the memory case as a new case. Once selected the case or made the alteration, the system shifts from a non-compliance situation to a compliance one and enters the core stages of the model (Haron et al., 2012).

This decision model leaves the door open for further research on the complementarily that other techniques that manage uncertainty, namely Bayesian Networks, Dempster-Shafer Theory and fuzzy Logic, may offer to the QoI, since they manage uncertainty in different ways. The implementation of such a decision model is necessary in order to capture the context of the execution of guidelines and provide measures of confidence in the outputs.
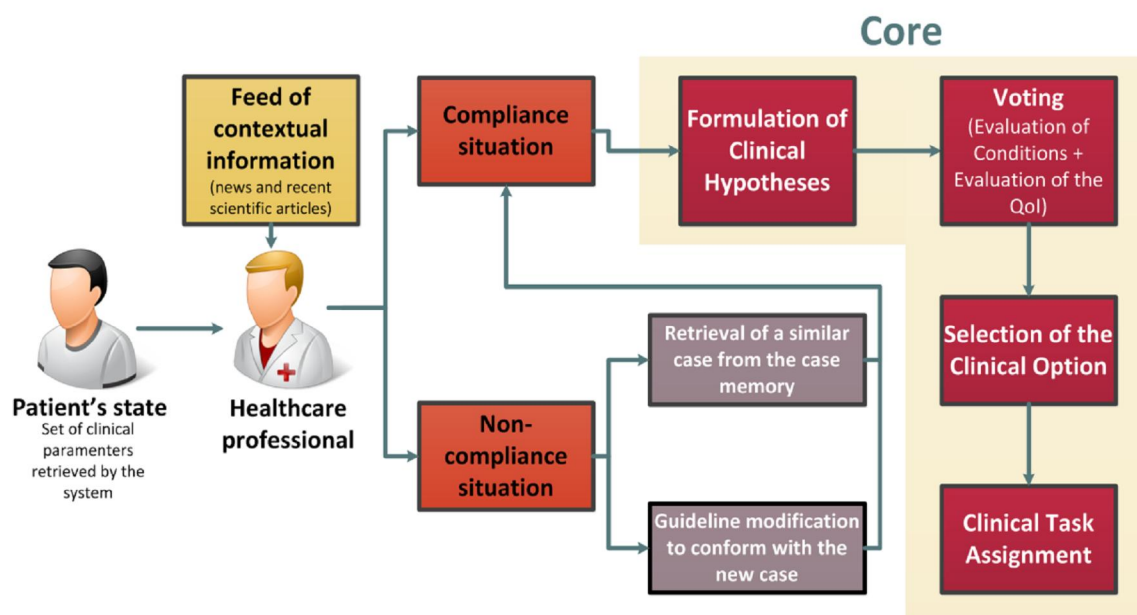

Fig. 2 Medical decision model for the execution of medical guidelines in an ES.

The development of such a decision model is but a step in the construction of a wider decision platform, represented in Fig. 2, where healthcare professionals, members of the same medical team, possibly dispersed across different locations, can discuss de case of a patient in the context of an intelligent environment.

Through the use of AI techniques it is possible to perceive information about the state of stakeholders, namely their attitudes and emotions and thus determine the type of interaction they are developing. If one throws into the equation relevant knowledge, from exterior sources, concerning the health condition (that is the object of the discussion) and guideline recommendations, a group decision environment is established for healthcare professionals to discuss if a guideline is suitable for the situation at hand and mediate/negotiate solutions. Having all this information enables the medical team, in cases of non-compliance of guidelines, to build new strategies and adapt their content to maximize the probability of a successful treatment.
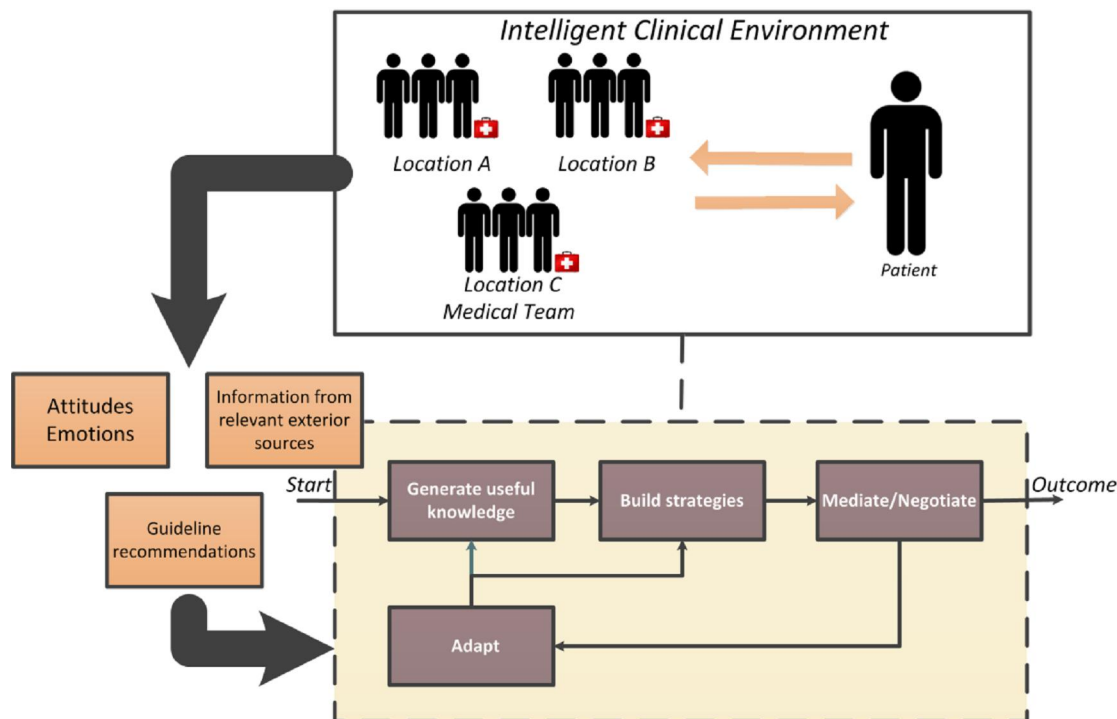
Fig. 3 Characterization of an intelligent medical environment where a group decision framework is established.

6. Conclusions and Future Work

It is widely accepted that the adoption of CIGs would greatly improve the efficiency of healthcare, both in medical and in economic aspects. This is an ongoing research line with numerous people working on the implementation of useful models and the development of execution engines. However, after perceiving the main necessities of paper-based medical guidelines and analyzing the current CIG approaches, we conclude that they do not solve completely the shortcomings of guidelines, as it is evident by the fact that the available models and systems are not widely implemented. The line of research proposed in this paper focuses on the development of an ontology for the representation of medical guidelines that effectively encompasses different medical domains and, at the same time, shows portability, for implementation in heterogeneous systems. The requirements to achieve this purpose include the conception of structures to accommodate different types of medical tasks, temporal and scheduling constraints, logical rules, triggering criteria and shows conformance with data and terminology standards. The current CIG models are not complete in the way that they do not have a transversal approach to all of these issues (Norouzi et al., 2012).

It is also viable to conclude that there is a need for a decision model that addresses the aspects of the contextualization of guideline execution and the handling of incomplete and uncertain information. However, healthcare professionals and their opinions should not be excluded of the process, since one of the current criticisms to guidelines is that they are too rigid and do not give space for innovation and change. This decision model should be incorporated in the ES that supports the ontology.

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Collapse of Authenticity of Artistic Work

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Abstract: The epoch in which we live is the collapse of authority. Postmodernism and its synonymous terms is the condition which covered the western civilization in the second half of twentieth century. This condition has challenged all the authorities before itself. Authenticity of the artist work is also an authority which is broken in this period. The study tries to show that the present epoch is the collapse of grant-narratives including the artistic work. In this period, the following grant-narratives are challenged and refused: "human" as the subject of episteme, authenticity of artistic work, author, reason, reality, "truth", matanarratives, modern religion and morality and theory of progress. The research dominantly focuses on the refusal of authority of the artist work which is appeared in parallel to the collapse of other authorities. In his famous article "the Artistic Work in the Age of Mechanical Reproduction", Walter Benjamin tried to link the cultural avant-garde and new Mass Media and put their emancipator power in the opposition point of traditional myth of "autonomous" artistic work. He coinaged the "Mechanical Reproduction" term to refer to any form of cultural production the trait of which is partly widespread reproduction of the cultural artifacts through machinery technologies in which each copy or a version is not less or more "authentic" than the other copies. In this case, the real problem is not merely technology because the mechanical reproduction even transforms the nature of aesthetic experience. Benjamin argues that a huge part of aesthetic power of traditional artistic work is originated in its position as incomparable and unique object. In this field, he applies the term "halo" in order to refer to the composition of authenticity, authority and uniqueness in the artistic work and he believes that the three traits have been tied inseparably. Now, the artistic work-which was a unique available version-is no more unique and the incomparable "versions (Monaliza) are generally available with excellent quality. The author tries to show that the mass media has removed the holiness and solemnity of the artistic work in our contemporary times.

Introduction:

The world before the postmodern condition is the world of authorities and certainties. In each epoch, there is a centre for authority based which a system and narrative, which contains and defines all aspects of life, is constructed. This basis, consequently, become a social norm and protected by people and the ruling power not only protects it but also achieves its own power based on this source of authority. This source of authority was once the myth and superstitious narrative, human, religion, again human, reason, science.

In the end of each era, the center of authority becomes marginalized and another phenomenon becomes the center of authority. This tradition, until the emergence of postmodern condition in the previous century, has been practiced for thousands years approximately across the world, but this systematic, dynamic, certain and disciplined form has merely been observed in the west because the developments has not taken place so quickly and carefully. Refusal of authority, for example, for human in this form was only in Greece and modern Europe and refusal of

authority has not occurred in some societies including in our society and seemingly it will occur soon.

Art is not only the social showing but also a dependent phenomenon to the society. In a society which turns around the authority of human, reason, religion or science the art also has formed based on this authority. Similarly, in a society the authority of which is God the religious art is formed and its basis is divine authority and it is the actual and formal representation of religion. The art is product of social conditions and human thought. Being or not being art is dependent to the social conditions; therefore, it is necessary to perceive the social condition and thought of a period as well as its predecessors if we intend to understand the art of the period.

Perception of drama condition in each epoch is associated to the perception of human's condition of the epoch which emerges in the frame of drama hero as well as the author and audience. In dram, the hero's perspective about its society depends on the human's position in the existence of its own period. In other words, if human has a transcendental position in the existence, more motivations and probably abilities of the hero, in confrontation to the challenges of the

world of drama, are observed and vice versa. Thus, we must investigate the human's position in each period if we intend to achieve a better understanding of the dramatic hero of the period. Is the human the mighty king of the world or only an earthworm? What is the relationship between human and world? Is the human centre of the world and the goal of creation or he is an incident whose importance for the world is not more than a bit of soil. Is the world's relationship to the human friendly, non-friendly or the world is essentially indifferent to him?

Method:

The research is based on the library studies in which the foreign, local books as well as internet sites are used.

Definitions:

Authority of Myths:

Before emergence of Greek philosophers, cosmology was a kind of divinity and the world was controlling by the gods who were administrating it according to their own science and style. Hasid and Homer's works, for example, are full of these thoughts. Each part is controlled by a god; Zeus is the god of lightening, Dionysus god of drunk, Poseidon of sea… . They are responsible for doing orders. Because human narrates a story for what he does not know in order to justify it and the myths are the storied justification of the natural incidents. The times of the myth, superstitious narrative, and magic authority continued for thousands years and possibly it is still dominant in some countries.

Authority of Human:

Pre-Socratic's philosophers (Tales, Heracles, Parmenides, Ansiguras, Anksimander, …) tried to distance from the mythic world-view. But there was the world-view of myth authority which gave the sentence of destiny certainty. Even Socratic, who was the last great Greek thinker, became executed because of his skeptical view about the myth. According to the myth, the gods decisions are certain on human's destiny and he has not any will by itself. The ritual plays in Greece represents this theme.

The great philosophers of Greece wanted to think by their wisdom and seek a model collecting the existence distinctions and the authentication of rational-personal analysis caused the replacement of authority from myth to human.

Human is the criterion for every thing, "criterion for being of the thing which exist and not exist"[1]. Probably, the statement by Protagorus is the best evidence for centrality of human in the ancient Greece.

Authority of the Church:

The next certainty is the church. Authority of the church, in the medieval ages, causes the formation of a new age in the certainty. The Medieval ages began from the fall of Western Roman Empire and it was since 476 BC to the 15th century (conquest of Constantinople), that is, for 10 centuries. The art of medieval ages, which is a Christian religious art, approximately was continued and gradually developed.

In the church world-view, human is a creature who is the heir of original sin (Adam's sin) and as a sinful creature he only achieves his salvation if he accepts the guidance and leadership of the St. Father (Pope and his represervtives). In this age, human, in comparison to the classical humanistic view (Ancient Greece) has been humiliated, because the classic Greek assumed the human as criterion of every thing and every body was the criterion of his/her own knowledge.

Authority of Subject:

The forces which caused the fall of medieval ages culture were influential in the renaissance birth: fall of Feudalism, development in urbanization, resistance against the doctrine of church, development of humanism school are the causes in the emergence of Renaissance. Along with these developments, art also was transformed and got a position among people more than the past. Worldly happiness and enjoyment were replaced by the fear and punishment of the spiritual world; therefore, the art returned to the society more than any thing. Regarding the art of theater, for example, "the most important consequence of Renaissance was to put aside the theme of holy history from the theater scene,[2] although this movement was not performed completely, the exclusively method which has centralized just the religious issues as the theme of theater was eradicated". After the ancient Greek, the age after Renaissance was the humanist golden and theater ages. In the beginning, the biblical and theological argumentations (Middle Ages) were replaced by the ancient Greek characters and the development in the humanistic thought of the writer and artist caused to show attention to dramatic values of classic play, that is, limitation of the classic works.

In the collapse of religion authority, the thinkers as Galileo, Coupler, Darwin and eventually Bacon and Descartes played an important role. In fact, it was the scientist who got the authority from the religion and gave it to the subject (acquainted subject). The dramatic hero also took his own authority from this acquainted subject. By "I think then I exist", Descartes centralized human and the modernity was started.

Some principles of modernity include:

Trust in ability of human's reason and science to treat the social diseases.

o Emphasis on the concepts including: development, nature and direct experiences.

• Overtly opposition to religion (particularly Christian theology)

• Humanism and expression of society and nature in the form of humanism

- Emphasis on the Empirical Methodology
- Positivism as Modernism methodology

Possibly the outbreak of the world wars was the end of modernity.

Postmodernism and Collapse of Authorities:

- Refusal of Authority from "Human" as the Subject of Episteme

During the three recent centuries, human's authority has been attacked by the three deadly strikes:

- Through Copernicus's revolution on the centrality of his house in the universe.
- Through Darwinism by its new genealogy which has broken his confidence.
- Through psychoanalysis which unstable him/her and overthrown his thrown of absolute sovereignty on existence.

In the middle ages or medieval centuries, human is defined in a new way. According to the church world-view, human is the heir of original sin (Adam's sin) and he achieve his/her own salvation if he/ she lives as Christ. Of course, such a life (as Christ) is possible only under the shadow of guidance and direction of St. Father (Pope and his representatives). Although in this world-view, the Christian human is assumed as God's son, he has been humiliated in comparison to the classic humanistic perspective (ancient Greece). Because the classic Greek assumed human as the criterion of every thing and every body was the criterion of its own knowledge. But the human, in church perspective, is an instinctually sinful person who just achieves his/her own salvation through the church training.

Postmodernism is a condition which covers the western civilization in the second half of twentieth century. The condition has been formed in opposition to the modern and traditional condition and challenged all predecessor authorities. In the "postmodern condition", Lyotard recognizes the modernity and modernism as the simultaneous presence of science and a set of universal and legitimizing grant-narratives which are originated from enlightenment. In his perspective, the grant-narratives lost their legitimizing power since the World War II. The main centre in opposition of modernity and post modernity is the decline in certainty.

Before the world wars, Nietzsche, Marx and Freud challenged the reason, instrumentalism, and alienation of technology, hypocritical and decadent morality of modern which tried to be an alternative for the effect Christian religion.

On the whole, postmodern condition is the dominant culture in the west after the war. Undoubtedly, postmodern art is exactly product of eradication of the borders and distinction between the high and low, elitism and popularism. Such distinctions or borders, like any other distinction, are disappeared in the postmodern culture. Lyotard tries to show that the doubtfulness in the meta-narratives or grant-narratives in the postmodernism contains grant-narratives of science and policy as well as art as enlightenment, and if the art is not the equivalent of enlightenment, it cannot claim its superiority over the mass culture.

Nietzsche tries to overthrown the all sources of authority; therefore, he re-investigates all norms.

Refusal of "Human's" Authority as the Subject of Episteme

Refusal of Author:

Considering the position of author in the present century, Ronald Bart says "writing is the destruction of each fame and origin. Writing is the inactive, complex and crisscross space in which our subject and all identities are lost and the first lost identity is the author's. The birth of the reader must be in the price of the author's death.

At first, human assumed the truth as a hunting thing that was possible only by him. But the west thinkers doubted in the truth and human's ability to discover it.

For Marx, the truth in our contemporary was what the industrialist wanted to be manifested and they exploited art, religion, culture, policy and the set of what is called in Marx's term ideology to show their own demand as truth; therefore, truth is not something but the favorite of the industrialist and its opposition is false.

But Nietzsche is the thinker who reduced the truth into illusion, false and error. Regarding the truth, he says: "truth is not something but instinct, tendency, madness and insane!"[3] Also he says: "truth is a nice word which is not exact and it is a signifier that does not refers to a certain signified. What is truth? It is the moving army of metaphors, metonymies and various analogies by human's imagination. In short, a set of mankind's relations which have been intensified, transformed and decorated poetically and rhetorically and, at present time, after a long and continuous applications it seems as a stable, lawful and obligatory order for human. The truths are the illusions the illusiveness of which has been forgotten. They are metaphors which have been disabled because of their excess application, the coins the design of which has been eroded and they are taken into account as just metal piece not as the multiplicand coin.[4]

Michel Foucault is another influential thinker who refuses the authority of truth. In his book "Power and Knowledge" Foucault says: truth is neither the reward of the liberal souls nor an advantage for those who have emancipated themselves, but it belongs to this world and it is produced in the various forms of obligation and coercion.

Emergence of Relativism and Multiplicity

In the end of the fifth century B.C, a group of thinkers, who did not assume to seek and discovery of truth necessarily, were appeared.

In his book "Beyond good and bad", Nietzsche puts forward the point that we should escape from dogmatisms in the philosophical thought. He challenges Plato's absolute truth and rejects the absolute truth and weal. In the absence of absolute truth, relativism and multiplicities emerge. Relativism, which was started by Nietzsche, was eventually resulted in the schools and thoughts including Hermeneutic, critical thoughts and Frankfort school, poststructuralism and postmodernism. Nietzsche's relativism thoughts about truth and reality were represented, in a radical form, in the views of the postmodern thinkers as John Francois Lyotard, Jacque Derrida, Gilles Deleuze, Michel Foucault and Jean Baudrillard.

Refusal of Grand-narratives

John Francois Lyotard (1924-1998), philosopher, theorist and the author of "postmodern condition", by his recently works has put forward postmodern discourse as a legitimized and current discourse. He produced his primary and very influential formulation about postmodern in his famous book "postmodern condition" which was published in 1979. He says: "the issue of legitimization is collected and produced in the various forms and interpretation in the contemporary, postindustrial society and postmodern. Grand-narrative, regardless it's applied method of universality and whether it is a theoretical or emancipative narrative, has lost its validity"[5].

In a famous way, he defines the postmodernism as "refusal of grand-narratives".

"Once the Sophists remembered the exceptions logic, eventually we have understood that this logic is correct and (the logic of unique truth) is useless. This unique truth is not something but one of the possibilities of the exceptions logic."[6]

Refusal of Authority of System

The thought is in the stage which cannot endure any system. In Gilles Deleuze's (1925-1992) view, instead of attention to the notions of unity and identity according which the west thought are centralized, we should deal with the concepts of multiplicity, becoming, difference and heterology. Therefore, he established the philosophy which is based on the concepts of multiplicity and difference.

Theory of Progress and Refusal of Authority

Historical progress is a religious idea which continued its life, after marginalization of religion from Renaissance, in a new framework. Religious idea believes that the world regards the weal and happiness and God's will guarantees this happiness and weal. Belief in a saver in all religions is a proof for this claim that the saver will emerge and he justly modifies the

world which has been dominated by vice, even though it is during the last day of the world. After In the Renaissance, human's reason was making this utopia. English Renaissance thinker, Francis Bacon argued that science is what increases man's domination over world; therefore, modernity recognized the history as the history of progress which is certain in the modern era by modern reason.

Refusal of Authority the Artistic Work Authenticity:

Walter Benjamin (1940-1892), a member of Frankfort School, in his famous article, "Artistic Work in the Age of Mechanical Reproduction" (1935), tries to connect the cultural Avant-garde and new mass media and put their emancipative power in the opposite point of traditional myth of "autonomous" artistic work. In this article, he puts forward a new point. In the new middle of nineteenth century, the visual art is reproduced because of improvement in technology, reproduction and mechanical reproduction of artistic work and physical art as the printing industry reproduces the writing text. Emergence of photography art was the promise of these times which was perfected by invention of the Cinema industry. By mechanical reproduction of artistic works, characters have lost their main characteristic and they are not taken into account as the unique and univalent who seem immortal, while keeping the distance from the audience (listener and spectator), or as holy objects. Thus, the artistic work becomes without authenticity and it has not any more a ritual value. "That is why the mechanical reproduction; which is, at first step, associated to the physical art; gradually influences the artist and audience's view on the artistic work in all branches of artistic production, and inaugurates a new phase of creation and perception of the artistic work.[7] He invented the "Mechanical Reproduction" to mention to any form of cultural production the characteristic of which is the widespread reproduction of cultural manufactures through machinery technologies in which each copy or version is as "authentic" as the others. The issue is not merely the technology because the mechanical reproduction even transforms the nature of aesthetic experience. Benjamin argues that "a huge part of aesthetic power of the traditional artistic work is resulted from its position as unique and incomparable objects to the individual. He applies the term "halo" to refer to the combination of authority, authenticity and uniqueness in the artistic work; moreover, he believes that the three characteristics are inseparably interconnected. He argues that "possibility" of quickly and abundant reproduction of the artistic work has changed the essence of art and removed the halo [holiness] around it through obliterating its qualities of "oneness" and "unavailability". In Benjamin's view, the main origin

of the "halo" is the notion that the artistic work has a position in the cultural traditional field the historical origin of which is traced in the religion ceremonies: "therefore, the art holiness is resulted from the holiness of the religious and magical ceremonies. Exactly, that is this holiness which is obliterated in the age of mechanical reproduction"[8].

Now, the artistic work-which was available only as a univalent version-is not unique and alone; ritual value of such a work has been lost. Now, the versions (Monaliza) with high quality are available for everybody. In our contemporary times, the mass media has destroyed the holiness and awe of artistic work. Benjamin takes photography as an example. By emergence of photography, we can print the picture as many as we like and we cannot recognize any picture as the "authentic" one. As a result, the ritual value of artistic work has been replaced by its dramatic value"[9]. For Benjamin, the mechanical reproduction and non-halo art provide the primary backgrounds for creation of the phenomenon which can be resulted in cultural democracy. Benjamin always hopes a kind of cultural policy which was simultaneously avant-garde and popular.

"Significantly, such a process, for Benjamin, is not negative; but – and against what Aderno thinks about culture industry – cause a promotion in the art rank. Now, people – common audience of artistic work – can democratically and freely express their views about them"[10]. According to Benjamin, the mechanical reproduction of artistic work "is a component of process of culture democratization."[11]

In such a process, Benjamin seeks the political meaning and shows his attention to the policization of aesthetic. But this study tries to show the relationship between Benjamin's consideration and postmodern thought. Scot Lash seeks such a concept in the meaning of halo decline. The similarity of Benjamin's critical perspective and postmodern culture is in this concept; because the cultural face of post modernity is [also] lack of this halo." [12]

By application of "halo decline", Lash considers the postmodern culture forms in the above mentioned conditions and in his consideration – with regard to Benjamin's work-regards the avant-garde in 1920s and surrealist movement and takes into account it as the beginning of post modernity; because it is regarded as a radical attack to the autonomous and halo of aesthetic. So, Lash declares that Benjamin's aesthetic is approximately the postmodernist aesthetic."

Many proofs and reasons can be presented for the Lash claim. But we have selected the halo decline as eradication of the borders between the high and common culture. We intend to discuss the political or aesthetic results of such phenomenon. We only try to show that there are similarities between

postmodernism and the Benjamin's halo decline. One of the features of postmodernism and particularly poststructuralism is to remove the binary oppositions in the philosophical tradition. "Metaphysic of presence of west has established the basis of its logic on the hierarchy of opposite bi-polar concepts including presence/absence, truth/false, conscious/unconscious, subject/object, form/content, nature/culture, speech/writing, soul/mater…."[13]

Such oppositions have been established based on the superiority of the primary sign and inferiority of the second sign. Post structuralism tries to break such authority structures. By extension, we can perceive that distinction between the high and common culture is a distinction and binary opposition based on a kind of authority which is resulted from a "halo" of artistic work.

Reproduction of artistic work through mechanical reproduction violates such an opposition by removing the "halo". Moreover, we can perceive that the halo decline and its effect in the avant-garde of 1920s- which was theoretically represented in the Benjamin's article- are the important conditions in emergence of postmodernism in the human sciences. Although Aderno is a partner for Benjamin's concerns, he recognizes Benjamin's aversion from artistic art and interest in the mass culture as prejudice.

What causes the death of value and validity of commodity including artistic and non-artistic is the "death of God" by Nietzsche. The death of God is accompanied by the death of human and author because the death of God is the "death of being God". The "death of being God", in the process of transformation and gloss in a short term, gives the authenticity to the commodity, as the artistic work achieve authenticity in the gloss and "Formalism" insists on it, this short term quickly passes and what remains is the simple truth that the commodity, in each form, has a consumer. In other words, the commodity is not in the form of an abstract object that human (subject) recognizes and valuates it but becomes a tool in the hand of human and its validity is capability of its application and this capability is determined neither by philosopher nor theorist but by interne.

Here, Heidegger emerges and, based on what was expressed, believes in the value of human as applicability. Now, the manufactured thing, in each form, is a tool which determines that it cannot be unique because it must be reproduced as much as the users who are not a part of society who are traditionally assumed as inferior but include all mankind society because human is assumed as the user in this gloss. Meanwhile, the superior and inferior have died by the death of system and narratives.

Considering the authenticity in the reproduced works and ontological similarity between the

reproduced and unique works, P.F Stravson proposes a controversial perspective and believes that we cannot reproduce the painting tableau and sculptures undistinguished from their original versions because of an accidental fact. According to Stravson, there is not an ontological difference between the various kind of executive, reproductive and unique versions. He claims that we can have many evidences (according to the sample/evidence model). Stravson says that the original version of painting and sculpture, like the early manuscripts of poet, except the emotional value and probably the historical and technical importance, were valueless (Stravson, recited by Henfling 1377: 150). Nowadays, with regard to the countless number of reproduced artistic works, we observe the certainty of Stravson's prophesy about the value of original version because, in the case of new arts, the oneness of the work has approximately lost their previous meaning.

Conclusion:

Postmodern characteristic is different for the experts and there is not any agreement between them up to now; however, we can mention to some common characteristics. In postmodern, the concepts as "reason", "truth", "tradition", "logic" and "morality" which determined the direction of human's life and gave it meaning and every one was once a the basis for episteme formation and essence of dominant model on human's mind, lost their meaning and their authorities were refused. By five important features, postmodern has caused new definitions in the political sociology. Such definitions are in a close association to the items of globalization:

1- "Opposition to the epistemology and more attention to the ontology, that is, interest in the various effects of knowledge on the life more than the life appearances for the real causes of belief."

2- "Attention to the infinite meaning as a source for construction of identities and structures."

3- "Refusal of centrality from society, namely the belief that the social structures are constructed during the processes which occur in the place and space and they are not determined in a scientific way. There is not any central institute (e.g. state) and meaning (e.g. truth) around which the various aspects of social life are organized in a stable position."

4- Refusal of Essence; in the political sociology influenced by postmodern, the identity and structures are the phenomena which are constructed in a particular social context and related to a particular historical conditions."

5- "The effect of the perspectives by which the social life is viewed. Through this angle, there is not any universal and transcendental truth and value which common and acceptable between all the society members."[14]

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Partial edentulism: a five year survey on the prevalence and pattern of tooth loss in a sample of patients attending King AbdulAziz University - Faculty of Dentistry.

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Abstract: There is little if any documentation regarding the pattern of tooth loss among the adult population living in Saudi Arabia, especially in the western region. The aim of this study was to investigate patterns of tooth loss in patients treated at King AbdulAziz University – Faculty of Dentistry and to compare it over five years with the documentation of the number and types of removable partial dentures provided as well as patients gender, nationality and mother tongue. Materials and methods: the dental records of patients treated by sixth year students at King AbdulAziz University - Faculty of Dentistry during the academic years 2004 and 2009 were reviewed to record patients' nationality, age, gender, mother tongue and Kennedy classification in both arches. The type and number of removable prosthesis provided were also noted. Results: Descriptive analysis and comparison between the groups was performed using Micro soft excel statistical programme. A total of 293 charts were reviewed and Kennedy Class III was found to be the most common classification in the entire sample. The construction of definitive removable partial dentures was three folds that of transitional removable partial dentures. Conclusion: in a selected sample of patients receiving dental treatment at the faculty of dentistry in Jeddah, Saudi Arabia, the most common pattern of partial edentulism was Kennedy Class III and definitive partial dentures was the first choice for treatment with removable prosthesis.

1. Introduction

Documenting the prevalence and pattern of partial tooth loss is very important for identifying the prosthetic needs of the studied community as well as aiding the provision of educational and preventive materials suitable for this population in terms of language and composition. Publications on the prevalence of partial edentulism among the Saudi population are scarce, the earliest survey was in 1995 which examined a selected population attending the dental school at King Saud University (KSU) in Riyadh, Saudi Arabia and reported the Mandibular first molar to be the most frequently missing tooth with a tendency for higher tooth loss in females compared to males. Loss of anteriors and premolars in the Maxilla was found to be more frequent than the Mandible in which loss of molars was more prevalent [1]. A later survey of patients receiving removable partial dentures (RPD) at KSU reported that Kennedy Cl III RPD was the most commonly constructed with higher prevalence in Saudi male subjects [2]. The attitude of 238 Saudi male patients attending the dental clinics at KSU towards replacement of missing teeth was studied and concluded that 82% of the studied sample expressed their need to replace missing teeth, the majority stated function as the prime reason for replacement of missing teeth,

followed by the negative effect of tooth loss to appearance [3].

An insight into the prosthetic needs of a given population can also be obtained by reports on patients' satisfaction and acceptance of RPD following treatment. In a study of RPD usage in Saudi male patients, a telephone interview was conducted with 52 male patients a year after receiving definitive RPD constructed by undergraduate students at KSU. 64% of the patients stated that they wore their dentures regularly while 21% have stopped completely using them mainly due to pain and discomfort. 27% of the discarded dentures were in the Maxilla compared to 36% in the Mandible. The most commonly provided were Kennedy Cl III in both arches, while Cl IV RPDs were the least common [4]. Denture quality was shown to be related to patients' satisfaction but could not explain the dissatisfaction of all patients or their intolerance to the prosthesis [5].

Information on the pattern of tooth loss regionally and in the Middle East is also scant. Kennedy Cl III was reported to be the most common (57.14%) in a sample of the Iraqi population. Surprisingly, 63% of the studied sample refused prosthetic replacement of missing teeth [6]. Cl III was also found to be the most common classification in

both arches among a sample of Jordanians attending a dental teaching hospital [7].

Clearly the few local and regional reports on partial edentulism in the Arabian Peninsula agree that Kennedy Class III is the most common while reports on the incidence of RPD in the USA concluded that Kennedy Cl I was the most common at 40%. It is worth noting that the authors recommended conducting periodic reviews on the incidence of various classes of RPD to aid in teaching [8].

Statement of Problem and Aim

Partial edentulism has a significant emotional and psychological impact on ones confidence and might lead to social inhibitions due to the changes in appearance that follow tooth loss [9]. However, available literature on the incidence and pattern of tooth loss and partial edentulism mostly quote Caucasian values where Kennedy Class I and II are reported as the most prevalent[10]. There is little if any documentation on the demography and pattern of tooth loss among the adult population living in Saudi Arabia, especially in the western region. The aim of this study was to investigate patterns of tooth loss in patients treated at King AbdulAziz University – Faculty of Dentistry (KAUFD) and to compare it over five years with the documentation of the number and types of RPD provided.

2. Material and Methods

This survey was conducted by reviewing the dental charts of patients treated at the KAUFD in the years 2004 and 2009. Only patients treated by Sixth year (senior year) undergraduate dental students' were included. The sample consisted of Saudi and non Saudi nationals. The information gathered charts included patients' demographics (age, gender, nationality and mother tongue) as well as the Kennedy classification in the partially edentulous patients excluding third molars. Descriptive analysis and comparison between the groups was performed using Micro soft excel statistical programme.

3. Results

A total of 293 dental charts were included in the current survey, 200 patients treated during the year 2004 vs. 93 in the year 2009. Out of the 200 patients charts reviewed for the year 2004, 106 (53%) were of male patients and 94 (47%) were of female patients while in the year 2009, 33 (35.48%) of the charts were for male patients compared to 60 (64.52%) female patients charts. The mean age of patients in 2004 was 34.48 years compared to 33.94 years in 2009. In 2004 the ratio of Saudi Arabian nationals to others was 55: 145 (27.5% and 72.5% respectively)

this is compared to a ratio of Saudi Arabian nationals to others of 23: 70 (24.73% and 75.27% respectively) in 2009. Table 1 lists the ethnicity of the entire sample according to gender.

The highest number of non Saudi nationals in 2004 and 2009 was from Yemen. The 5 most common non Saudi nationalities in both years are presented in table 2.

The mother tongue of the sample was recorded as either Arabic or other languages and the ratio in the year 2004 was found to be Arabic 142, other languages 54 (71% and 27% respectively) compared to a ratio for Arabic: other languages of 53: 40 (56.99% and 43.01%) in 2009. Table 3 lists the percentage of patients with Arabic as the mother tongue compared to other languages according to gender in the entire sample.

The prosthetic needs and pattern of tooth loss in the sample were also tabulated using the Kennedy classification which describes the location of missing teeth in the arch. Tables 4 – 7 explain the distribution of each Kennedy class in both arches by gender as well as the frequency of each class in the sample. Without a doubt Kennedy class III was found to be the most common in both genders and in both arches while Kennedy class IV was the least common. Higher tooth loss is evident in female subjects except those with Kennedy class IV.

Finally, the charts were used to quantify the number of transitional and definitive RPD provided for the sample in each arch. A higher number of definitive Co-Cr RPD was delivered to patients compared to transitional acrylic RPD. A total of 205 dentures were provided in the year 2004 (158 definitive and 47 transitional) compared to 119 in the year 2009 (85 definitive and 34 transitional). The percentage of patients who received transitional and definitive RPD is tabulated according to the arch treated and by gender (table 8, 9 respectively).

Clearly a higher number of female subjects received transitional RPDs compared to male patients in both 2004 and 2009 but there was no difference in the percentage of arches restored.

The number of female patients receiving definitive RPD was higher compared to their male patients in both examined years and more so in the year 2004.

In terms of additional retentive aids, in 2004 1 male patient received extra coronal attachments and one male patient was treated with copings compared to one female patient whose RPD was fitted with extra coronal attachment. Attachments and coping were not used in 2009.

Table 1: The distribution of patients' ethnicity according to gender

Year	2004				2009			
Ethnicity n (%)	Saudi Arabian 55 (27.5)		Others 145 (72.5)		Saudi Arabian 23 (24.73)		Others 70 (75.27)	
Gender n (%)	Male 33 (31.13)	Female 22 (23.40)	Male 73 (68.87)	Female 72 (76.60)	Male 16 (48.48)	Female 7 (11.67)	Male 17 (52.52)	Female 53 (88.33)

Table 2: Percentage of top 5 non Saudi nationalities.

Year	2004	2009
Nationality n (%)	Yemen 32 (18.93)	Yemen 21 (30.43)
	Philistine 22 (13.02)	Pakistan 10 (14.49)
	Afghanistan 17 (10.06)	Afghanistan 8 (11.59)
	Sudan 13 (7.69)	Eretria 8 (11.59)
	Eretria 11 (6.51)	Philistine 5 (7.25)

Table 3: Distribution of patients language according to gender.

Year	2004				2009			
language n (%)	Arabic 142 (71.00)		Other 54 (27.00)		Arabic 53 (56.99)		Other 40 (43.01)	
Gender n (%)	Male 85 (80.19)	Female 61 (63.83)	Male 21 (19.81)	Female 33 (35.11)	Male 8 (24.24)	Female 32 (53.33)	Male 25 (75.76)	Female 28 (46.67)

Table 4: The distribution of Kennedy classification in the Maxilla by gender in the year 2004

	Cl I	Cl II	Cl III	Cl IV	Total
Male (%)	12 (11.32)	10 (9.43)	40 (37.74)	7 (6.60)	69 (65.09)
Female (%)	17 (18.09)	16 (17.02)	38 (40.43)	0 0	71 (75.53)
Total (%)	29 (14.50)	26 (13.00)	78 (39.00)	7 (3.50)	140 (70.00)

Table 5: the distribution of Kennedy classification in the Maxilla by gender in the year 2009

	Cl I	Cl II	Cl III	Cl IV	Total
Male (%)	3 (9.09)	4 (12.12)	14 (42.42)	0 (0)	21 (63.64)
Female (%)	7 (11.67)	11 (18.33)	27 (45.00)	1 (1.67)	46 (76.67)
Total (%)	10 (10.75)	15 (16.13)	41 (44.09)	1 (1.08)	67 (72.04)

Table 6: The distribution of Kennedy classification in the Mandible by gender in the year 2004

	Cl I	Cl II	Cl III	Cl IV	Total
Male	10	14	36	2	62
(%)	(9.43)	(13.21)	(33.96)	(1.89)	(58.49)
Female	22	20	32	1	75
(%)	(23.40)	(21.28)	(34.04)	(1.06)	(79.79)
Total	32	34	68	3	137
(%)	(16.00)	(17.00)	(34.00)	(1.50)	(68.50)

Table 7: The distribution of Kennedy classification in the Mandible by gender in the year 2009

	Cl I	Cl II	Cl III	Cl IV	Total
Male	2	6	11	0	19
(%)	(6.06)	(18.18)	(33.33	(0)	(57.58)
Female	12	12	25	0	49
(%)	(20.00)	(20.00)	(41.67)	(0)	(81.67)
Total	14	18	36	0	68
(%)	(15.05)	(19.35)	(38.71)	(0)	(73.12)

Table 8: Percentage of patients provided with transitional RPD in the years 2004 and 2009 according to gender and arch restored.

Year	2004				2009			
Arch	Maxillary		Mandibular		Maxillary		Mandibular	
n	23		24		17		17	
(%)	(11.50)		(12.00)		(18.28)		(18.28)	
Gender (%)	Male	Female	Male	Female	Male	Female	Male	Female
	7	16	8	16	5	12	4	13
	(6.60)	(17.02)	(7.54)	(17.02)	(15.15)	(20.00)	(12.12)	(21.67)

Table 9: Percentage of patients provided with definitive RPD in the years 2004 and 2009 according to gender.

Year	2004				2009			
Arch	Maxillary		Mandibular		Maxillary		Mandibular	
n	72		86		39		46	
(%)	(36.00)		(43)		(41.94)		(49.46)	
Gender (%)	Male	Female	Male	Female	Male	Female	Male	Female
	28	44	34	52	11	28	16	30
	(26.42)	(46.81)	(32.08)	(55.32)	(33.33)	(46.67)	(48.48)	(50.00)

4. Discussion

The dental records of patients treated by sixth year undergraduates were used for this survey as these students are required to provide comprehensive clinical care to their patients. Therefore, students carry out a thorough dental examination on their patients including dental charting, periodontal examination and full mouth radiographs prior to planning and completing the comprehensive dental treatment required by these patients. The dental charting is reviewed and approved by a team of multidisciplinary consultants which insures both the accuracy and consistency of the diagnosis and especially in regards to diagnosis of restorability guided by the preset criteria which takes into account both the restorability if the tooth and the periodontal condition of the patient among other considerations. It is important to point out that both Saudi and non

Saudi patients receive free dental treatment at KAUFD including prosthetic RPD and FPD, thus the provision of RPD reported in the present survey is not affected by patients socio economic limitations.

A significantly lower number of patients were treated in 2009 compared to 2004. This can be attributed to two factors, primarily the flooding crisis which devastated Jeddah in 2009 causing the stoppage of schools and university for a few weeks with a decrease of patients' flow in the weeks after. The second factor was the exclusion of any incomplete files from the survey, such as incomplete or unauthorized charting or when treatment was discontinued. Obviously in light of the flooding crisis some patients choose not to continue their treatment which decreased the sample number for the year 2009. The department of medical records at KAUFD reported a decrease in patients flow and attendance of

40% in 2009 compared to previous years as a result of the flooding crisis.

The majority of patients receiving treatment at KAUFD are none Saudi nationals as KAUFD is the sole free dental care provider for foreigners in the city of Jeddah, Saudi Arabia. The current survey illustrates that Arabic is not the mother tongue in a high number of expats patients. While KAUFD provides advocates and translators to aid in filling personal history forms, explaining patients rights, consent and treatment plan, yet most of the take home written instructions are provided in Arabic and English languages. Based on the findings of the current report, a leaflet for partial and complete denture home care instructions utilizing pictures and graphs in addition to text was designed and distributed to patients at the denture delivery appointment, patients feedback on the usefulness of these leaflets has yet to be investigated.

The prosthetic needs of the sample were tabulated using the Kennedy classification which is the most familiar and most widely used classification in literature and in educational curriculums and describes the location of missing teeth in the arch. Kennedy class III was found to be the most common in both genders and in both arches while Kennedy class IV was the least common. These findings are in agreement with other reports on the prevalence of RPD in the kingdom[1,2], where Kennedy Cl III was found to be the most common at 45% and 37% (Maxilla vs Mandible) while Cl IV was the least common at 8% and 3% respectively[4].

An inclination towards higher partial edentulism among female subjects was recognised and is consistent with earlier findings reported in patients treated at KSU[1]. Similarly higher levels of tooth mortality in women in some countries have been reported and were attributed to the more frequent dental visits by females for care of inadequate and unaesthetic dentition rather than to a true reflection of higher tooth mortality than the male counterpart[11]. The current study cannot ascertain such claims due to the variance in sample size and diversity of the sample. However, a significantly higher number of female patients received RPD (both transitional and definitive) compared to their male counterpart which is consistent with some studies[12]. This could be a reflection of females' higher concerns over aesthetics and function. A question addressing the purpose for seeking replacement of missing teeth during history recording would be an additional aid in disclosing the public view and perception of partial edentulism in the western region of Saudi Arabia.

It is well establishes that the vast improvement in dental care over the last three decades - especially in developed countries - has lead to the decrease in tooth loss and subsequently a decrease in complete denture users. This was accompanied with an increase in RPD users[13]. During the late 80's of the last millennium, the pattern of partial edentulism was investigated with reports that the most common Kennedy Classifications are class I in the Mandible and Class III in the Maxilla[14]. Such changes are expected to occur in developed countries where improvement in health care is distinct. On the other hand, the demand for removable prosthesis is increasing in developing countries suffering from the economic depression and lack of or limited access to dental care[15]. Periodic surveys on the pattern of tooth loss are thus vital for measuring dental disease and treatment needs in these countries. The situation of partially and completely edentulous patients in Saudi Arabia cannot be established without the inclusion of patients treated with complete dentures. Future investigation of the prevalence and distribution of complete edentulism by gender would aid in establishing the prosthetic needs in the population as well as provide important resources for educational purposes.

This study illustrates that a significant number of definitive RPD is constructed annually at KAUFD is significantly high. The provision of a considerably higher number of definitive Co-Cr RPD compared to transitional RPD might be a result of the patients treatment need and demands, though, it is more likely to be due to the course requirement, since sixth year undergraduates are required to provide complete and comprehensive dental care to their patients and grades are awarded according to the number of cases the student completes with a minimum of three cases per student. Such comprehensive treatment is free of charge at both of the dental schools in Saudi Arabia (KAUFD and KSU). Sadig *et al*. reported that out of 650 patients receiving removable partial dentures at KSU in one year, 422 were supplied with definitive RPD[2]. Akeel[4] reported that in a sample of patients receiving prosthetic treatment at KSU, only 12 transitional RPD were constructed in a year compared to 72 definitive Co-Cr RPD. It may be that the availability of free dental treatment at the dental college at KSU and KAUFD results in exaggerated treatment demand especially when taking into consideration that Kennedy Cl IV was the least commonly provided RPD, thus, esthetics and appearance were not among the reasons for replacement. An investigation into the usage of RPD provided to patients at KAUFD is needed to disclose if exaggerated treatment is applied by the students in fulfillment of their requirements and weather such an approach is cost effective. In essence dentures might actually be supplied to patients who do not use them, an issue that has been reported by other investigators [4, 16,-18]. The exaggerated treatment provided in the

public sector however is not mirrored in the private sector. A published survey of RPD constructed in private dental practices in Bahrain found that 89% of RPD provided where transitional compared to 11% Co-Cr definitive RPD[19]. Recently KAUFD has adopted a new teaching strategy where requirements were replaced with minimum procedure exposure so that once a given clinical skill is mastered by the student to meet the preset criteria and a clinical competency exam in that skill was successfully completed by the student, that clinical procedure would no longer be a requirement. The impact of this strategy on the number of RPDs provided has not been established to address the question of possible over treatment, additionally and since 2010 KAUFD has introduced a course on dental implants for undergraduates whereby 6th year students are trained on the surgical placement and prosthetic restoration of single missing teeth. The impact of this on the number of definitive Cl III RPD provided should be addressed in future surveys. It is interesting to note that in the UK the provision of RPD is indicated by the patients demand and physical function with an annual cost of almost fifty million pounds. Thus a recommendation was proposed to re evaluate the management of partial edentulism to be more cost efficient so that patients with poor oral hygiene would receive transitional acrylic RPD[20]. This was also based on the reports that 30 – 50% 0f patients receiving RPD in the UK occasionally or never use them[21,22].

Although prosthetic treatment is provided free of charge at KAUFD, a lower number of male patients received RPD. This is in contrast to an earlier report of higher prevalence of RPD among Saudi males treated at KSU[2]. Social or cultural inhibitions towards use of dentures may be a factor since similar attitude towards tooth loss was reported in other cultures where the replacement of missing teeth is considered socially unacceptable [6, 23]. This is in contrast to the European and North American standards of care in communities where esthetics, social, function and cultural factors are the basis for prosthetic replacement[24, 25]. Dental caries and periodontal disease are the leading biological factors associated with tooth loss and are associated with the socioeconomic level of subjects. Sanya et al. reported that in Kenya, molars were the most common teeth lost due to caries[26], while Mathew stated that periodontal disease was the prime etiologic factor of tooth loss at 61.8% followed by caries at 24.8%[27]. These results are a reflection of the socioeconomic level and its relation to oral health where dental caries is the primary etiological factor to tooth loss in developing countries such as Kenya compared to periodontal disease in developed counterparts where

access to restorative dental care is readily available. It has been demonstrated that social class, gender and age are all significant factors for whether or not patients use dental services to obtain dentures[28].

What follows is a sample of a few of the most recently published reports (2010 – 2011) and is presented for comparison between the prosthetic needs of the sample studied in the current survey and that of other communities. The university hospital of Benin, Nigeria reports that the most common partial edentulism amid 351 subjects (53.6% Male and 46.4% Female) was Kennedy Cl III at 57.3% followed by Cl IV at 26.2%, while the least common were Cl I and Cl II at 2.6% and 2.3% respectively[29]. A study of 193 elderly Taiwanese receiving dental rehabilitation support from the government reported that Kennedy Cl I was the most common at 30.75% while Cl IV was the least common at 3.16%. The highest prevalence of edentulism was among subjects with lower social class, low income level and little or no education. These subjects received treatment only when experiencing tooth ache or discomfort [30]. A survey of 1800 patients receiving dental treatment at the dental college and hospital on Chennai, South India, concluded that Cl I was the most common in the Maxilla at 33.3% while Cl III was the most common classification in the Mandible at 36.3%. As for the type of the RPD provided, 96.9% of the dentures worn by the patients were transitional acrylic RPD compared to 3.1% Co-Cr RPD[31]. A survey of 553 patients receiving treatment at dental school of Athens reported that Kennedy Cl I was the most commonly reported in both arches[32]. Similarly a review of 1502 casts at dental laboratories in eastern Wisconsin reported the Kennedy Cl I was the most common RPD constructed with one in three RPD's made as an acrylic RPD[33].

Conclusion

The current survey of a selected sample of patients attending KAUFD highlights numerous challenges to providing optimum dental care generally and removable prosthesis specifically. Most importantly is the diversity of the patients seeking treatment as well as the language barrier and socio economic status of these patients, thus drawing attention to the need for untraditional take home instructions to assure patients compliance. The most common Kennedy classification in the entire sample was Kennedy Class III. Prothetic treatment provided at KAUFD clearly has a tendency to providing definitive RPD with conventional retentive elements. These findings propose the question of whether exaggerated treatment is provided for unsuitable patients, therefore, it is strongly recommended to investigate patients' satisfaction with the provided

RPD at recall appointments few months after treatment.

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Study And Development of Governmental Services Cost Price Accounting Model in Iran

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ABSTRACT: The transition to the international methodology of cost accounting and statistics has exclude "non production sector" concept, which has been continously applied in the service sector in the practice of Islamic Republic of Iran. During recent years, the service sector has continued to be one of the most developing sectors of the world economy. In most developing countries, as a consequence of restrictions on activities, the private sector is not built on firm grounds and therefore, does not function effectively. On the other hand, the public sector holds a major portion of the economic activities and takes a big part in produceing goods and providing services at a single-rate price: mostly determined by the legal and supervisory authorities. As a result of this practice, in our country, there have been continously raising difference between the final cost of the production and price of goods (service). There are factors affecting to that, among them lack of a suitable system for calculating the final cost and lack of information transparency related to the quality of products are of importance. The research is an applied study in the field of industrial (cost) accounting. It focuses on evaluating the effectiveness of the cost accounting systems and its development in companies with 51% or more state shareholding. As information source, the library study and service of the statistical center of Iran has been used, along with the accounting records of the organizations under study and the state budget data. For collecting empirical data, a set of questionnaire with 30 questions has been used. Different public organizations have been chosen, out of which 100 different professionals were participated in the survey. The questionnaire results then were analyzed to reach a conclusion and make recommendations. In addition, there is also a description of limitations to the study.
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1. Introduction

In recent decades, the world has continously been in the process of transformation, especially with regard to the international methodology of cost accounting and statistics. With this regard and by considering the globalization trend, the accuracy of information about products produced or services rendered are of high importnace.

Nowadays, the accounting, economic and financial management theories not only offer different methods for calculating, estimating and predicting the final cost of goods and services that are influenced by the open market relationships, but also put emphasis on the necessity and importance of the Automated calculation systems. The proper cost calculation and final cost accounting methods not only allows for measuring the efficiency degree of a series of a specified production operations, but also is able to offer a comparison of this efficiency degree among the different manufacturing and service sections. As a result, aside frome the possibility of the preparation of accurate financial statements, the assessment of the yield and growth rate of the economic activities can be facilitated as well. (Being informed about such variables the intended activities can be given priority in allocating capital resources, or through revising the service provision and manufacturing methods the final cost of any intended goods and services can be assessed within the public and private market sectors.)

Thus a necessary condition for organization success is seting competitive prices. Hence, the researcher seeks answeres to the following questions:

1. Does the present cost accounting system function in comformity with relevant laws and regulations?

2. What kind of relationship there is between the costs accounting and method of goods/services Pricing?

3. What are the organizational obstacles restricting the pricing by the companies?

4. How to improve the present cost accounting system?

5. How to control the arising differences between cost of goods(services) and the selling price?

2. Research Background

During the 1970s of the last century, the Iranian economy faced deep transitional periods, which targeted at improving the market mechanism. It was a very complicated and contradicting process that affected not only the producers and consumers, but also the public interest as a whole. It imposed its stamp both on the process of production, circulation and service sector as well.

According to the founder of market economy: Adam Smith's doctrine, the need of market relations stems from the separation of the public work and economic split of the producers (based on features), who are acting independently while simultaneously affecting each others.

According to views of most of the economists, the government intervention in the regulation of economic activities must be "limited", othwerwise, the effectiveness of the market economy will be reduced. Simultaneously in the professional literature, it is expressed that the government should not be involved in all the econmic affairs, since it will affect the effectiveness of the market economy relationships. This means that the government involvement in all affairs must be limited to some extent, just where it is a necessity for fair regulation. Thus, it can be stated as follows: " Competetion must be everywhere, where it is possible, and regulation should be there, where its is expected to be." As a rule, the immediate government regulating approach is appeared at least at the microeconomic level, and the maximum: on the macroeconomic level.

In market relations the buyers can be either the producing firms and big organizations or the end users (the public). Regarding latter, the demand is for the consumption goods. But the classification of market gets more complicated in cases where there are production factors, industrial services and part of consumption items (demanded by massive consumers.) In general, services are separated in two parts: one part goes to the production of material goods and services sector for industrial consumption purposes, while the other part is non productive consumption and goes to the final consumers. In service sector, there are such economic units that carry out various production

functions. There are four categories of branches in the service sector. Those are branches that: a) Produce market related services, .b) Produce non-market related services: based on state institutions. c) Produce non-market related services: based on private, non-commercial organizations.

Within each sector of the economy, the formation of subsectors is closely related to the national economy features of a given country. The economic branches in Iran are classified as production of goods and service industries.(Table 1)

Table 1. Classification of the branches of economy

1.	Mining industry
2.	Electric energy, gas, water supply
3.	Transportation and communication
4.	Financial intermediaries
5.	Real estate agencies, rental and commercial activities
6.	State management and defense, mandatory social security
7.	Education
8.	Health and social services
9.	Foreign organizations and bodies

According to the 4-th article of "The Commercial Code of Iran" enforced in September 1987, a public company is a defined organizational entity which has been incorporated in the form of a corporate legal body, or nationalized or expropriated in virtue of the court's decree and identified as a public entity with more than 51% of its whole capital owned by the government. Generally, the public companies may be categorized in two main manufacturing and service providing groups which, in turn, are subdivided to more specialized groups according to their statement of mission, nature of activities and dependency to the relevant ministries. The number of those companies, banks, insurance companies and private not-profit institutions affiliated to the government, as mentioned in the 2007 National Budget Law, amounts to 512 companies.

All manufacturing and service providing companies and industries, either profit-making or non-profit, are predestined to determine the price of their finished goods and services which, in turn, influenced by the internal and external factors of these companies. The internal factors include the outlined policy and

integrated elements of marketing and company's costs. The external factors are the nature of the market and demand, current competitive condition as well as involved intermediaries. The pricing of goods and services is a multi-dimensional process which is affected by the product, profit margin, interaction with the customers and applied final cost accounting systems. The concept of price and pricing is considered a ubiquitous and universal matter. According to Katler, the price is simply a suggestion or an experience for testing the market pulse (Katler, Phillipe, marketing principles – 10-th edition). The managers of the industrial sectors do constantly have grievances about the challenging nature of the pricing of their industrial products and do not consider it as an opportunity for scaling up the profit level, but as a tedious work. These managers argue that since the prices are determined by the market and supervisory authorities they are unable to manage their intended and proper prices; instead they are forced to adapt themselves to the present situation.

However, the main questions remain unanswered, which are: "what kind of relationship there is between the costs accounting and method of goods/services pricing?"; "What are the organizational obstacles restricting the pricing by the companies?". "What sorts of problems the industrial companies are facing the area of global-scale pricing?"

One important aspect of the industrial pricing process at these companies is the effect that their internal systems put on the pricing process. This is evident in the coordinated or uncoordinated situation among the organizational sub-systems. Three researchers: Lanchioni, Shawe and Smith (2005) concluded that the pricing strategy of an organization is the product of what is programmed by the financial managers of the organization. For example, they proposed the finding that only 5% increase in the price of a specified industrial product may give rise to the increase in the company's profit rate by 22% (Lanchioni, 2005). They believed that the pricing is a very difficult process, because so many environmental factors like political, economic parameters affect it. According to another research undertaken by these three researchers on the leading companies in the USA' market they concluded that the main organizational unit which prevents the pricing process is the financial and accounting departments. However, the present study is directed mainly toward the examination of the situation of the pricing systems used by the public companies. Such companies need to act within framework of the approved laws and regulations and apply a proper cost accounting system on the one hand and are obliged to determine and notify the cost value of the finished goods and services.

Accounting System: An accounting system is a part of an overall (unified) system in which all open systems are affected mutually by the environmental factors such as economic, social and other parameters. As for the impact of the environmental factors on the accounting systems, we can mention the appearance of the inflation accounting from 1970s onward, or the changes in the tax, commercial and banking regulations and their impact on the data, processing of them and preparation of financial statements according to the occurred changes.

2.1. Theoretical Framework

Accountancy is the process of communicating financial information about a business entity to users such as shareholders and managers. The communication is generally in the form of financial statements that show in money terms the economic resources under the control of management; the art lies in selecting the information that is relevant to the user and is reliable**. (**Elliot, Barry & Elliot, Jamie: Financial accounting and reporting, Prentice Hall, London 2004)

The history of accounting dates back to 7000 years ago. (Friedlob, G. Thomas & Plewa, Franklin James:Understanding balance sheets, John Wiley & Sons, NYC, 1996) Today, accounting is called "the language of business" because it is the main mean for reporting financial information about a business entity to many different groups of people.

Financial accounting: In the 19-th century, the development of joint stock companies put special emphasis on the financial accounting, with the aim of providing more reliable and complete information to the company partners (banks, vendors, financial analysts, economists, government agencies, shareholders and others) in the form of publically available financial reports. This development resulted in a split of accounting systems for internal (i.e. managerial accounting) and external (i.e. financial accounting) purposes, and subsequently also in accounting and disclosure regulations and a growing need for independent attestation of external accounts by auditors.

Due to the various needs of the users of the financial reports, the presentation of financial accounts is very structured and subject to many more rules than management reports. One of those commonly rules is the application of the accounting standards.

At present Iran Accounting Standards are issued, updated and their application are supervised by the Iran Auditors Committee. Since 2001, the application of those standards by public companies is a requirement of law. I is worth to mention that the private sector accounting standards are currently under development. And, even though, each of the National Accounting Standard of Iran makes a reference to the relevant International Accounting Standard, but the

National Accounting Standards need further developments.

The increased attention toward the financial accounting, anyway, has never caused careless attitude toward the requirements of the managerial accounting reporting. The market competitiveness, especially regarding cost items recording, reduction in production costs and finding the potentials for increasing profitability, has made serious requirements, via which parallel to the financial accounting, the cost accounting has also undergone systematic processing and recording.

During the last two decades, the managerial accounting has been representing as a separate branch of economics. And in the applied economics, untill today, it is still in the process of formation. Hence, it is not occasionaly, that both in the practice and theory, the managerial accounting is not considered as a separate science: not being isolated from the cost accounting.

At the beginning of the 20-th century, the cost accounting finally has gain much importance and set in the accounting pracice. It was closely related to those days, when the standardized costs were started to be introduced by the companies toward finding out the actual cost variations from the planned costs, reasons behind them and taking corrective actions to eliminate them. The managers, periodically analysed those variations, appraised the impact of various factors on them and made operational decisions regarding the ways to find out negative variances from the planned costs. It was just at this stage, that the cost accounting, which was considered as a tool representing the cost flow information, started gradually to be appeared as managerial accounting. The cost accounting is an important tool under the custody of the manager, which helps in planning and supervising the costs and analysing the obtained results.

Recently the cost accounting has gained much importance than before among Iranian manufacturing companies,especially with regard to the government use of the direct economic regulatory tool of subsidysing policy. The subsidyzing policy in the islamic Republic of Iran affects differently on the market with the participation of the public companies. From one side, it helps increasing the said sector profitability and competetiveness, on the other hand, this policy motivates the market via indirect ways: especially by means of setting higher mark up payments on the product prices. And, as a result of subsidyzing, the real pricing is affected, hence, it is necessary to record the amount of subsidies granted in connection with the costs of products and services by way of managerial accounting.

Toward this end, in order to better understand the characteristics of the production unit and their reporting, it is necessary to get familiarity with the flow of their activities, costs and the variations from the defined standards. It is worth mentioning, the purpose of variance analysis is to find the reasons of inefficiencies in the activities of the production unit.

In the standardized cost accounting system, there are a wide range of applicable norms and standards. In the diagram below, there is shown the flow of information re variations from the standardized costs in the cycle of production (material purchase and production related activities) and selling stage (the realization of the produced goods) (Fig.1)

The standard cost approach is based on the selection of standards, which are:
- Basic norms,
- Ideal norms,
- Accessible norms,
- Current norms.

With regard to these, the accessible norms are applied in the standard cost accounting. And during the analysis of variances, by comparing them with the current norms, more reliable and effective information is obtained. In fact, the industrial accounting or cost value accounting is a very important tool at the manager's disposal to help them plan, control, supervise and analyze obtained results. According to Shabahang R., due to negligence of the principles and theories of the industrial accounting and its valuable outcomes from its execution, the involved authorities, factory owners and industrial organizations' managers encounter always numerous difficulties in the financial fields and, even, bear a heavy and irreparable loss which, in turn, is likely to lead to the decline and dissolution (bankruptcy) of the organization. (Shabahang R., Management Accounting, Tehran, 2001)

Current accounting systems of costing are utilized to collect information and make decisions based on those information. Modern operation phenomena and significant ABC effects distinguish the activity based accounting system from the traditional system. More over, it will make sense considering all the cost components of manufacturing process as well. Therefore, the prices of produced goods and services instead of being set automatically, should be determined by the manufacturing units: by taking into consideration all the cost centers involved in the production process on the basis of activity based costing method (ABC). It will contribute not only to the creation of healthy competitive environment (considering the differing costs of the produced goods and services set by the private sector), but also to regulate the prices by setting them via the production costs incurred.
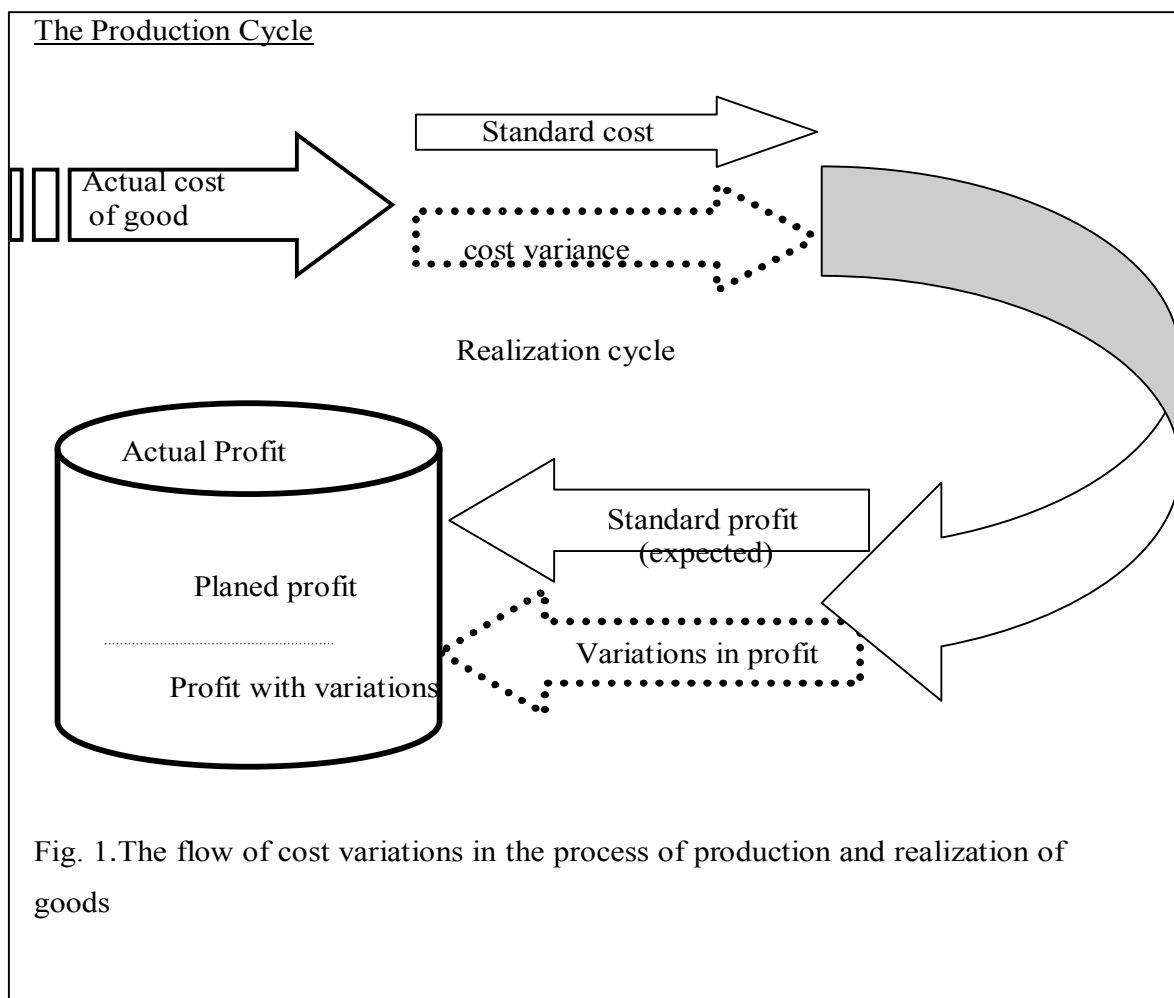
The Production Cycle

Standard cost

Actual cost
of good

cost variance

Realization cycle

Actual Profit

Planed profit

Profit with variations

Standard profit
(expected)

Variations in profit

Fig. 1.The flow of cost variations in the process of production and realization of goods

3.   Research Objectives (aim and problems to be solved)

The aim of this research is the development of the cost accounting system of the production and service companies with state shareholding in the Islamic Republic of Iran: along with the formulation of a new model for planning and calculating the final cost of goods and services produced.

Thus, toward achieving the set goal, some problmes should be addressed, which are as follows:

A) Determination of the applicability degree of the cost value accounting system adopted for establishing the price of goods and services at different companies.

B) Analysis of the cost accounting systems for goods and services within framework of the lines defined under the budget law[1].

C) Determination of an applicable cost accounting system and approach which enable to:
- Manage and monitor the incurred cost,
- Establish the updated final cost, and
- Estimate the final cost-price.

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[1] According to local laws and decisions, a considerable portion of the prodcution (such as gaz, electricity and oil processing products and services) is held by the state sector.Thus, one of the issues under study is disclosure of the cost-pricing policy for the produced goods and rendered services under the budget law by the companies with the monopolistic power.

Also, considering that according to the current laws and regulations the major part of the industrial production and services such as gas, electricity and petrochemical supplies are provided by the public sector, in relation to the aim of the research, it is of special importance to examine the accounting system adopted for determining the final cost of the monopolistic production and services sector which requires most industries to supply the goods and services of those companies under the provisions of the budget law**.**

Thus, by addressing those problems, it is hoped that unlike the automatic pricing approach of the present companies and organizations, which are influenced by the legally appointed committees, councils and governmnetal authorities, as well as, the weak logical relationship between the final cost and determination of produced goods and rendered services, the utilization of proper final cost calculation systems and methods will contribute to obtain the actual prices, as a result, the competetion between the state and private sector will be both transparent and functional.

4. Research Subject and Object: The research subject is the cost accounting system, their supervision, the identification of final cost prices and the laws and regulations related to the budget system. The subject of the research also includes the quantative and qualitative aspects of the the economic events and procedures.

The object of research is the service sector: a whole system including its branches in both small and large governmental companies (which operate as the specialized mother companies with a lot of subsidiary companies of the manufacturing and service provision sectors. For checking and completing the related questionnaires you are welcome to the principal offices or their related directorates in Tehran). Thus, the research object includes the activities of the public companies that are engaged in the production of goods and services like energy carriers (gaz, oil), agricultural and natinal resource management, trading, mine exploration, rail road transportation and insurance companies during 2006 – 2010 period.

5. Hypotheses

Main Hypothesis: The present cost accounting system in public companies is not effective in determining the prices of produced goods and services.

Subsidiary Hypotheses: In order to study and identify the proper methods for developing a favorable cost accounting patter and system the following subsidiary assumptions of the research were investigated:

1- The proper cost accounting system does not conform to the implementation of the budget laws and rules.

2- The present cost accounting system does not follow the accounting principles and standards.

3- The accounting system of the comptroller is not in compliance with the goods and services cost accounting system.

4- The cost accounting system for state-provided goods and services does not lead to the determination of the final costs.

6.   Research Methodology and Sampling

The purpose of selecting a research methodology is to help the research establish a method that is more likely to direct the research toward the probable answers in an easier and more accurate way. The adopted methodology of the research depends on the targeted goals, nature of the discussed subject, available facilities and resources.(Levine & others 1999, P 45). The research is a process through which one can explore the unknown areas and get some information about them. According to the process, the manner of gathering evidences and proofs and their transformation into factual findings is termed as "methodology"(Khaki, 2005.)

Considering that the research is to deal with the examination of the status quo and identification of the subject pattern of the research using paper documents and available literature and with the gathering of information from the experts and elite society of the field it is categorized among the survey-descriptive studies. Of course, some analyses employ scientific research approaches.

The methodology of the research includes the 4 stages:

Stage 1. The initial question; this stages tries to find an answer to the question that if the present final cost accounting system applied by the large governmental companies and industries are effective, and if they are able to determine the real final cost of the produced goods and services.

Stage 2. The exploratory studies:examination of the available literature and face-to-face interviews. Stage 3. The construction of an analytical mode; The assumptions and analytical model are designed on the basis of the relations among the assumptions.

consisting mainly of managers and accounting department staff of the companies under study.

The data analysis: the gathered information are processed and a comparison between the obtained results and the expectations from the proposed assumptions is made. If the degree of the deviation is low it can be concluded that the assumption is confirmed. If this not the case the roof of the deviation need to be established as to reach a conclusion in proportion to the present conditions.

Sampling : Research covers separate public companies categorized by their size mainly in two

groups of: 1) Small sized companies involved in manufacturing and service provision and 2) Middle - Large companies. Thus, the statistical population of this research consists of 100 companies that were chosen from 20 specialized mother companies which are consisted of 389 sub-dependent. And the sampled respondent size for survey purpose consisting mainly of managers and accounting department staff of the companies under study were 100 people.

6.1. Data Collection Method

For data collection purposes, in this study a set of descriptive nature questionnaires (both closed and open type) have been designed and used. The questionnaires have contained 30 questions all were addressed by the sampled respondents. The questionnaires before being used were tested for validity and reliability.

6.2. Data Analysis

The data analysis have been done via comparative tables, ANOVA (F-test), as well as Spearman's correlation coefficients and Binomial test methods were used. The analysis have been implemented by the SPSS statistical software.

7. Testing Hypotheses

Main Hypothesis - The present cost accounting system in public companies is not effective in determining the prices of produced goods and services.

Table 2 shows, an amount of Sig level that is exceeding the α=0.05 premise level. It means, that the cost value in the companies under study is mainly determined based on personal taste of the management and the economic and political conditions prevailing in the country and etc. This means that the hypothesis is not rejected, therefore " The present cost accounting system is not effective in determining the prices of produced goods and services."

Table 2: ANOVA- Variance analysis

		Sum of Squares	df	Mean Square	F	Sig.
Cost Accounting SYSTEM	Between Groups	.058	2	.029	.188	.829
	Within Groups	10.479	68	.154		
	Total	10.537	70			
STANDARDS- accounting and auditing, and principles	Between Groups	.125	2	.063	.271	.763
	Within Groups	15.685	68	.231		
	Total	15.810	70			
ACOUNTING	Between Groups	.387	2	.193	.699	.501
	Within Groups	18.823	68	.277		
	Total	19.210	70			
DETERMIN- cost-price	Between Groups	.429	2	.215	.820	.445
	Within Groups	17.812	68	.262		
	Total	18.242	70			

Besides, the gap emerged as a consequence of the government intervention in pricing, is mainly covered with state financial support: via subsidies, which in its turm further affects the indifferent attitudes toward cost price accounting systems in underlined companies. Therefore, with a 95% confidence, it may be concluded that the present cost accounting system in state organizations is not effective.

Secondary Hypothesis:

1- Cost price accounting system does not have coordination with enforcment of the budgetary lows and regulations.

The obtained results from the related question as shown by table 3 indicates that more than 70% o the respondents have mentioned the option of ≤ 3 in answering the said question. And by considering the Sig amount = 000, which is less than $\alpha = 0.05$ premise level, it may be concluded with
95% confidence that the "current cost price accounting system does not comply with the enforcement of the budgetary laws and regulations", and therefore the mentioned hypothesis is confirmed.

Table 3: Binomial Test						
		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (2-tailed)
Cost price accounting SYSTEM	Group 1	<= 3	66	.70	.50	.000[a]
	Group 2	> 3	28	.30		
	Total		94	1.00		
STANDARDS accounting and auditing	Group 1	<= 3	74	.79	.50	.000[a]
	Group 2	> 3	20	.21		
	Total		94	1.00		
ACCOUNTING	Group 1	<= 3	73	.78	.50	.000[a]
	Group 2	> 3	21	.22		
	Total		94	1.00		
DETERMIN cost price	Group 1	<= 3	85	.90	.50	.000[a]
	Group 2	> 3	9	.10		
	Total		94	1.00		

a. Based on Z Approximation.

***- It seems that cost price of the goods and services in chosen firms is not based on usage and utalizing the accounting system and observing the principles and standards of industrial accounting. Analysis of these obtained results represents this point that in these firms the direct interfers of the government and legal and supervisory departments in determining the cost price are more effective than the other factors which are in consideration of industrial accounting system. Therefore, the secondary hypothesis of the research that says "desirable cost price accounting system does not have coordination with enforcement of the budgetary laws and regulations" is being confirmed, In the other word the cost price accounting systems of goods and services does not have coordination with enforcement of budgetary laws.

2- The existing cost price accounting system does not follow the accounting standrads and principles.

Table 4: Statistics – on the application of accounting standards and principles by the present cost price accounting system					
	N		Mean	Median	Std. Deviation
	Valid	Missing			
Cost –price Accounting System	94	0	2.87	2.85	.384
STANDARD-accounting -auditing	94	0	2.71	2.71	.485
ACOUNTING	94	0	2.62	2.55	.517
DETERMIN-cost-price	94	0	2.50	2.57	.502

Out of 94 respondents, all have replied to this question: without missing and fully provided with answers (Table 4). And the results of analysis of those answers have indicated a varinace exceeding α=0.05 premise level (error/ variation level). It means that the cost price in the companies under study is mostly determined based on personal taste and also by considering to some special economical condition and political conditions of the country ; and in some cases it is determined in order to encounting with national bycottings, and does not have much conformation with standards of cost price accounting systems and accepted inustrial accounting principles. Out of 94 respondents, all have replied to this question: without missing and fully provided with answers (Table 4). And the results of analysis of those answers have indicated a varinace exceeding α=0.05 premise level (error/ variation level). It means that the cost price in the companies under study is mostly determined based on personal taste and also by considering to some special economical condition and political conditions of the country ;

3- The comptoller accounting system does not have coordination with cost price accounting system of goods and services.

4- Governmental cost price accounting system of goods and services does not lead to detemination of the final (actual) costs.

***- Cost price accounting system is an applying scientifitic system that based on it, one can calculate the cost price of the goods and services in the format of current, stable, and open expenses by using special industrial accounting formula. Because of this, dealing with it should be done within pauing attention to the factors which are interfer in goods production. If there are some interfering conditions in determining the price of the goods except the cost price calculations, one can not do anything about the process of investigating the cost price of goods based on scientific approaches. Therefore the hypothesis of research based upon that " Comptoller accounting system does not have coordination with cost price accounting system of goods and services"**,** was been confirmed by the %95 of confidence. In other word, it can be said that the existed accounting system does not have coordination with cost price accounting system.

***- In detemining the cost price of goods and services that is represented by chosen firms, the cost price of the raw materilas, energy transportes such as gas, petrol, etc do not specified clearly; specially that those raw material of these goods are naturally existed in our country and there aren't much expenses for extracing them. Because of this reason, the cost price of these goods in contrast with other countries, specially those countries which do not have natural raw material, by considering and subtracting the raw material's price is much lower; whereas the declared price by the government for these kinds of goods and services is so much more than their extraction and refining expenses. And even in some cases the cost price of these goods is more expensive than their price in those countries which do not have raw mateials. Thus the interfering of the government in determining these prices in not so logical and cost price accounting system of the under-study firms do not represent the actual price of productive goods and represented services. Because of this point it can be said that another by-hypothesis of the research is also being confirmed, the one which says that "governmental cost price accounting system of goods and services does not lead to detemining the actual cost price."

By considering this point that the 4-th hypothesises of the research were being confirmed within %95 of confidence, and based on inductive principle it is obtained that existed cost price accounting system of goods and services in governmental firms is not useful.

About 90% of the respondents have chosen the " <= " option in answering to these questions. And by considering the Sig amount that is less < α = 0.05 premise level, it can be concluded that the third and forth hypothesis are accepted. It means that it is possible to state with 95% confidence that the "accounting system does not have coordination with cost price accounting system of goods and services", therefore the mentioned third hypothesis is confirmed by the absolute majority. More over, it also can be stated with 95% confidence that the "govenmental cost price accounting system of goods and services does not lead to the determination of the actual cost price." And the forth hypothesis is confirmed as well.

Another finding of the research: The relation between organizational position and hypotheses

To investigate this point that what answers are given to the hypotheses of the research by the differrent organizational positions, T-Test (ANOVA) examination is being used. By paying attention to the table 6 one can see that validity of the axamination for budget variable, standards variables, under governmental control accounts variables and determining cost price variables have been more than 0.05. Thus there is no meaningful diffrence between different educational levels and response which have been given to the hypotheses. In other word it can be obtained that there is no relation between the educational level and answering the hypotheses of the research.

Table 5: Binomial Test – The role of the comtroller accounting system with regard to determination of the goods and services cost-price

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (2-tailed)
Cost Accounting SYSTEM	GROUP 1	< = 3	66	0.7		-
	GROUP 2	> 3	28	0.3		-
	TOTAL		94	1	0.5	0.000
STANDARDS(accounting and auditing)	GROUP 1	< = 3	74	0.79		-
	GROUP 2	> 3	20	0.21		-
	TOTAL		94	1	0.5	0.000
ACCOUNTING	GROUP 1	< = 3	73	0.78		-
	GROUP 2	> 3	21	0.22		-
	TOTAL		94	1	0.5	0.000
DETERMIN- cost-price	GROUP 1	< = 3	85	0.9		-
	GROUP 2	> 3	9	0.1		-
	TOTAL		94	1	0.5	0.000

a.based on Z approximation.

Table 6: F- Test (ANOVA) -The relation between organizational position and hypotheses of the research

		Sum of Squares	df	Mean Square	F	Sig.
Cost Accounting SYSTEM	Between Groups	.058	2	.029	.188	.829
	Within Groups	10.479	68	.154		
	Total	10.537	70			
STANDARDS(accounting and auditing)	Between Groups	.125	2	.063	.271	.763
	Within Groups	15.685	68	.231		
	Total	15.810	70			
ACCOUNTING	Between Groups	.387	2	.193	.699	.501
	Within Groups	18.823	68	.277		
	Total	19.210	70			
Cost –price DETERMIN	Between Groups	.429	2	.215	.820	.445
	Within Groups	17.812	68	.262		
	Total	18.242	70			

8. Design stages of the automated accounting systems

Some methods and proceedings are adopted for designing and developing accounting systems at separate stages. The stages of designing accounting systems are presentable in six steps as follows:
- Identification of (cost) accounting system(s),
- Analysis and assessment of (cost) accounting system,
- Design and development of new: automated accounting system,
- Execution of new cost accounting system,
- Inspection and follow up testing of new cost accounting system,

- Technical maintenance of cost accounting system.

In some cases, these stages are integrated into each other in such a way that their separation, actually, is impossible. In some other cases, the last stage of the accounting system designing i.e. accounting system maintenance may return to its first stage i.e. accounting system identification, necessitating the collection of further information and more detailed identification.(Goldratt Elyahu m,"cost accounting: the number one enemy, proceedings of20th Annual apices conference. Oct 1983.)

Conclusions

One of the main features of healthy and competitive economic system is the determination of the cost value of the products (goods and services) based on the actual costs incurred on their production. Toward addressing that important target, logically operating cost accounting systems are used by many organizations. But contrary to the effective application of cost accounting system, in our country the pricing process is affected by the existence of certain circumstances that are as follows:

A) The price of some goods are set lower than their actual cost values; for example, the cost value of some products called "energy *carriers*" including gas, petrol, gas oil etc is much higher than the price offered to the public. In such case, the government finances the arisen gap (as a consequence of adopted pricing approach) in the form of subsidy. This way, the considerable part of the national credit resources which have been originally earmarked for developing economic infrastructures and national growth is spent on providing subsidy to certain companies. Here, the important issue is related to the fact that the "energy carrier" products play an essential role in setting price for other kind of produced goods regardless of their cost value. Thus it may be concluded by saying that the low price of the energy carriers not only impacts but also makes it difficult to correctly calculate the real price of other goods and services produced within the economy.

B) The enforcement of some laws and regulations and the monopoly power possessed by some public companies have resulted, in high difference between the prices set for the finished goods and services (offered by those companies) and their actual cost value. For example, the price of the in house produced cars is much higher than the cost value of their production.

The government participates in the economic relationship based on the legal and administrative drivers. On legal level, government is the main authority for enforcing the "rule of game" and

legislations for economic affairs as a whole. Therefore, through enacting specific laws and regulations and by imposing heavy custom duties for the imported similar products, the government prevents the competitiveness of the market environment. More over, the government intervention causes the escalated price differences because of indifferent attitude toward the low quality of domestic products in general. On the other hand, the government intervention in determining the price of goods and services produced by the public companies stimulates the creation of special economic conditions within the country, so that certain decisions are just made according to the political status quo or as a reaction to the imposed international sanctions.

Thus, such interventions and the ineffective application of the industrial accounting system have caused the emergence of a deep gap arisen between the price of produced products and their actual production cost. As a result, from one side the consumers are affected: by paying higher prices, on the other hand, the continuous flow of subsidy out of state budget is directed to one certain sector only: adversely influencing on the remaining sectors of the economy because of unfair distribution of state budget.

In our opinion, the government must apply the administrative tools within limited farmework, otherwise, the market competetion will be subsituted by administrative rules and orders. By the way, according to the economists, the role of the government in the distribution of corelationships must be considerable, on the other hand, its participation in the production and consumption area must be the least. Otherwise, by regulating the market relationships, just the later will be affected adversely.

According to the research findings, the studied companies need to be governed by a series of approved laws and regulations via using proper accounting system (called "National Cost"). Besides, the determination of the cost price of the produced goods and services must be carried out in a scientific approach toward realizing the mission of accountancy as an informative, planning and supervising body and predicting the prices, as well as the increasing fluctuations thereafter, and simultaneously controlling the expenses and revenues.

Recommendations

Based on the above mentioned reasoning, the following recommendations are made:

1. Integrating the cost and financial accounting system and ensuring information transparency via application of "National Cost" complete accounting package.

2. Using activity based costing method (ABC), which will enable to enhance the efficient use of limited resources.

3. Enhancing the role of Managerial Accounting especially, with regard to revealing the causes of variations by using special accounts. And ensure targeted use of resources and rational distribution of state budget. Keep proper paperwork of variance analysis for future review and follow-up.

4. Applying the International Accounting/Auditing Standards by considering their completeness, the world globalization and our country's request for membership with WTO.

5. Enhancing the scientific understanding of staff and management team regarding resource usage in creating economic values by arranging periodic attestation and qualification examinations.

6. Enforcing mandatory application of Legal Acts and relevant Standards by all public companies, as well as the flow of transparent information on behalf of protecting the interests of the users of financial statements.

It is expected that the research results will contribute enhancing the effectiveness of the state cost accounting system in public companies, the creation of competitive market and steady development of private sector as well.

Limitations to Study

Like any other research, the present study has encountered some limitations some of which are presented below:

1) Because of the subject of the present research (examining the presence or lack of goods/services cost accounting systems in different companies and industrial units) and due to the use of a different pricing system from that applied by others, it was impossible to compare the used pricing methods to each other.

2) At the data collection stage, in some companies, there were different financial positions and sometimes, the accounting operations were carried out under supervision of the Board of Directors, managing director or business manager; therefore, the exact determination of the statistical society was impossible. Due to such limitation and information about the company the statistical society was defined in a wider range.

3) At the questionnaire completion stage, in some cases, the managers used to postpone the completion of the distributed questionnaire form or assigned the duty to others who need to make their presence at the location of the company to give their responses for getting more precise data. This required more time and cost.

4) In some cases, it was not easy to get an access to the present accounting systems of the selected companies or those laws for determining of the goods and services provided by the public companies, but instead they were considered as classified documents. To get an access to such information required more prearrangements and time.

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Effect of NATO expansion into the Central Asia and the Caucasus and Russia's reaction to it

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Abstract: This study was conducted with the aim to investigate the impact of NATO expansion into Central Asia and the Caucasus and Russia's reaction to it. First, the objectives and impact of NATO expansion into the Central Asia and the Caucasus were investigated. Then the causes of Republics of Central Asia and Caucasus cooperation with NATO were analyzed and investigated. The results indicate that the factors such as fear of Russia re-domination, inability in providing the national security, potential disputes in the Caucasus and fear of political Islam are the reasons for the cooperation and relationship between NATO and Asia Central and the Caucasus. Finally, the reasons and rate of association of each of the countries in Central Asia and the Caucasus with NATO was investigated. In summary, it can be stated that Russia believes that the expansion of NATO into Russia has a mutual and direct effect on reducing the power of Russia in the international system.

1 - Introduction:

In the last decade of twentieth century, we have seen the dramatic and profound changes in the international scene and determining changes in the political, economic and military equations of the world. In fact, the end of twentieth century is considered as the end of an era and beginning of a new era in the international system. These changes and developments have totally disturbed the foundation and basis of former structure and are searching the criteria which have the ability to adapt to the new situations of the world. In this new situations, the all people around the world have seen the fragmentation of the Soviet empire, the collapse of bipolar system, end of Cold War, regional conflicts along with the emergence of nationalist extremism in the Balkans and Central Asia, reduction of military competition and changing the geopolitical strategy towards the geo-economic strategy and its importance in the international relations, so that the meaning and concept of power and security have been changed and led to software from hardware and the risk of nuclear war has been reduced. In these situations, which represent a transition era at the level of international system, the performance of international organizations and institutions was challenged as the result of several changes in the structure of international system. North Atlantic Treaty Organization (NATO) was established in a situation of international environment, in which the confrontation between the East and West was dominating, and in order to confront the threat of the Soviet invasion and prevent from the infiltration of communism to the West; as time passed these two treaties were considered as the main symbols of

confrontation between two mentioned blocks during the Cold War by making Warsaw Pact.

In this paper and in two main sections, we are seeking to study the effect of NATO expansion into Central Asia and the Caucasus and also Russia's reaction to NATO expansion.

2 – Evaluating the objectives and effect of NATO expansion into Central Asia and the Caucasus

Since the process of developments in the Republics of Central Asia depends partly on the foreign factors, predicting the outlook of process development in this area is extremely difficult. What is certain is that the Central Asia will remain as the center of attention by the domestic and foreign beneficiary groups. Among the republics, only Kazakhstan has been effective in determining the rules of play in this competition by its own relative political and economic consolidation, so it will become one of the major exporters of energy in the world in future. Despite the existence of facilities and also the high hopes, Uzbekistan will have no significant portion in this process.

Analysts believe that the Central Asia will be faced with close competition in near future among Russia, USA and China and these republics will effort to avoid dictating the foreign programs in the framework of this competition.

Process of developments may be continued in another way. On the one hand, the process of demanding Islam and Islam Orientation is developing in the region and the Muslims' unanswered requests in the region specially the active extremist group may be connected to the separation tendencies in the north Caucasus, autonomous province of "Xinjiang" in China, and make massive crises for the region.

Presence of foreign factor also intensifies the issues of region; and connecting the events in the Central Asia with Middle East may be proceeded unlike what is considered by the U.S.A major planners and may change the Political Geography of region under the Islamic globalization. For this reason the Central Asia and Caucasus countries, where are located in the Eurasian region, have no tendencies to limit themselves to the level of unities or organizations within the region in order to provide the national security. However, they are interested to become a member of Trans Regional Organizations in order to ensure their independence and national interests. As all countries of Central Asia and the Caucasus have been accepted as the members of Organization for Security and Cooperation in Europe or have started the cooperation with the military unions like the North Atlantic Treaty Organization (NATO) within the framework of programs such as programs for participating in the peace which paves the way for joining in them in long term, so that the level of current relations of republics of Central Asia and the Caucasus is considered at the strategic level with NATO.

On the other hand, the members of NATO, leading by U.S.A, which is the pioneer of expanding the democratic systems into their West concept, have taken effort to impose the created power gap resulted from the Soviet fragmentation in Central Asia and the Caucasus to the region by advertising and development of their desired model and increase their own international power and influence by this way (Cornel, 1999). At conference on security policy in Munich (Germany) on Eighth to tenth February 2006 hosting and lecturing by Ms. Merkel, Chancellor of Germany and in the presence of 300 officials from forty countries including 34 Foreign and Defense Ministers of Countries around the world, Putin stated about the presence of NATO in the East: "On one hand, the conversion of North Atlantic Treaty to the political organization is declared and one the other hand, its military infrastructure is being close to the boundaries of Russia. With regard to this fact, we design our military theory and equip our armed forces according to it" (Moradi and Goudarzi, 2010).

Therefore, they have attempted to leave Russia, China and Iran behind within the framework of NATO expansion policy into the east in the guise of participation program for the peace. For this reason, it is interpreted that the emergence of new established countries in the Central Asia and Caucasus area in the field of international relations will recreate a kind of competition.

3 – Evaluating the causes of cooperation between the republics of Central Asia and the Caucasus with NATO

3-1 - Fear of Russia's re-domination

Fragmentation of the Soviet Union caused that the Russian Federation to be faced with a new set of its own surrounding countries. The term "Near abroad" is now completely common in the domestic and foreign policy of Russia in order to refer to these republics. For most of Russians, imagination of these republics as the national independent units is unacceptable (Koulaei, 1997). Presence of 25 million Russian-born in the surrounding republics has made one of the major axes in relations of Russia with other survivors of Soviet Union Fragmentation and has intensified the importance of this region for Russia. Moreover, the political instability in Central Asia and the Caucasus and development of ethnic conflicts are among the main concerns of Russia. These Countries have multiple territorial and boundary disputes with each other and each of them can disturb the peace and security of region. Therefore, providing the security is one of the serious considerations of Russia in Central Asia and the Caucasus. This can prepare the background for development of foreign forces influence in the region, while Russia has considered the vital interests for itself around its own country (Koulaei, 1997). On the other hand, the economic problems and widespread deficiencies in the republics have caused that they have no appropriate maneuver power against the great economic capacity of Russia. Security difficulties of republics have also revealed their reliance upon Russia for providing the security. These countries have taken considerable efforts to eliminate their own wide dependence on Russia and have developed their own commercial and economic relations with European countries and U.S.A in order to reduce the dependence on Russia (Moradi and Goudarzi, 2010). None of these countries can be compared with Russia in terms of military and they depend on it based on the weapons; for this reason, these countries have taken attention to the cooperation NATO members and its innovative programs such as membership in the "North Atlantic Cooperation Council" and the plan of "Partnership for Peace" in order to reduce the dependence and creating the balance of these countries.

3-2 - Disability to provide the National Security

Newly independent countries in Central Asia and the Caucasus have never had the independent political structure in its today meaning (National Government) during their own political life era (Shirazi and Majidi, 2000). One of the problems, which these countries were faced with after the fragmentation of Soviet, was the issue of security and defense arrangements. These republics were under political-military, security and economic domination of Moscow for a long time, thus this question was raised that how the new defensive structures and security arrangements can be achieved after the independence? (Afshordi, 2002) Furthermore,

these countries were faced with other problems like deep economic crises, lack of independent foreign policy, era of transferring to the market, weak governments, and lack of democratic conditions and civil elements (Roskin and Nicholas Berry, 1999). On the other hand, these countries tend to exaggerate the foreign threats for their own national security in order to hide their own security problems which are as the results of military, political, and economic weaknesses, ethnic nationalism and population heterogeneity.

3-3 - Potential Conflicts in the Caucasus

Before the Fragmentation of Soviet Union, the boundaries between the republics and political and administrative units of the Caucasus were mainly defined based on the ethnic and racial domains. Unlike the colony countries of Africa, where have been accepted the same boundaries of colonial era and minimized the boundary conflicts after the independence, the boundaries were one of the reasons for tension among the units in the Caucasus after the Fragmentation of Soviet. Ethnocentrism can be considered as one of the main factors of instability and crisis in the Caucasus (Alexander, 1997). According to the demographic structure in this region, the political ethnics and sects can be as the results of continuous crises in the region. It should be noted that new civil institutions, administrating the affairs with communist thinking, and the competition of regional and international powers are the other causes of instability. Another reason for the continuity and prolongation of crises in this region is that about 50 ethnic- sectarian groups from three large Caucasian, Indian and European families, who have numerous ethnic distinctions, live in the Caucasia (Vaezi, 2003). Conflict of Karabakh, which is considered as the longest ethnic wars in Soviet between Armenia and Azerbaijan (Vaezi, 2003), and also the crisis of separatism in Abkhazia and South Ossetia regions in Georgia have led to the instability and insecurity in the Caucasus (Nemati Zargaran, 2002) . Given the above realities, the main subject in this region is the issue of stability and security. These republics cannot defend their own territorial integrity and the country ruling against the potential internal, intra-regional, or trans-regional threats (Russia) only by relying on their own financial resources. Problems of this "unsafe region" are considered as the stagnant conflicts, risk of assault by Russia, and a not so serious risk in the current status about the possibility of an Islamic movement. Therefore, the consistency with the Euro-Atlantic structures was a type of foreign policy objective in the region and the political elites think that Europe has something for the presenting in the region (Cohen, 2003).

3 -4 - Fear of Political Islam

Islam has been one of the potential important resources in the political instability of Muslim republics of Soviet after the independence. Most of the analysts believe that strengthening the Islamic fundamentalism among the Central Asian nations can lead to the establishment of new Islamic institutions (Shirazi, 2000). Leaders of republics are so afraid of political Islam influence (Edmund, 2000). Central Asia and the Caucasus elites are mainly secular, are absolutely opposed to the intervention of Islam in the politics, and consider the Political Islam as a threat for preservation and stability of political system of Central Asia and the Caucasus republics, because the Political Islam is a revealed movement which its control is difficult. Since there is the possibility of radical Islamist groups' ability to organize and preserve the traditional structure and they are ready to do violence in order to achieve their objectives, they are considered as the threat against the security and stability and can take the short-cut national boundaries quickly in order to affect the whole region (Menashri, 1999). Therefore, confronting with them is put on the agenda of some of the Central Asia leaders like Uzbekistan (Edmund, 2000). Thus the republics of Central Asia and the Caucasus leaders, who consider political Islam as one of the largest threats to the stability and security of region, have thought that the cooperation with West security-military organizations or unions like NATO (which is possible to become a member in them in future) is positive in order to control or deactivate the political Islam along with the consolidation of peace and stability.

4 - NATO relations with the republics of Central Asia and the Caucasus

By the fragmentation of Soviet Union, a condition was created and the NATO was able to expand its own security region; thus the NATO applied three methods; first through creating the North Atlantic Cooperation Council and second by implementing the plan of Partnership for Peace and finally by plan of individual cooperation of countries with NATO from the year 2005 (Shirazi and Majidi, 2000).

In general, after the collapse of the Soviet Union, three republics of South Caucasus and five republics of Central Asia have taken efforts based on the incomplete and limited concept of independence and consider it as the only way for getting rid of the Soviet Union domination, and some of these republics such as Azerbaijan and Georgia have considered the development and growth equivalent to become western and more compatible with Western structures (Shirazi and Majidi, 2000).

At the beginning of the Partnership for Peace program, the Russians first opposed this plan. In an effort to execute their opposition, they announced that they would send out their own forces from the Baltic

countries. Soon after, the pragmatic* policies of Russia changed the conditions and the advocates of Russia's strong tendency to the West changed the Russia's past position. With this new turn, Russia declared its willingness to join this program. After the NATO attack on Serbs' positions in Bosnia, Russia again showed reaction and delayed joining the Partnership for Peace program. However finally, Russia's foreign minister at that time, Kozyrev, makes Russia as the twenty-first partner for the partnership for Peace program by his own signature (Seifzadeh, 2004).

Overall objectives of developing the measures of partnership program, which are the consolidation of political consulting factor for responding within the framework of Euro–Atlantic participation, development of operational role and readiness for partners' greater involvement in decision making and planning, will contain a set of overall process of NATO expansion and will be facilitated by doing the measures such as common practices and final membership in NATO. Republics of Central Asia and the Caucasus have also attempted to move in this direction.

The relations of each of the Central Asia and the Caucasus countries with NATO are reviewed briefly as follows.

4 -1 - Turkmenistan

On 10 May 1994, Turkmenistan has joined the Partnership for Peace program. Turkmenistan has expanded the military communication and relations with NATO by joining the Partnership for Peace program and has received effective aid from NATO in order to reform its own military forces. Furthermore, this country has allocated a ship for research activities of NATO in Caspian Sea. Within the framework of this program, NATO evaluates the underground resources of Caspian Sea.

4 -2 - Kyrgyzstan

Compared to other republics of Central Asia and the Caucasus, Kyrgyzstan has been more willing to cooperate with NATO and has been the first regional country, which joined the Partnership for continuous Peace program on 1st June 1994 (Kubicek, 2000). On the other hand, it seems that NATO has considered interests for itself in Kyrgyzstan because Kyrgyzstan has border with China and by the presence in this country, NATO can effectively expand its own political influence into the borders of North West and North East China; moreover, both sides have common concern about the Islamic fundamentalism.

4 -3 - Kazakhstan

On 27th May, 1994, Kazakhstan joined the "Partnership for Peace"; this country is interested in extending its links with Western countries in order to get rid of Russia's domination. Relation of this country with NATO is more complicated because on the one hand it emphasizes on a political-military union with Russian Federation and on the other hand, it is willing to cooperate with NATO simultaneously. Because of the common borders with China, this country has a strategic importance for the West. In 2005 AD., the Ministry of Foreign Affairs of Kazakhstan stated that the cooperation with "NATO" is as the main priorities of foreign policy for this country.

4 -4 - Uzbekistan

Uzbekistan is probably the most active country among the Commonwealth of Independent States (CIS) and has taken the responsibility for strengthening the cooperation between NATO and Eastern Europe countries and republics of Soviet through the joint training programs and military practices and has forced itself to implement this responsibility in 1994. Uzbekistan is seeking to play a regional role in order to get rid of influence of Russia. For this purpose, it follows a policy matched with policy of Turkey and Israel through the development of its own security relationship with the U.S.A and not stopping its own policy based on strengthening the influence in neighboring countries (Maleki, 1993).

4 -5 - Georgia

Due to the geographical, political and geopolitical position of South Caucasus region, Georgia is so important in playing the major role in implementation of oil and transit plans as well as the security aspect; for these reasons it has been the center of attention by NATO. Due to the specific geopolitical position of Georgia and being located in the middle of Caucasus region and also because it is as the entrance gate of the Caucasus and the most important part of it, this republic has become critically important for the whole region of Caucasus and NATO. Georgia welcomes NATO and its measures warmly and sees it consistent with its own interests based on every aspect. Emphasis of former Georgian president "Shevardnadze" on the inefficiency of existing security system in the world (inability of the UN in providing the security and ensuring the world peace) and insisting on the need to revise the existing mechanisms for establishing the world peace and resolve the ethnic conflicts by the force confirmed this matter. (Shirin, 2009)

4 -6 - Armenia

Armenia has joined NATO's Partnership for Peace program on 5th October 1994 (Edmund, 1999), but is not willing to endanger its own links with Russia. Thus, it has been treated more cautious than other Soviet republics. Armenia has less cooperation with Russia in this program due to the strategic and military participation. This situation is more caused by the security calculations by the leaders in these countries. This issue has been changed and developed specifically after the developments in the relations of Russia-NATO and the events of 11 September and the participation of regional countries especially

Kazakhstan has been dramatically increased in this program (Heidari, 2003).

4 -7 - Azerbaijan

Republic of Azerbaijan seeks its own security out of the zone of Russia influence and being separated from the regional structures and joining the Euro-Atlantic trans-regional structures. Since the independence of Azerbaijan, this country has been seeking to the integration with Euro-American (Euro-Atlantic) structures along with the South Caucasus republics and entered the NATO Partnership for Peace program on 4th May 1994. Azerbaijan has incentives to cooperate with NATO. Although these incentives are similar in three republics of South Caucasus, but Azerbaijan has considered the issue more seriously. The major issue is the security and stability. Azerbaijan has been convinced that NATO can play an important role in creating the peace and stability in this country. NATO has a powerful image in Azerbaijan due to its own success in the Balkans (Amir Ahmadian, 2003).

5 - Russia's reaction to NATO expansion into Central Asia and the Caucasus:

It should be stated that Russia took more attention to the security and position of its own newly independent republics and even called them the safe and near abroad regions, as a result, it did not permit the presence of out-of-the-region and even regional forces in these regions. Therefore, it has been shown numerous reactions to the expansion of NATO into the East and its entry to this region and considered it as a threat to security of Russia and an action to isolate this country.

Kremlin Leaders have taken any opportunities for expressing the opposition against the expansion of NATO into the East. Before the last threats, Boris Yeltsin raised three conditions for any kinds of expansion by re-expressing that the expansion of NATO might lead to the war and conflict:

1. Establishment of permanent references of consultation;
2. Not establishing the nuclear weapons in the lands of new members;
3. Utilizing the dispatch of foreign forces to the above regions;

Moreover, Russia Prior president had threatened that he would ratify a "small Warsaw Pact" in the Soviet environment in response to this expansion. This view, which was raised after signing the Yeltsin's instructions about the "Strategic doctrine" of Russia's relations with countries member in the Commonwealth of Independent States, made concerns among the allies' communities. Based on the military aspect of this document, since now the policy of Moscow should monitor the development of collective security system through encouraging the purposes of countries, which are the member of mentioned compliance, about

grouping in the defense unions on the basis of common military-political benefits and objectives. This document asks the third countries and international organizations to understand this reality that the discussed region (Environment of Soviet Union) is considered as a region covered by the Russian Federation interests more than anything else.

On the other hand, foreign minister's assistant of Russia at that time declared that Russia would strengthen its own close defense in case of NATO expansion into the countries of Baltic region and would take economic-defense measures. Mentioning that nowadays all people in Europe believe that there is no enemy any more, raised this question that who threatens the stability? Who is against the security of Czech, Poland, Hungary or Baltic republics? Furthermore, he adds: "NATO Bombardment in Bosnia reinforced the position of Russians, who were against the expansion of Atlantic Treaty, and most of the Russians still consider the NATO as an enemy". In this regard, White Russia (Belaya Rus) has also determined a defense line against the expansion of NATO and opposed any kinds of expansion into the boundaries of Soviet Union. While asking for strengthening the Commonwealth of Independent States (CIS), the president of White Russia (Belaya Rus) has stated that we will not accept the threats of NATO about expanding its domain into the boundaries of White Russia.

Russia also felt threatened by the Participation for Peace Program and clearly revealed that would not allow NATO to enter its own republics. Emergence of these reactions caused that NATO leaders sought to take Russian leaders' attraction and trust. Signing the Charter of Russia and NATO in July 1997 was along with this regard. This charter was essentially written based on NATO raised proposal in December 1995 for developing a political framework in order to institutionalize the relations of Russia and NATO.

Originally, the expansion of NATO was started practically from July 1997 and after Madrid Summit and membership of three countries including Czech, Poland and Hungary was one of its consequences (Koulaei, 1999).

Totally, it can be stated that despite the fact that Russia was against the expansion of NATO into the East and especially the membership of republics of Central Asia and the Caucasus at the beginning and in the form of CIS countries member in NATO, as time passed and after providing the plans and suggestions by Europeans- especially Paris and promise of entering Russia to the Group of Seven- the rate of opposition and sensitivity to it were reduced and flexibility was seen by it.

Issues like NATO Participation for Peace Program, which was created with the purpose to

strengthen the political and military cooperation of NATO with newly independent countries in 1994, resulted in Moscow's concerns, although the Russians accepted its membership in Participation for Peace Program with the hope to change it to an alternative institution for membership of Soviet countries. Despite the severe internal opposition, Moscow cooperated with NATO during the crisis in the Balkans from 1992 to 1995 in order to become a member of NATO, but when the membership conditions (including the establishment of democracy, respecting to the human right, market economy, Civilian control of armed forces, appropriate relations with neighboring states and resolving the domestic ethnic disputes) were declared in that organization, Russians became disappointed. Among the national, Westernization, and radical attitudes, there is a third attitude called Eurasian attitude. Based on this attitude, because Russia is a geopolitical country, which is located both in Asia and Europe, both strategies of considering the East and searching the national interests in West should be considered in the foreign policy. This view, which was the outcome of both previous views in Russia, not only does not believe in being member in NATO (as the target) and full cooperation of this country with this organization (and acceptance of NATO expansion), but also it does not know the cut of relationship with this organization in line with accessing to the national and security interests of Russia. Eurasians thought, which is a realistic approach to NATO, is based on this country activity in the international system in order to prevent from the expansion of this organization. Based on this approach, Russia believes that the expansion of NATO into Russia has a mutual and direct effect on reducing the powered of Russia in the international system.

6 - Conclusion:

The most important reasons for the expansion of NATO into the EAST include providing the security and stability in Euro-Atlantic region, establishment and consolidation of democratic systems in newly independent republics of former Soviet which lead to the America's strengthening and influence in the region. Other reasons include limiting the influence and controlling the countries such as Russia, China and Iran in the region and the world through imposing the surrounding strategic blockade of these countries. U.S.A is willing to continue the NATO for two reasons; first, Washington sees NATO as the military arm of policies and global hegemony objectives and even some people consider NATO as the toolbox of America's foreign policy. Second, disbanding NATO can severely destabilize the America's role and position in Europe. America has imposed its own leadership on Europe through NATO and has used Europe as a platform for strategic domination on the strategic regions of Eurasia, the Middle East and other regions.

European countries have also urged NATO continuity and its presence in Europe.

Given these facts, it seems that the views of central Asian governments compared to the republics of Azerbaijan and Georgia about the expansion of NATO into the East is different to some extent in the framework of Partnership for Peace program. Central Asian leaders still believe that they need Russia in order to provide the security for their own countries, but they do not deny the cooperation with NATO; while, by being member in NATO's Partnership for Peace program, Azerbaijan and Georgia leaders in the Caucasus asked for quitting the collective security system of CIS, sending out the Russian military forces from the Caucasus and establishment of NATO military bases and suggested the repetition of Bosnia and Kosovo model and NATO military action in order to resolve the conflicts in the Caucasus. It seems that the Caucasus republics join in the Partnership for Peace program is the first action and the cornerstone of NATO in military operation in the Caucasus. However, this issue is not taken seriously at the beginning, but as time passed the strategic importance of event becomes more evident. In other words, after the fragmentation of the Soviet Union and end of Cold War and also disbanding Warsaw Pact, it was expected that the North Atlantic Treaty Organization (NATO), which its existence philosophy was to overcome the communist threat, will have no incentive for the survival and become dissolved gradually. Because based on the theory of alliances; (alliances are created in response to the threat and when the threat is decreased, the alliance will not be also continued. "Kenneth Waltz", the famous neorealist, was among those who believed that NATO would lose its coherence and would be disbanded. But in practice it did not happen and after a short period of confusion at the end of Cold War for NATO, NATO's role began again and the West led the extensive effort, leading by U.S.A during the past decade, in order to strengthen and expand NATO and expanded it into Russia's borders.

Russia has considered the expansion of NATO as a risk against its own national security and considered it in line with minimizing the power of Russia in the international system, eliminating the Russia's retaining areas and not taking attention to this large country. On the other hand, Russia considers the expansion of NATO into the Eastern Europe countries as the reasons for the expansion of this organization into the Baltic countries and then the near abroad republics. Therefore, it opposes severely to the expansion of NATO (Ghaedi, 2001).

Russia acknowledges that the expansion of NATO into the East and membership of the Baltic countries will be the additional threat to the Russia's security and if the Baltic countries become the member

of NATO, this organization will expand right into Russia's boundaries, thus Russia cannot ignore these actions. New divisions in Europe are the major Russia's concern about the expansion of NATO. Russia is deeply sensitive to the political objectives of NATO and is worried that this organization is reducing the role of Russia in the issues of Europe. On the other hand, Russia seeks to influence the security issues of Europe according to the common decision-making about the role of NATO.

However, according to the change and development of international system, NATO is seeking to adapt itself with the historical developments of Europe after the Cold War, but obviously, not only the improvement of NATO relations with Russia requires the investment of the West in the Russia's Economy, but it also depends on considering the role and importance of Russia at the position of a main player in the Euro- Atlantic security.

On the other hand, this serious issue of NATO expansion into the East caused that Putin to declare the territory of The Soviet republics as the Russia's national security area. Therefore, he attempted to prevent the influence of these republics by the West political and security structures and even has applied the political, economic and military tools in this regard. Publishing the News related to the transfer of Russia's nuclear weapons Applications to Kaliningrad can be evaluated in this framework as a weapon for opposing the expansion of NATO. But the fact is that not only NATO is expanding into the East, but also the process of expansion and integration of these republics into the political and security structures is irreversible. However, NATO is faced with other barriers in addition to Russia's opposition to expand its influence in the Caucasus and Central Asia regions. Meanwhile, the widespread opposition of regional powers such as China and Iran can be mentioned as the main issues of financial strength and also the divergence in NATO.

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Kinetic Spectrophotometric Determination of Zafirlukast in Bulk and in Drug Formulations

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Abstract: Simple, accurate and reliable kinetic spectrophotometric method was developed for the determination of zafirlukast (ZAF) in bulk powder and in pharmaceutical formulation. The proposed method depends on hydrolysis of zafirlukast using 1M NaOH at 100°C for 2.5 hours and subsequent reaction of the formed degradation product which contains primary amino (NH_2-) group with 4-Chloro-7-nitrobenzo-2-oxa-1,3 diazole (NBD-Cl) at 90 ± 5 ºC to form a yellow colored chromogen. The formed color is spectrophotometrically measured after 10 min at 466 nm. The fixed time method was adopted for constructing the calibration curve. The linearity range was found to be 0.5-3 μg mL^{-1}, and the limit of detection is 0.139 μg mL^{-1}. The proposed method has been successfully applied to the determination of hydrolyzed zafirlukast in pharmaceutical dosage forms with no interference from the excipients. Statistical comparison of the results shows that there is no significant difference between the proposed and official methods.
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1. Introduction

Zafirlukast (ZAF), chemically [4-(5-cyclopentyloxy-carbonylamino-1-methyl-indol-3-ylmethyl)-3-methoxy-*n*-*o*-tolylsulfonylbenzamide] is a novel selective peptide leukotriene receptor antagonist [1] used as an antiasthmatic drug in the prophylaxis and treatment of mild-to-moderate chronic asthma in adults and children [2]. ZAF is a competitive orally administered inhibitor of the cysteinyl leukotriene LTC_4, LTD_4 and LTE_4 in respiratory tracts [3]. By using zafirlukast as a single dose, bronchoconstriction caused by foreign allergens are inhibited and also decrease the bronchial hyper responsiveness to inhaled histamine. It is highly bounded to plasma proteins especially albumin (99%). It is metabolized in the liver by the cytochrome P450 enzyme. Its half-life is about 10 hours and the onset of action was seen in 1 hour and take 3 hours to reach peak plasma concentration [4 and 5].

Till date there are only few analytical methods reported for the determination of zafirlukast in pharmaceutical preparations and in biological fluids. These methods include high performance liquid chromatography [6-10], capillary electrophoresis [11], spectrophotometry **[**7 and 12], and electrochemical methods [13 and 14].

NBD-Cl (4-Chloro-7-nitrobenzo-2-oxa-1,3 diazole) is a highly sensitive chromogenic and fluorogenic reagent that reacts with molecules containing primary and secondary amino group [15]. NBD-Cl has been abundantly used as a coloring reagent for the spectrophotometric determination of certain cephalosporins [16], fluvastatin [17],

praziquantel [18], ascorbic acid [19] and trimetazidine dihydrochloride [20].

No kinetic spectrophotometric methods have been reported in the literature for the assay of ZAF. So in the present work, a kinetically based method is proposed for the determination of zafirlukast. The method is based on the fact that alkaline ZAF degradate molecule possesses a typical primary amino group which readily and quantitatively reacts with NBD-Cl to form a yellow colored condensation product which can be measured spectrophotometrically at λ_{max} 466nm.

Generally, some specific advantages that the kinetic methods possess are as follows [21 -23] : simple and fast methods because some experimental steps such as filtration , extraction, etc. are avoided prior to absorbance measurements, high selectivity since they involve the measurement of the absorbance as a function of reaction time instead of measuring the concrete absorbance value, other active compounds and common tablet excipients present in the commercial dosage forms may not interfere if they are resisting the chemical reaction conditions established for the proposed kinetic method and colored and/or turbid sample background may possibly not interfere with the determination process. So, the aim of this study was to develop a simple and sensitive kinetic colorimetric method for the quantitative determination of zafirlukast after its alkaline hydrolysis in bulk powder and in pharmaceutical preparations.

2. Experimental
2.1. Apparatus

Dual-beam UV-visible spectrophotometer, UV Probe 1800 version 2.32 (Shimadzu, Kyoto - Japan) with matched 1-cm quartz cells, connected to an IBM compatible personal computer (PC) and a HP-600 inkjet printer.

2.2. Materials and reagents

All materials used were of analytical reagent grade.

- Reference zafirlukast was kindly provided by DELTA PHARMA S.A.E, Tenth of Ramadan City, Egypt. The purity of the samples was found to be $100.43 \pm 0.735\%$ (n = 5) according to the reported method [7].

-Ventair® tablets, Batch No. 06093, labeled to contain 20 mg of zafirlukast per each one tablet; manufactured by DELTA PHARMA S.A.E, Tenth of Ramadan City, Egypt.

- 4- Chloro-7-nitrobenzo-2-oxa-1, 3 diazole (NBD-Cl) (E. Merck, Darmstadt-FRG): 0.1%w/v, freshly prepared in 95% ethanol.

2.3. Preparation of standard solution of degraded zafirlukast (D-ZAF):

Accurately weighed 20 mg of ZAF were dissolved in 20 mL acetonitrile. Subsequently, 25 mL of 1M sodium hydroxide were added and the solution was heated under reflux or in a temperature controlled oven at 100 º C for 2.5 hours. The solution was concentrated nearly to dryness under vacuum, cooled to room temperature (~25 ^{0}C), then quantitatively transferred into a 100-mL calibrated flask and the volume was completed with acetonitrile. Aliquot portion of this solution was diluted with distilled water to prepare working standard solution of (0.02mg mL^{-1}) of D-ZAF. Complete alkaline degradation of the studied drug was confirmed by the reported HPLC method [7], where no peaks corresponding to intact drug were detected in case of the degraded samples.

2.4. General assay procedure

Aliquot portions of degraded ZAF working solution (0.02mg mL^{-1}) over the concentration range (0.5-3μg mL^{-1}) were transferred separately to a series of test tubes. 1 mL of 0.1 % NBD-Cl was added and then the mixture solutions were heated in a thermostatically controlled water bath at 90 ºC for 10 minutes. The test tubes were cooled to room temperature and quantitatively transferred to 10-ml calibrated flasks. The volume was completed with distilled water and the absorption spectrum of the reaction product was recorded at 466 nm against the corresponding reagent blank. The concentration of D-ZAF was then computed from the corresponding equation of the calibration graph for the fixed-time method.

2.5. Procedure for pharmaceutical formulation

From the average weight of 20 crushed Ventair® tablets into fine powder, an accurately weighed quantity of the mixed powder containing an equivalent to 20 mg of ZAF was extracted with 2 x 30 mL of acetonitrile with vigorous shaking for ~ 10 minutes. The solution was filtered through a Whatman filter paper (No. 42) and then diluted to volume with acetonitrile in a 100-mL calibrated flask.

The solution samples were prepared as described under 2.3 by heating with 1 N NaOH for 2.5 hours. An aliquot of this hydrolyzed degraded solution was diluted with distilled water as required and analyzed according to the suggested procedure.

3- Results and Discussion

3.1. The reaction mechanism

The hydrolytic degradation of zafirlukast was used as a preliminary step in the analytical procedure used for its determination. The proposed spectrophotometric method was based on the alkaline hydrolysis of the drug and subsequent reaction of the formed amino group with chromogenic reagent. Zafirlukast is completely hydrolyzed with 1M sodium hydroxide after 2.5 hours at 100 ^{0}C, through the splitting of the ester group. The method is based on the feasibility of hydrolysis of amide ester linkage of zafirlukast in alkaline medium [24 -27]. The expected major degradation product (D-ZAF) is obtained according to the suggested mechanism for alkaline degradation process of zafirlukast (Figure 1).

The assignments and structure elucidation of the degradation product were confirmed by mass spectral data. The mass spectrum of (D-ZAF) was characterized by the appearance of the molecular ion peak at 463 m/z & 465m/z (M & M^{+2}) which confirms the molecular weight of the suggested degradation product. The proposed reaction mechanism between NBD-Cl and primary amines [15] is illustrated in Figure (2).

3.2. Absorption Spectra

The method is based on the fact that (D-ZAF) possesses a typical primary amino group which readily and quantitatively reacts with NBD-Cl at 90 ^{0}C for 10 minutes to form a yellow colored condensation product.

The formed colored product can be measured spectrophotometrically at λ_{max} 466 nm against a reagent blank (Figure 3). This indicates formation of a new compound of higher sensitivity compared to the spectrum of D-ZAF which gives a very weak and very broad absorption maximum at 283.8 nm.

3.3. Optimization of reaction conditions

The optimum conditions for the alkaline degradation and subsequently the development of method were established by varying the parameters one at a time and keeping the others fixed and observing the effect produced on the absorbance of

the colored product. It was found that complete hydrolysis of ZAF and optimum yield of amino group were obtained after reflux or heating with1 M NaOH at 100 ^{o}C for about 2.5 hours. In order to establish experimental conditions, various factors affecting the reaction conditions were studied such as, temperature, concentration of NBD-Cl and time of heating.

Borate buffer solutions of different pH values ranging from 7.8-10 were used and form an orange yellow color. This will decrease the absorbance of the sample solution when using it as a blank reagent. Therefore, maximum color intensity was attained with no buffer reagent.

The influence of volume of 0.1% NBD-Cl was studied and optimized to be 1± 0.25mL for maximum sensitivity (Figure 4). Increasing the volume of NBD-Cl leads to decrease in the absorbance; this may be due to the high background absorbance of the reagent.

The effect of temperature on the reaction was studied in the range of 40-100 ºC and it was found that 90 ºC is optimal for maximum color development (Figure 5).The influence of the time of heating was investigated in the range of 5-35 min. The experimental results show that heating in the range 5-25 min gave the optimal values in kinetic studies (Figure 6). The color product was stable for up to 2 hours at room temperature as shown in Figure (7).

The molar ratio between the drug and NBD-Cl was determined by the limiting logarithmic method [28]. The slope of the curve in case of first solution set yields the number of moles of D-ZAF (0.9317) while that in case of second solution set gives the number of moles of NBD-Cl (0.9311). The stoichiometric ratio of 1:1 was revealed under the attained optimum conditions as shown in Figure (8).

3.4. Kinetics of the reaction
3.4.1. Determination of reaction order

The rate of the reaction was determined using various concentrations of D-ZAF in the concentration range of 0.5-3 μg mL^{-1}, while keeping concentration of NBD-Cl constant at the optimized conditions. The rate of the reaction was found to be [drug] dependent. From the graphs shown in Figure (9), it was clear that rate of the reaction increases with increasing drug concentration, indicating that the reaction rate obeys the following equation [21,22]:

Rate = k' [drug]^{n}………equation (1), where,

k' = the pseudo-order constant of the reaction , n= order of the reaction.

The rate may be estimated from Figure (9) by the variable time method measurements as $\Delta A/\Delta t$, where A is the absorbance and t is the time in seconds, Table (1).Taking logarithms of rates and

concentrations, equation (1) is transformed into the following one:

Log (rate) = log $\Delta A/ \Delta t$ = log k' + n log [drug] equation (2)

Regression of log [drug] versus log (rate) by least square method, (Figure10) yields the calibration equation:

Log (rate) = 1.0122 log C + 2.554 ………..equation (3), with correlation coefficient (r) = 0.9996. So, k'= 358.096 s^{-1} and the reaction is pseudo-first order (n ≈1) with respect to zafirlukast concentration after its alkaline hydrolysis.

3.4.2. Evaluation of different kinetic methods

Several experiments were run to obtain drug concentrations using the rate data, rate constant, fixed absorbance and fixed time methods and the most suitable analytical method was selected taking into account the applicability and the sensitivity (the slope of the calibration curve, the correlation coefficient (r) and the intercept).

3.4.2.1. Rate constant method:

It was performed by plotting graphs of logarithm of absorbance versus time for D-ZAF concentration in the range of 1.08 x 10^{-6} to 6.48 x 10^{-6}M (0.5- 3 μg mL^{-1}). All graphs appeared to be rectilinear and the slope of the line is k / –2.303. Pseudo first order rate constants (K') corresponding to different drug concentrations (C) were calculated from slopes multiplied by –2.303, Table (2). Regression of (C) versus k' gave the following equation:

K' = - 60.855 C - 0.0005 (r = 0.8776)

The value of "r " indicated poor linearity which makes the method not applicable.

3.4.2.2. Fixed absorbance method:

A pre-selected value of absorbance was fixed (0.53). The time required for each drug concentration (2.16 x 10^{-6} to 4.31 x 10^{-6} M) to reach this value was measured in seconds. The reciprocal of measured time (1/ t) against the initial concentration of the drug, Table (3) was plotted and the following regression equation was obtained:

1 / t = 0.0011 C- 0.0002 (r = 0.9608)

The value of "r " indicated poor linearity and the range of drug concentrations that give satisfactory results, was limited therefore this method can't be used.

3.4.2.3. Initial rate method:

In this method, the calibration curves were constructed by plotting the logarithm of the initial rate versus the logarithm of molar drug concentration at the beginning of the reaction as a function of time between 0-5 minutes. Graphs were not easy to plot because the reaction was too fast to follow and so this method was abandoned.

3.4.2.4. Fixed time method:
Graphs of the absorbance versus initial concentrations of the drug were plotted at fixed times of 5, 10, 15, 20 and 25 minutes. The regression equations and correlation coefficient for each graph was calculated (Table 4). It was clear that slope is increasing while intercept is decreasing along with the best correlation coefficient obtained after 10 minutes so that it was chosen as the most suitable time for measurements and for constructing a calibration curve.

Therefore, the fixed time method was utilized to calculate the concentration of zafirlukast via its hydrolyzed form either in the pure powder form or in its pharmaceutical preparations.

3.5. Method validation
3.5.1. Linearity and range
By applying the specified optimum conditions, the standard calibration curve was plotted between the absorption of the reaction product and the concentration of the studied drug. Beer-Lambert's law was obeyed and linear relationship was obtained over the range of 0.5-3 µg mL^{-1}, the linear regression equation was computed and found to be:
A= 0.4001 C+ 0.0008(r = 0.9999)
Where, A= the absorbance at 466 nm; C= the concentration in µg.mL^{-1}; r= the correlation coefficient.

3.5.2. Limits of detection and quantification
According to ICH recommendations [29], the approach based on the S.D. of the response and the slope of the calibration curve was used for determining the limit of detection (LOD) and limit of quantification (LOQ). For the proposed fixed time method, LOD and LOQ were determined and found to be 0.139 and 0.42 µg mL^{-1}, respectively.

3.5.3. Precision
The precision of the proposed colorimetric method was carried out by five determinations at different concentrations of 0.5, 1 and 1.5 µg mL^{-1} for D-ZAF. The percentage relative standard deviation (RSD %) for the intra-day and inter-day variations during 1 and 5 days was calculated. Statistical analysis [30] of the small values of standard deviation of the intercept (S$_a$) and slope (S$_b$) also indicates high precision of the method. The results obtained are summarized in Table (5).

3.5.4. Robustness
The robustness of the developed method was examined by detecting the effect of small but deliberate variations of some of the most important procedure parameters such as wavelength (466 ±0.2 nm) , heating temperature (95 ^{O}C , 100°C) and volume of NBD- Cl reagent (0.75mL ,1.25 mL)

None of these variables significantly affected the assay of D-ZAF and the proposed method could be considered robust (Table 5).
3.5.5. Application to pharmaceutical formulation
The suggested method was successfully applied for determination of ZAF in Ventair® tablets through its alkaline degradation product. The results shown in Table (6) were satisfactory and with good agreement with the labeled amounts.
3.5.6. Accuracy
The accuracy of the suggested method was assessed by applying standard addition technique by spiking different amounts of zafirlukast samples in its degraded form to pre- analyzed tablet samples equivalent to 0.5µg mL^{-1} of ZAF. The mean recoveries of the added drug and percentage relative standard deviations were calculated and illustrated in Table (7). The results obtained suggested non-interference of formulation excipients in the estimation.
3.5.7. Statistical comparison to the reported method
Statistical analysis [31] of the results obtained by the suggested procedure and the reported HPLC method [7] were carried out. Table (8) showed that the calculated t - and F values were less than the theoretical ones, indicating no significant differences between the proposed procedure and the reported one. Moreover, the method is highly sensitive compared to the reported one [7] which needs not less than 30 µg mL^{-1} from the drug.

4. Conclusion
The kinetically based colorimetric method proposed in this work is the first kinetic method developed for determination of zafirlukast after its alkaline hydrolysis. The suggested method is found to be accurate, precise, selective, and reproducible and requires simple apparatus for its performance. Furthermore, the method can be used as a stability indicating assay due to the fact that the alkaline degradate of zafirlukast reacts quantitatively with NBD-Cl with formation of a new compound of higher sensitivity.While; intact zafirlukast doesn't react with the same reagent and gave a baseline spectrum under the optimized experimental conditions even in a very large quantity. From the previous discussion and results obtained in this work, we can conclude with 95% of confidence that the suggested method can be successively applied for quality control and routine analysis of D-ZAF in bulk and pharmaceutical formulation.

Table (1): Logarithms of the rates for different concentrations of degraded ZAF at the optimized experimental conditions.

Log rate (ΔA/ Δ t)	log [drug] M
-3.481	-5.967
-3.189	-5.666
-2.994	-5.491
-2.881	-5.366
-2.785	-5.268
-2.691	-5.189

Table (2): Values of K' and molar concentrations of degraded ZAF

k' (sec $^{-1}$)	[Drug] M
-5.34×10^{-4}	1.08×10^{-6}
-6.22×10^{-4}	$\times 10^{-6} 2.16$
-6.06×10^{-4}	3.23×10^{-6}
-8.38×10^{-4}	4.31×10^{-6}
-8.56×10^{-4}	5.39×10^{-6}
-8.02×10^{-4}	6.48×10^{-6}

Table (3): Values of reciprocal of time taken at fixed absorbance for different rates of various concentrations of D- ZAF at the optimized experimental conditions

[Drug] M	1/ t (sec $^{-1}$)
$\times 10^{-6} 2.16$	1.11×10^{-3}
3.23×10^{-6}	1.66×10^{-3}
4.31×10^{-6}	3.33×10^{-3}

Table (4): Calibration equations at different fixed times for D- ZAF concentration range (1.08×10^{-6}- 6.48×10^{-6} M) at the optimized experimental conditions

Time (min)	Regression equation	Correlation coefficient (r)
5	A= 0.2393 C + 0.0679	0.9942
10	A= 0.4001 C + 0.0008	0.9999
15	A= 0.5100 C + 0.0697	0.9934
20	A= 0.6391 C + 0.1433	0.9941
25	A= 0.7297C + 0.1703	0.9966

Table (5): Regression and assay validation parameters for determination of zafirlukast by the proposed method

Parameter	D-ZAF
Linearity (µg.mL $^{-1}$)	0.5-3 µg mL $^{-1}$
(S$_a$) Intercept ± SD	0.0008 ± 0.0041
(S $_b$) Slope ± SD	0.4001 ± 0.0013
Correlation coefficient (r)	0.9999
Mean recovery % ± RSD	99.96 ± 0.653
LOD* (µg.ml $^{-1}$)	0.139
LOQ * (µg.ml $^{-1}$)	0.42
Precision (RSD %) ** :	
RSD $_a$	0.825 - 0.458- 0.625
RSD $_b$	1.102 – 0.338 -0.776
*Robustness data ***:*	
-Standard ZAF(10 µg mL^{-1})	100.25±0.285
1- wavelength	
466.2 nm	99.99 ± 0.558
465.8 nm	100.05 ± 0.494
2- Volume of NBD-Cl 0.75mL	
1.25 mL	100.45 ± 0.345
3- Heating temperature	100.15 ± 0.602
95℃	99.98 ± 0.335
100°C	100.45 ± 0.446

*Limit of detection and quantitation are determined via calculations:

LOD = (SD of the response/ slope) × 3.3

LOQ = (SD of the response/ slope) × 10

** RSD $_a$: The intra- day and RSD $_b$: inter- day relative standard deviations of 0.5, 1 and 1.5 µg mL^{-1} ZAF, each of triplicate analysis. *** Mean recovery % ± RSD (n=5).

Table (6) Determination of zafirlukast in pharmaceutical formulation by the proposed colorimetric method

Preparation	Taken (µgmL^{-1})	Found (µgmL^{-1})	Recovery* (%)
Ventair® tablets, Batch No. 06093	2	2.021	101.05
		1.998	99.9
		2.01	100.5
		2	100
		1.99	99.5
		Mean ±SD	100.19 ± 0.598
		RSD	0.597

*Average of triplicate determination

Table (7): Standard addition method for the assay of the studied drug in pharmaceutical dosage forms by the proposed method.

Preparation	Claimed amount (µg mL^{-1})	Authentic Added (µg mL^{-1})	Found (µg mL^{-1})	Recovery* (%)
Ventair® tablets, Batch No. 06093	0.5	0.5	0.498	99.6
		1	1.008	100.8
		1.5	1.489	99.267
		2	2.01	100.5
			Mean ±SD	100.04 ± 0.725
			RSD	0.725

*Average of triplicate determinations

**Table (8): Statistical analysis of the results obtained by determination of zafirlukast by the proposed colorimetric method and those obtained by the reference method.**

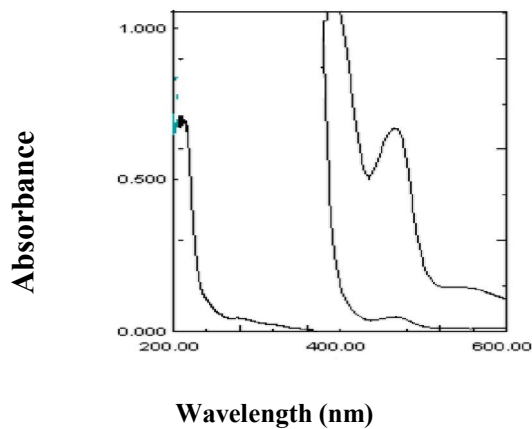| Parameter	Proposed method	Reference method [7]
Mean	99.96	100.43
S.D.	0.653	0.735
Variance	0.426	0.540
n	6	5
t *(2.262)	0.841	
F *(5.19)	1.268	

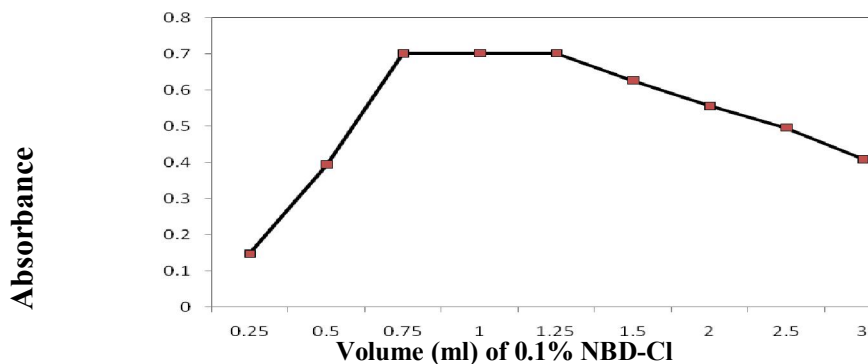 *Figures in parenthesis are corresponding theoretical t- and F- values at *p*=0.05 [31]
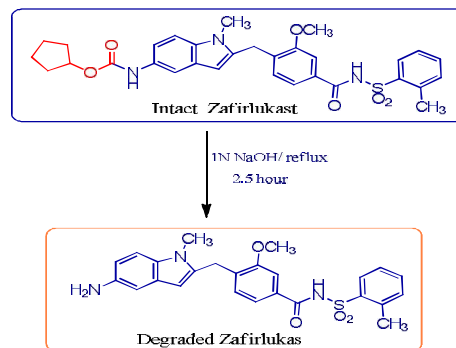
Fig. (1): Scheme of alkaline degradation of ZAF
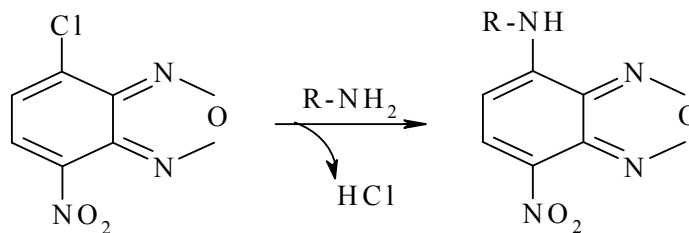
Fig. (2): The proposed reaction mechanism between NBD-Cl and primary amines [15]

Wavelength (nm)

Fig. (3): Absorption spectra of (a) zafirlukast hydrolysate (2 µg mL^{-1}), (b) reagent blank and (c) the reaction colored product.

Volume (ml) of 0.1% NBD-Cl

Fig. (4): Effect of volume of 0.1 % NBD-Cl on the reaction of zafirlukast (2 µg ml^{-1}) after alkaline hydrolysis
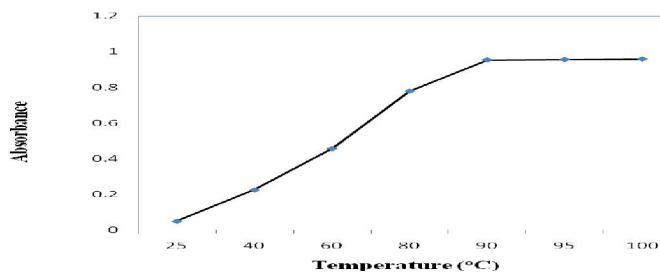
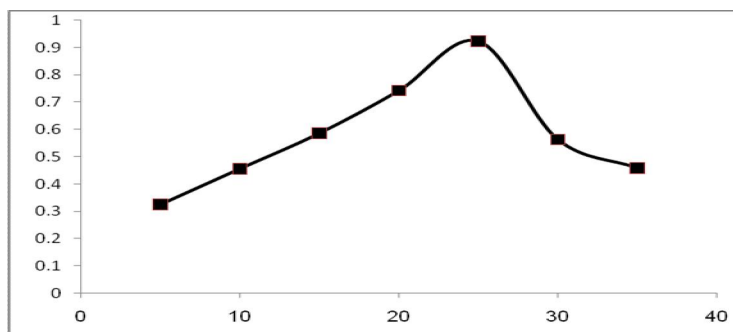**Fig. (5): Effect of heating temperature on the reaction of degraded zafirlukast (2 µg mL^{-1}) with NBD-Cl**

Fig. (6): Effect of heating time at 90 ^{O} C on the reaction of degraded ZAF (2 µg mL^{-1}) with NBD-Cl

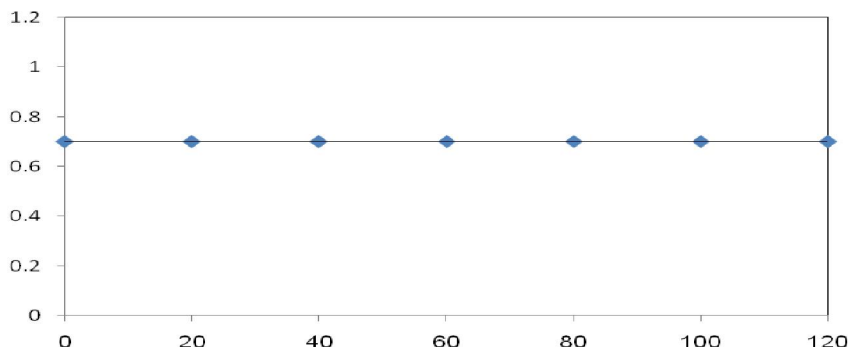**Fig. (7): Effect of time on the stability of color of D-ZAF- NBD-Cl complex (2 µg mL^{-1})**

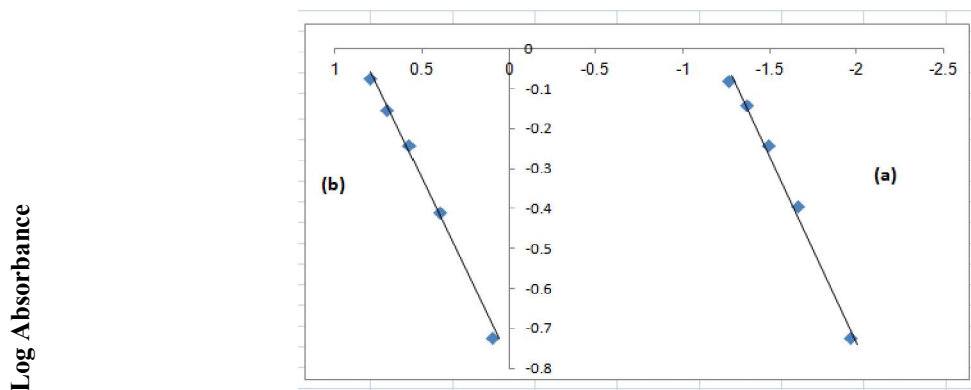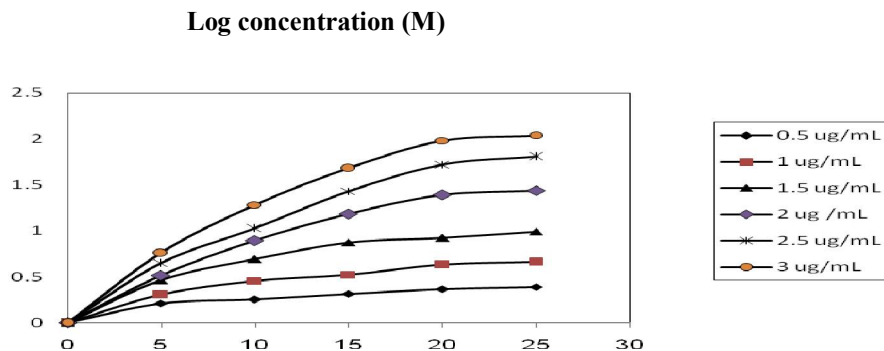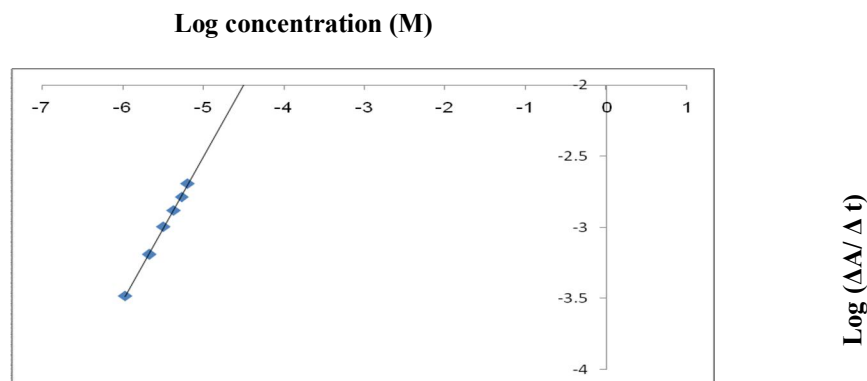**Fig. (8): Determination of the molar ratio between degraded zafirlukast (a) and NBD-Cl (b) by limiting logarithmic method**

Log concentration (M)

Fig. (9): Absorbance versus time for the reaction of different concentrations of D-ZAF with NBD-Cl

Log concentration (M)

Fig. (10): Calibration plot of logarithm rate of the reaction versus molar concentrations of hydrolyzed ZAF
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Specifying balance in expense and time as a result of changing method of collecting and transporting rubbish at 22 districts of Tehran

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Abstract: The present research deals with specifying balance in expense and time as a result of changing method of collecting and transporting rubbish at 22 districts of Tehran. A research methodology is library &field if pacification of research is observed on goal, the present research is among applied research and based on infereneil-method it is descriptive research in wich with respect to design, the present research amonge post –event research . On this basis besides comprehensive study on related thematic literature and by using 8 aspects conceptual model and field studies at 22 districts of Tehran, have intended to collect data in 4 aspects related to time and 4 aspects related to cost. The collected data was analyzed by SPSS and Excel software. Results of this research indicate that upon changing traditional method to mechanized method, time of collecting rubbish, coming and going time, time of stop at place of discharging rubbish and time out of path(waste time) is decreased. Also within 4 aspects related to cost upon changing traditional method to mechanized method the cost of collecting and carrying rubbish, strategic cost and maintenance cost, cost of investment are increased and only cost of human work force is decreased. In general the results indicate that within aspect of time we are facing with decreasing time but in aspect of cost we are facing with increase. At the end of research, besides offering results and findings in detail the aforesaid issues are concluded, discussion and comparison, applied suggestions and suggestions related to continuation and following up similar researches are offered in future.

Introduction:

Tehran by having area of 700km, population of 10 million people is regarded as the greatest, most populated, most traffic and most polluted cities of world by producing 7000ton rubbish. Until end of year 2005 citizens of Tehran produced pile of rubbish in front of their apartment and floor of street and by polluting environment and scenery of city, it is regarded as center for accumulating insects and harmful animals and each night many of these pollutions are transferred to different parts by step walking of people. On the other hand, upon population increase and permanent growth of cities, it is required for increasing level of consumed materials; consequently, increasing waste materials and entering it to the environment. Waste material is regarded as one of the most

important factors of pollution. If human intends to keep present growth and combat with such pollution, it is required to apply from technology management, engineering and economic principles for discharging waste materials. Within this unsuitable condition, rubbish is transferred, thrown and displaced by empty hand workers by remaining many sap and even increasing level of pollution. Excess transportation of low capacity rubbish machines is secondary factor of circulating pollution. Paying attention to environmental pollution through different environmental plans such as: management of solid waste materials is remarkably increased at global health and economy and the issue of rubbish recycle is created revolution at modern technology. Encouraging people to produce less rubbish and separating components of rubbish at production centers prepares suitable grounds for correct management of rubbish. It is to be noted that costs of collecting rubbish nearly covers 80% total annual budget of discharging waste materials which makes us to neglect traditional methods of engineering and public attitudes (Omrani 1995). Technological advancement has caused numerous changes at priorities. Meanwhile public health, economy and health

have still specific importance, it is required for paying attention to environmental problems and relationship between discharging solid waste materials (Abdoli 2000). Failure in correct management of waste materials is regarded as environmental pollutants, so that in addition to ever growing pollution of soil, air, weather, environmental chain the human inhabitants is faced with serious problem. In addition to technologic achievements, ever growing rate of urban population, irregular development of urbanism, improving process of life, ever growing production of industrial and urban rubbish have caused many problems for collecting and discharging rubbish and sometimes pollution by rubbish and waste materials caused many abnormalities in society such as: endangering health of citizens (set of report 2007). Regarding all of the aforesaid factors simultaneously improves efficiency of mechanization plan and remarkable decrease at costs, pollution, transportation of vehicles, facilitation of operation, increasing safety, improving public health, citizenship culture, attracting public partnership and satisfaction of citizens.

Table 1: Research background

	Sequence	Researcher	Year	Results
Domestic Research	1	Naghavi	2005	Efficiency of mechanized method in neighborhood is higher since compression of population is very high, regions of collecting rubbish is high, distance of collecting rubbish, time of transportation is low and method of Neisan is appropriate for neighborhoods that compression of population is low and distance of collecting rubbish is very high
	2	Deputy of Urban Cities of Tehran Municipality	2000	Determining some technical indices for new stations according to the collected information
	3	Madani Shahroudi	1999	Offering model based on economic, social, technical, environmental considerations extending for designing and managing system of transferring waste materials at Tehran
	4	Sabzevari	2003	Not observing health and economic principles at provisional stations of collecting rubbish
Foreign Research	5	Koli Katra and et al	2009	Carrying out research at most sections of America on compost, legal nature, nature of waste materials, continuing attitude toward market for managing purification operation, liabilities and its consequences
	6	Gormad and et al	2009	Establishing effective models of management of solid waste materials at sample city
	7	Komara and et al	2009	Quantity and structure of waste material management from one place to the other is different and has fixed partial correlation with average life standard
	8	Hezare and et al	2009	Absence of having suitable facility (equipments and infrastructure) less estimation of production rate of waste materials, insufficient technical skill, unsuitable planning, non-competent person in charge of collecting rubbish, poor transfer of urban solid waste materials
	9	Shakdar	2006	Recommendation for obtaining to macro urban solid waste materials plan in relation to national policies, legal framework, technology management, operation management, financial management, awareness and public partnership

General Research Methodology:
Like other discussions of humanistic sciences, several different approaches are offered in relation to research methodology (Zohouri 1999). Generally all research methodologies are divided into 2 sections including: library and field; in which, this research benefited from both methods (Bazargan and et al 1998). If research is classified according to aim this research falls within applied research and in case of classification according to inferential method this research falls within descriptive-survey research and with respect to plan of research it is regarded as   post-event.

Definition of Terms:
Time: It refers to transportation time, stop at discharge place and waste time for discharging rubbish
Cost: It refers to money paid for collecting rubbish until transferring it to station, investment costs for launching plan, keeping plan and personnel costs
Rubbish: It refers to all solid materials produced by human activities, different institutes and industries that are not applicable and from chemical point of view are classified as decomposition and non decomposition (Naghavi 2005)
Collection: It refers to operation of collecting solid waste materials and transferring them to specific place for discharging and keeping them (Madani 1999)
Change Method: Whereas method of collecting and transferring rubbish is changed from traditional method into mechanized method at Tehran municipality since year 2005; therefore, in order to compare aforesaid 2 methods the information of year 2003 until 2005 for traditional method and information of year 2006 until 2008 for mechanized method was compared.

Statistical Universe:
Statistical universe of this research is 22 districts of Tehran municipality

Sampling Method and Volume Sample:
By insisting on comparing traditional and mechanized method since year 2003 until 2008 the sampling was not performed and according to census method, all related statistics and information was studied

Meth of Collecting Data and Information:
Library and field method

Tools of Research:
Slip writing, table, form of benefiting references such as books, articles, journals, statistics for drawing up research literature, identifying effective variables and indices. Within descriptive research the descriptive information is collected through questionnaire, interview or observation and in this research the tools for collecting data are related to documents, interview and observation

Method of Analyzing Data and Information:

Statistical Method: This research benefit from descriptive statistics consisting of following items: mode, mean, average, range of changes, variance, standard deviation, dispersion, standard error, skewness coefficient and stretch coefficient

Research Model: Each conceptual model is regarded as basis for performing study and research, so that it determines desired variables and their relationship (Edward and et al 2000) i.e. conceptual model or MSM and analysis tool (Mirzaei 1998) is regarded as ideal strategy for beginning research, so that it is expected to study variables and their relationship and based on necessity to observe some amendments (to decrease or increase some factors) (Sater and Lizen 1999). This research applied from conceptual model (Naghavi 2005) (diagram 1)
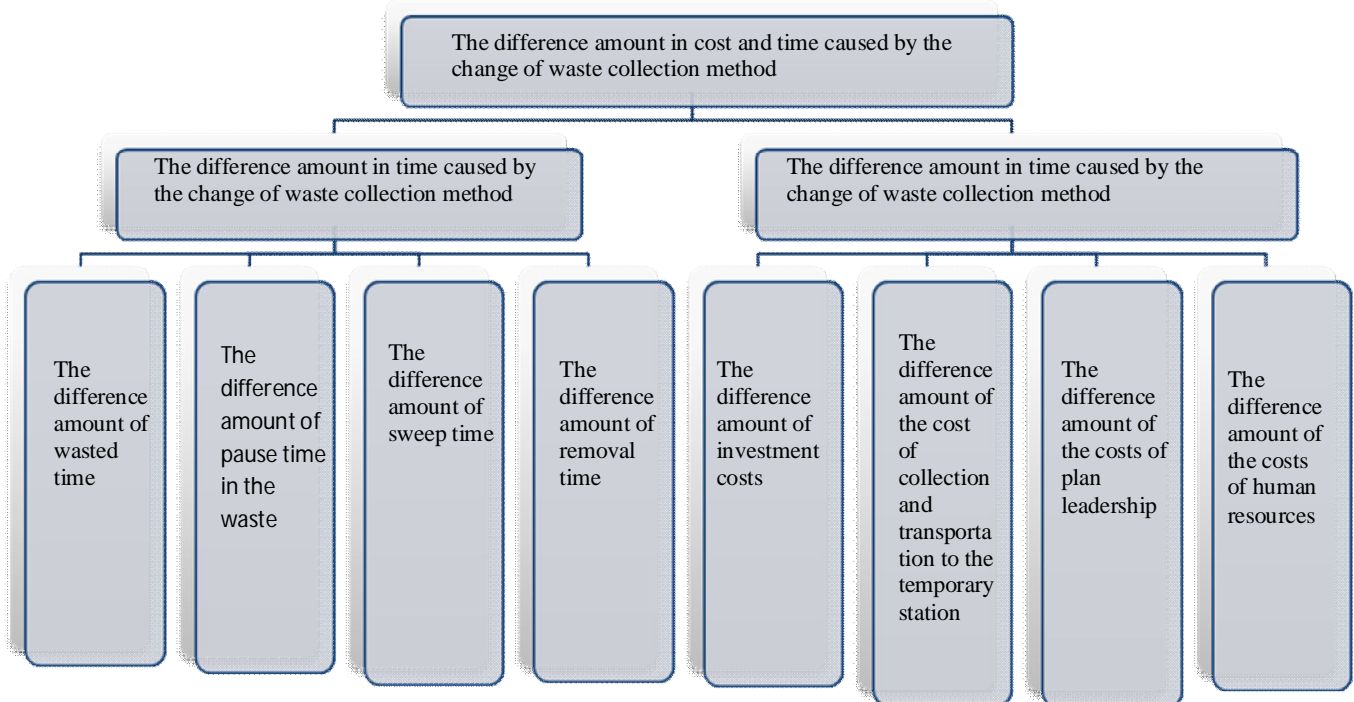
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                    The difference amount in cost and time caused by the
                          change of waste collection method


        The difference amount in time caused by              The difference amount in time caused by the
         the change of waste collection method                  change of waste collection method


   The          The          The          The          The          The          The          The
   difference   difference   difference   difference   difference   difference   difference   difference
   amount of    amount of    amount of    amount of    amount of    amount of    amount of    amount of
   wasted       pause time   sweep time   removal      investment   the cost     the costs    the costs
   time         in the                    time         costs        of           of plan      of human
                waste                                               collection   leadership   resources
                                                                    and
                                                                    transporta
                                                                    tion to the
                                                                    temporary
                                                                    station
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Chart 1

Research Variables & Defining Operation:

* Time of collecting rubbish based on type of collection system is divided into 2 groups including:

A) The time of collection within traditional collection method refers to required time for loading rubbish sacks or contents of rubbish container at Nissan Van; in which, this time is began with stop Nissan Van at the first rubbish sack to rubbish container until completing capacity of Nissan Van

B) Collecting rubbish with rubbish truck and container within mechanized method of collecting rubbish refers to time of reaching truck to the first rubbish container until completing capacity of truck

* **Transportation Time:** It refers to the required time for vehicle of collecting rubbish (Nissan Van or truck) from being filled until reaching to place of burying rubbish (discharge station), in addition it refers to required time

that vehicle of collecting rubbish reaches to first sack or container of rubbish; in which, this time does not consists of stop by vehicle of collecting rubbish at discharge place (station)

* **Time of Stop at Burial Place (Discharge):** It refers to time between entrance and exit of vehicle for collecting rubbish to the station (place of discharging rubbish) and also expecting for discharging rubbish

* **Wasted Time Out of Path:** It refers to time that no effective action is performed for collecting rubbish that is divided into 2 groups including:

A) **Required Useless Time:** It refers to time that collection and transportation system inevitably have to spend it, for example time spend at urban traffic, time that is spend for entering and exiting station, time that is spend for entering to the first station on night and returning to garage on morning, time that is spend at repair shop, changing flat tire and failure of machineries

B) **Non Required Useless Time:** Time that is spend for eating dinner, drinking tea and long time relax

Analysis and findings of research:
At first, the tables of descriptive statistics are used to display data numerically and mode, median and mean as indices of central tendency, variation range, and standard deviation as indices of dispersion, and standard error, coefficient of deviation and coefficient of strain as indices of distribution are calculated. Also, columnar and polygonal charts are used in order to display data image to compare two methods of traditional and mechanized.
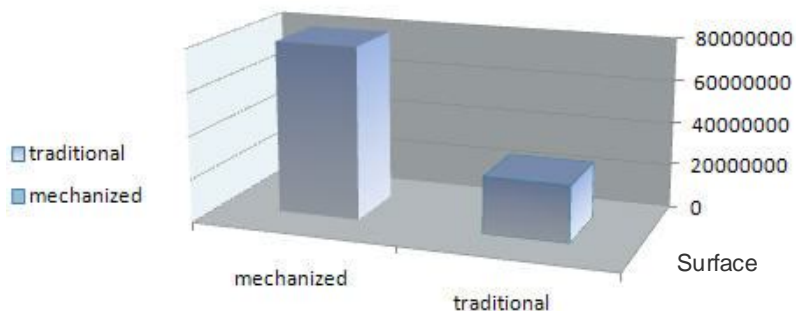
According to the Statistical indices related to the investigation of the cost of "transportation and collection of waste" and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. The mean cost of the transportation and collection of waste in traditional method and mechanized method is 4.669 Million Rials and 12.117 million Rials, respectively.
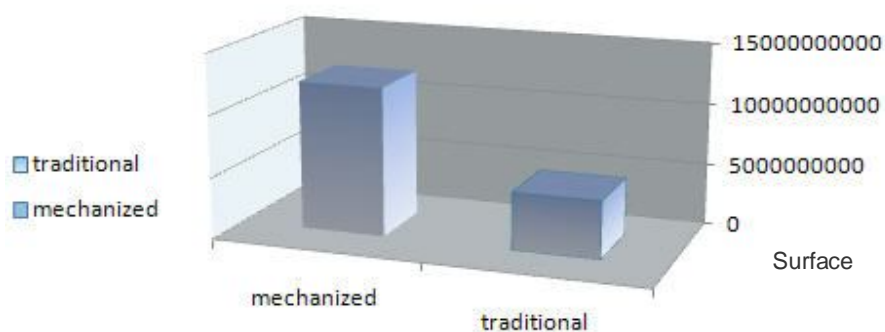
Charts related to Table 2.

According to the Statistical indices related to the investigation of the cost of "Leadership and Maintenance"and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of st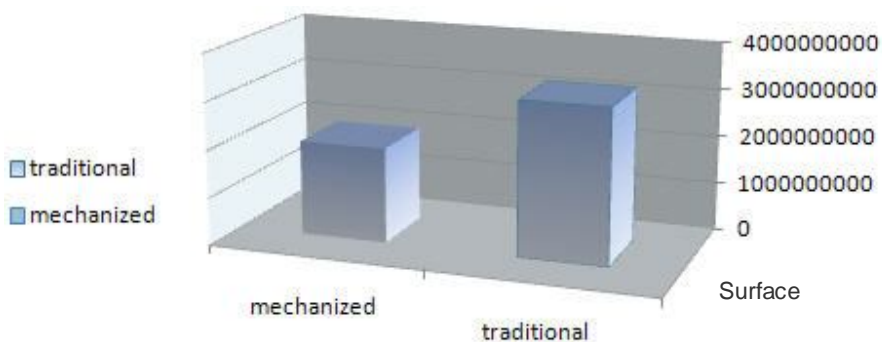rain is less than 1, it can be proposed that the above distribution has the assumption of normality. The mean cost of leadership and maintenance in traditional method and mechanized method is 262 Million Rials and 799 million Rials, respectively.

Charts related to table 3

According to the Statistical indices related to the investigation of the cost of "human resources"

and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it c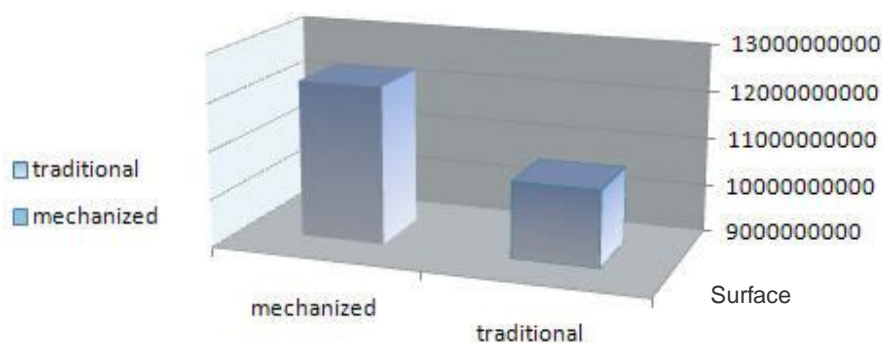an be proposed that the above distribution has the assumption of normality. The mean cost of human resources in traditional method and mechanized method is 3.233 Million Rials and 198 million Rials, respectively.

Charts related to table 4.

According to the Statistical indices related to the investigation of the cost of "investment" and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviat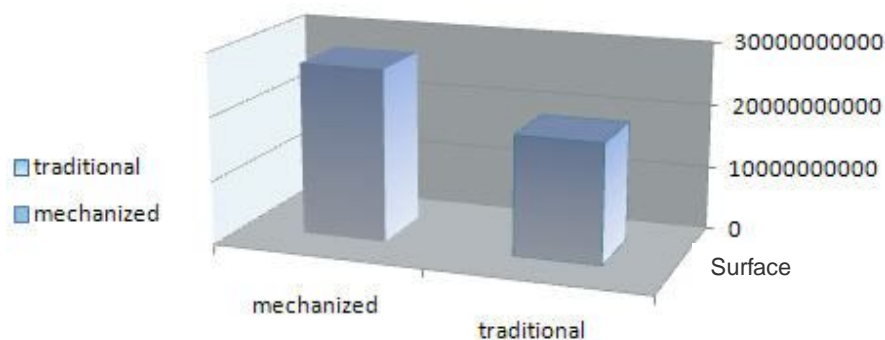ion and coefficient of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. The mean cost of investment in traditional method and mechanized method is 10.598 Million Rials and 12.298 million Rials, respectively.

Charts related to table 5

According to the Statistical indices related to the investigation of "total" cost and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it can be proposed that 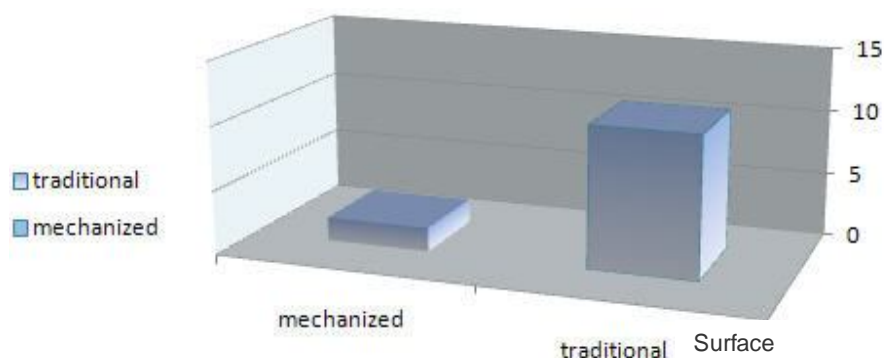the above distribution has the assumption of normality. It should be mentioned that the total mean of the cost of the transportation and collection of waste in traditional method and mechanized method is 18.763 Million Rials and 27.203 million Rials, respectively.

Charts related to table 6

According to the Statistical indices related to the investigation of the time of "pause in the waste dumping site»and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, i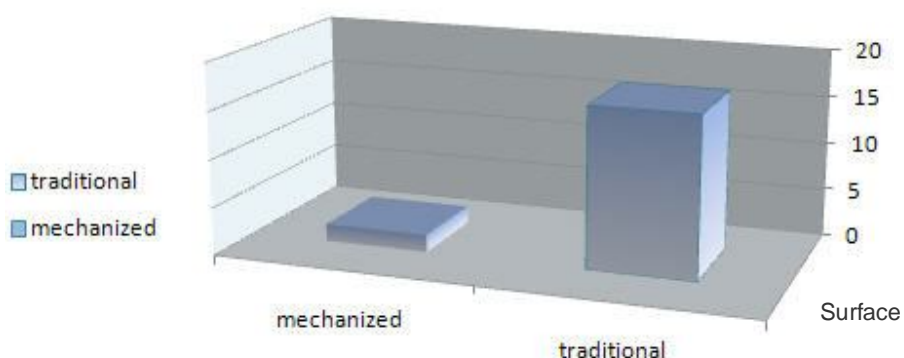t can be proposed that the above distribution has the assumption of normality. It should be mentioned that the mean time of "pause in the waste dumping site»" in traditional method and mechanized method is 11 minutes and 1/86 minutes, respectively.

Charts related to the table 7

According to the Statistical indices related to the investigation of the time of "sweep" and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. It should be mentioned that the mean time of "sweep" in traditional method and mechanized method is 16/75 minutes and 1/80 minutes, respectively.
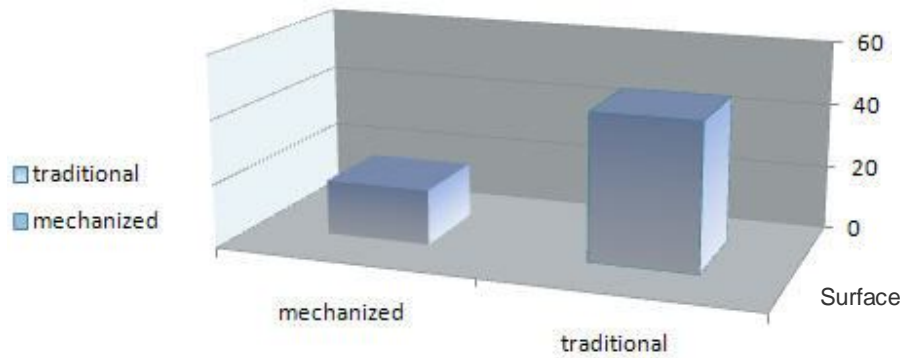

Charts related to the table 8

According to the Statistical indices related to the investigation of the time of "waste removal"and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. It should be mentioned that the mean time of waste removal in traditional method and mechanized method is 44/61 minutes and 17/22 minutes, respectively.
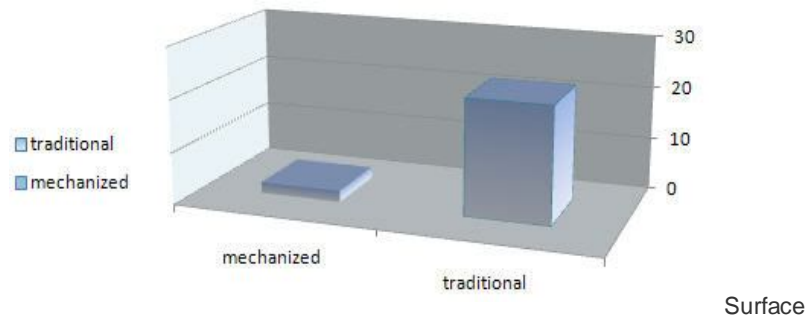
Charts related to the table 9

According to the Statistical indices related to the investigation of time "out of the path (lost)"and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. It should be mentioned that the mean of time out of the path (lost) in mechanized method and traditional method is 2/11minutes and 22/19 minutes, respectively.

Charts related to the table 10

According to the Statistical indices related to the investigation of "total" time and with emphasis on this point that there is a little difference between mode, median and mean and since the amount of coefficient of deviation and coefficient 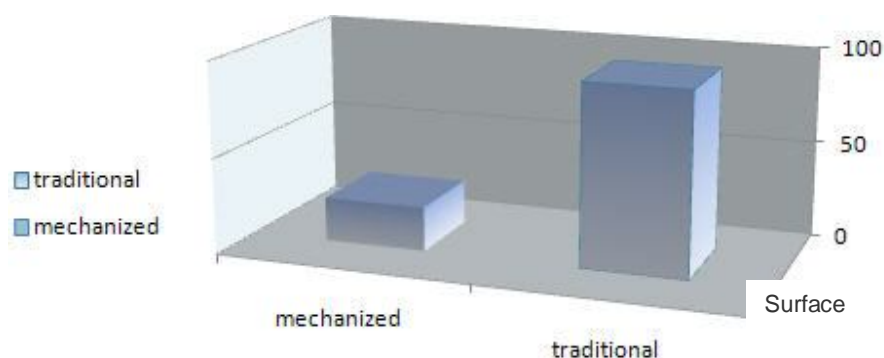of strain is less than 1, it can be proposed that the above distribution has the assumption of normality. It should be mentioned that the mean of total times in mechanized method and traditional method is 23 minutes and 94/55 minutes, respectively.

Charts related to the table 11

Conclusion:

Subsidiary Questions:
* What is time of collecting rubbish from changing traditional method into mechanized method? Average time of collecting rubbish in total districts of Tehran by traditional method from year 2003 until 2005 is 44.61min and by mechanized method from year 2006 until 2008 is 17.22 min; consequently, average monthly time of collecting rubbish at mechanized method is 27.39min less than traditional method
* What is transportation time of rubbish from changing traditional method into mechanized method? Average time of transportation in total districts of Tehran by traditional method from year 2003 until 2005 is 16.75min and by mechanized method from year 2006 until 2008 is 1.8 min; consequently, average monthly time of transportation at mechanized method is 14.95min less than traditional method
* What is time of stop at rubbish discharge station from changing traditional method into mechanized method? Average time of stop at rubbish discharge station in total districts of Tehran by traditional method from year 2003 until 2005 is 11min and by mechanized method from year 2006 until 2008 is 1.8 min; consequently, average monthly time of stop at rubbish discharge station by mechanized method is 9.20min less than traditional method
* What is wasted time from changing traditional method into mechanized method? Average wasted time in total districts of Tehran by traditional method from year 2003 until 2005 is 22.19min and by mechanized method from year 2006 until 2008 is 2.11 min; consequently, average monthly wasted time by mechanized method is 20.08 less than traditional method
* What is cost to be paid for collecting and carrying rubbish to provisional station from changing traditional method into mechanized method? Average cost to be paid for collecting and carrying rubbish to provisional station in total districts of Tehran by traditional method from year 2003 until 2005 is Rls 4,669,145,750 and by mechanized method from year 2006 until 2008 is Rls 12,117,151,201; consequently, average monthly cost to be paid for collecting and carrying rubbish to provisional station by mechanized method is Rls 7,448,005,451 higher than traditional method
* What is investment cost for launching plan from changing traditional method into mechanized method? Average investment cost for launching plan in total districts of Tehran by traditional method from year 2003 until 2005 is Rls 10,598,181,818 and by mechanized method from year 2006 until 2008 is Rls 12,298,363,636; consequently, average monthly investment cost for launching plan by mechanized method is Rls 1,700,181,818 higher than traditional method
* What is strategic and keeping cost of plan from changing traditional method into mechanized method? Average strategic and

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keeping cost of plan in total districts of Tehran by traditional method from year 2003 until 2005 is Rls 262,061,056 and by mechanized method from year 2006 until 2008 is Rls 799,506,397; consequently, average monthly strategic and keeping cost of plan by mechanized method is Rls 537,445,341 higher than traditional method

* What is cost of human workforce from changing traditional method into mechanized method? Average cost of human workforce in total districts of Tehran by traditional method from year 2003 until 2005 is Rls 3,233,960,836 and by mechanized method from year 2006 until 2008 is Rls 1,988,355,272; consequently, average monthly cost of human workforce by mechanized method is Rls 1,245,605,564 less than traditional method

With respect to average costs of both methods, the cost of human workforce in traditional method is higher; meanwhile, cost of keeping and carrying rubbish until provisional station, strategic and keeping cost of plan and investment cost in mechanized method is higher than traditional method. Average time of both methods reveal that within traditional method the time of stop at place of discharging rubbish, transportation time, time of collecting rubbish and waste time is higher than mechanized method

Principal Research Questions:

* What is difference between cost and time in case of changing method of collecting and carrying rubbish at 22 districts of Tehran? Total monthly average spent costs from time of collecting rubbish until its discharge at station in total districts of Tehran by traditional method from year 2003 until 2005 is Rls 18,763,349,460 and by mechanized method from year 2006 until 2008 is Rls 27,203,376,508; consequently, total monthly average cost by mechanized method is Rls 8,440,027,048

* Total monthly average time from collecting rubbish until its discharge at station in total districts of Tehran by traditional method from year 2003 until 2005 is 94.55min and by mechanized method from year 2006 until 2008 is 23min; consequently, total monthly average time by mechanized method is 71,55min less than traditional method

Applied Recommendation in the way of Domain of Research:

Changing method of collecting rubbish and stabilizing items of urban service from traditional method into mechanized method has satisfactory achievements with respect to environmental, social and cultural aspects; therefore, according to the results of this research, following recommendations are offered for decreasing related time and costs:

1) Optimum localization of transfer stations in Tehran

2) Correct localization and topology of regions for collecting rubbish by minimizing transportation path

3) Applying containers with higher capacity for minimizing number of required times for discharging; consequently, decreasing waste time, decreasing cost of carrying and collecting rubbish

4) Establishing suitable culture through media for citizens to put their rubbish exactly at 9 p.m. (hour of beginning urban service) in front of their homes due to not repeating this service during day

5) Whereas contractor of green space began his work at 6 a.m. which is simultaneous with termination work of urban service contractor, it is recommended to make arrangement between 2 contractors or minimizing merging their affairs in order to decrease wasted time and not intervention of their affairs

6) In order to facilitate time of discharging rubbish from container it is recommended to make arrangement with Traffic Department to prevent from park vehicles in front of rubbish container through applying fine, installing No Stop sign and prevent from park vehicles

7) Designing path of collecting rubbish should be so that the final collection station is preferably be very close to discharging station

8) At the present time many persons under title of inspector, supervisor, fourth factor… supervise and control over performance of vehicles and contractors that due to having different attitudes, many contractor and employers are dissatisfied and increases costs. Therefore, through installing Online G.P.S by showing path on map and movement information such as report of stop, transportation in the defined area or unauthorized area, report of infringement from authorized speed and level of consumed fuel it is possible to optimally manage all stages such as supervision over performance of human and vehicle in order to minimize costs and time

9) Through installing scale system (weight measurement system) on arms of vehicles for carrying rubbish it is possible to measure weight of each container while discharge and by using GPS system installed on vehicle, to register information related to weight of rubbish and register it in system and to analyze rubbish according to alley and neighborhood separately, which assists for correct cost and time management for collecting and carrying rubbish

10) Through benefiting from GIS (Global Positioning System) system it is possible to determine the shortest possible path for collecting and carrying rubbish according to impediments such as: traffic, blocked roads… which increases speed and decreases wasted time and decreases costs of carrying and collecting rubbish

11) In order to minimize mechanization plan we evaluated aforesaid plan and by using SWOT (Strength, Weakness, Opportunities, Threats) model we investigated strong points, weak points, threats and opportunities for having maximum efficiency

Recommendations for Further Research:

1) Recognizing effective environmental, mental, social, cultural and political factors on economizing at cost and time of mechanization method in Tehran

2) Studying potentials of applying new technology in the field of management of solid waste materials in Tehran

Limitations of Research:

1) Delegating power of cleaning roads affairs from Tehran municipality to motorized service organization (waste material management organization) in fiscal year 2006 and change at management and method registering information: whereas costs of collecting the produce waste materials of Tehran from year 2003 until 2008 is studied many of information was related to period before mechanization (years before 2005) and information should be collected from 123 districts; nevertheless, due to this fact that this information was not related to a concentrated unit of a department, there were some problems for collecting such information. In addition the criterions of registering information during recent 2 periods (period before year 2006 and after year 2006) were based on traditional method; nevertheless, at mechanization method the statement is based on number of personnel and hour; consequently, there is no compatibility between comparisons and integrating this information was very complicated

2) Merging motorized service organization (waste material management organization) and recycle organization (waste material management organization): whereas merging both organizations and not establishing organizational structure and a new detailed organization, the waste material management organization due to enforce elimination was not able to meet the requirements of departments and collecting related information.

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Effect of Biological Fertilizers on Germination Indices in Wheat Cultivars With Drought In Greenhouse

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Abstract: To determine aminol-forte and fosnutren, as two biological fertilizers containing amino acids, effects on 11 bread wheat cultivars in Ardabil IAU research greenhouse a research was carried out in factorial completely randomized block design with three replications. Factor A in two conditions (drought and normal), factor B in three levels (water, aminol-forte and fosnutren) and factor C included 11 bread wheat cultivars. Results suggested that there was a significant difference between test conditions based on all measured indices at 1%. Also there was a significant difference between studied cultivars based on assessed properties at 1 to 5%. There was a significant difference between fertilizer levels based on germination speed coefficient, ultimate germination percentage, germination rate index and daily average germination rate at 5%. The test conditions interaction in biologic fertilizers in all studied traits were significant at 1%. The results to the means comparison suggested that genotypes of Kuhdasht with a mean of 57.57, Saisons with a mean of 57.13, Azar 2 with a mean of 56.64 and Zagros with a mean of 56.60 had the highest germination duration mean and Chamran genotype with a mean of 46.39 had the lowest germination duration mean. On germination rate, also, Chamran genotype with a mean of 0.0218 had the best and Kuhdasht and Saisons genotypes with means of 0.0173 and 0.0175, respectively, had the lowest germination rate. Results to the data mean comparisons on fertilizer levels indicated that fosnutren liquid fertilizer was the best genotype in germination rate coefficient, germination duration mean and germination rate index. Finally, it could be mentioned that applying biological fertilizers which contain amino acids, could play a great positive role in wheat germination indices.

Introduction

Considering the population growth in Iran and the world, and also lack of food in the world, studying all strategies which could increase the production and wheat optimal use, have been taken into considerations. Among the main factors which play roles in wheat is the seeds quality or seed masses that are among the most significant crop production inputs and have great importance in desirable yield (Qorbani et al, 2005). Indecent quality, inadequate germination and deployment are among the main difficulties which crops confront in various regions. The quality is affected by various factors such as cultivar, genetic purity, physical purity, viability, germination capability, and seed viability. Other factors such as genetic structure, environment, and maternal nutrition, maturity stages during harvesting time, mechanical damages, seed reserves, age, wear and pathogen could affect germination and seed yield. Germination is the first stage in wheat growth which is of a great significance. Along with germination, germination rate and consistency and also seed vigor are among important parameters in seed quality (Soltani et al, 1996). Seed's vigor and quality are affected by the seed age and wear and consequently it decreases the germination capacity and rate (Macdonald et al., 2004; Basra et al., 2003; Defigueiredo et al., 2003). Seeds with higher quality and vigor could grow better and they have higher germination rate and growth percentage in confronting environmental stresses and finally, they provide stronger seedlings (Salehiyan, 1995). According to the various observations in studying various seed masses in various plant species in laboratory and field conditions, it has been proven that the germination percentage of a seed mass in the laboratory is different from the seedling deployment in the field. These differences and changes are due to the differences in various seeds masses vigor (Rouzrokh and Qasemi Gol'azani, 1998). Environmental stresses, especially drought stress plays an important role in reducing plant growth,

especially during germination in arid and semiarid regions of Iran. Drought stress occurs when the amount of water intake plant is less than its losses. In addition to restricting water uptake of seed by affecting fluidity reserves and fetal protein synthesis, drought and salinity stresses can cause decreased germination (Jevad, 2002). Osmotic and ionic compounds created by the stresses can be effective on these parameters, although, the impact depends on the type of material that causes stress and type of cultivar (Jevad, 2002; Ikeda et al., 2002). Identifying cultivars or genotypes which are more tolerant to the stresses in germination stage is of essence (Pessarkli et al, 1991). Considering the biologic fertilizers positive effects on various growth stages, studying various fertilizer types for finding proper method in retrofitting against drought stress during germination is of a huge significance (Shahryari and Khayatnejad, 2011). Thomas et al (2009) studied the effect of amino acids formulations such as humiforte which are biologically active, on tea quality and production. Also, Mostafa et al (2010) studied arginine's effect on growth and yield in late-planting wheat. Some biological stimuli, such as humiforte to create environmental stresses, have been released in the market. The objective to this research is to study the response of various wheat cultivars to two amino acid types on germination and identifying wheat cultivars which are proper for optimal fertilizer and water resources.

Material and methods

To study the aminol-forte and fosnutren effects, as two biological fertilizers containing amino acids, on 11 bread wheat cultivars a research was conducted in Ardabil IAU research greenhouse.

The research was carried out in factorial completely randomized block design with three replications. Factor A in two conditions (drought and normal) and factor B in three levels (water, aminol-forte and fosnutren) and factor C included 11 bread wheat cultivars (Table 1).

Table1. Genotypes name that used in this study

NO.	Name	NO.	Name
1	Rasad	7	Saisons
2	Kuhdasht	8	Sardari
3	Gascogne	9	Azar2
4	Bezostaya	10	Zagros
5	Cross Sabalan	11	chamran
6	MV-17	-	-

The amount of Aminol-forte and fosnutren used in this compound was 2 ml per 500 ml water. Polyethylene glycol 6000 was used as the drought agent in greenhouse condition for drought treatment. After providing equal amount of sand, gravel and slit for each pot, 10 seeds were planted in each pot. Pots were watered with water and solutions according to the planting map. The drought stress treatment was conducted on the plant by polyethylene glycol solution after three days. To measure the germination indices, germinated seeds were counted daily. Coefficient velocity germination (CVG), germination rate index (GRI), mean germination time (MGT), final germination percentage (FGP), germination rate (Rs) and mean daily germination (MDG) were calculated by the following formulas (Table 2):

Table 2 - The formula used to calculate the index of germination

Germination indices	The Formula used
Coefficient Velocity Germination (CVG)	$\sum NiTi / \sum Ni \times 100$ CVG (Scott et al, 1984) $=$
germination rate index (GRI)	$X / Gx + \dots + G2 / 2 + G1 / 1 = $ GRI (Ruan et al, 2002)
final germination percent (FGP)	$100 \times Ng / Nt = $ FGP (Ruan et al, 2002)
mean germination time (MGT)	$\sum Ni = 100 / CVG / \sum NiTi = $ MGT (Kulkami et al, 2007)
germination rate (RS)	$1 / MTG = $ Rs (Rajabi and Poostini, 2004)
mean daily germination (MDG)	$FGP/d = $ MDG (Scott et al, 1984)

Data variance analysis and comparing their means were carried out by MSTATC and SAS softwares. Means were compared by using Duncan's multiple-range test at 5%.

Results

Considering the variance analysis results on studied traits (Table 3), it was observed that there was a significant difference between research conditions in all measured indices at one percent. There was also a significant difference found between studied cultivars on coefficient of velocity of germination (CVG), mean germination time

(MGT), germination rate (Rs) and germination rate index (GRI) at one percent. There was a significant difference found between studied cultivars on final germination percentage (FGP) and mean daily germination (MDG) at five percent. This suggests the genetic variation between cultivars for selecting desired traits. The fertilizer levels showed a significant difference on coefficient of velocity of germination (CVG), germination rate index (GRI) and mean daily germination (MDG) at 5%. The interactive effect of research conditions and biological fertilizers combination was significant on all studied traits at 1%. There was no significant difference found between other interactive effects on any of studied traits. Results to the data mean comparison (Table 4) on studied cultivars suggested that genotypes of Kuhdasht with a mean of 57.58, Saisons with a mean of 57.13, Azar 2 with a mean of 56.64 and Zagros with a mean of 56.50 had the highest mean germination time (MGT). Chamran genotype with a mean of 46.39 had the lowest mean germination time (MGT). On germination rate (Rs), Chamran genotype with a mean of 0.0218 was the best and genotypes of Kuhdasht and Saisons with means of 0.0173 and 0.0175 had the lowest germination rates (Rs). Sardari genotype formed one group, Gascogne formed another group, Rasad and Bezostaya and Cross Sabalan genotypes in formed group, and also MV17, Azar 2 and Zagros formed another group and showed no differences in other traits. Kuhdasht and Zagros cultivars with a mean of 100 percent had the height final germination percentage (FGP), while Sardari genotype with a mean of 93.33 percent had the lowest final germination percentage (FGP). Cross Sabalan, Saisons and Azar 2 formed on group and Rasad, Gascogne, Bezostaya and MV 17 formed another and Chamran formed another group and they showed no differences in other traits. On germination rate index (GRI) in studied cultivars, Saisons genotype with a mean of 9.82, Kuhdasht with a mean of 9.79 and Azar 2 with a mean of 9.79 were the best cultivars while Chamran with a mean

of 6.85 had the lowest germination rate index (GRI). Zagros and Kuhdasht cultivars with a mean of 7.69 had the highest mean daily germination (MDG) while Sardari with a mean of 7.17 had the lowest mean daily germination (MDG). Based on coefficient of velocity of germination (CVG) among the studied cultivars, Azar 2 with a mean of 10.91 and Saisons with a mean of 10.88 were the best cultivars while Chamran with a mean of 10.17 had the lowest coefficient of velocity of germination (CVG). Results to the data mean comparison (Table 5) on fertilizer levels indicated that liquid fosnutren fertilizers was the best based on coefficient of velocity of germination (CVG), mean germination time (MGT) and germination rate index (GRI) and aminol-forte liquid fertilizer along with fosnutren was the best on final germination percentage (FGP) and mean daily germination (MDG). Based on germination rate (Rs), normal water conditions with a mean of 0.020 was the highest while fosnutren liquid fertilizer with a mean of 0.017 had the lowest germination rate (Rs).

Discussion

Shahryari and Khayatnejad (2011) conducted a research to assess the humiforte spraying effect on two wheat cultivars in late season drought stress and calculated some tress-tolerant traits and indices. They came to this conclusion that humiforte in both with stress and without stress conditions, has significantly affected the yield. Calculating the stress-tolerant indices in their research suggested that humiforte increases the wheat cultivars tolerance against late season drought.

Alaei et al (2012) conducted a research to study the effect of two types of biological fertilizer containing amino acids on germination indices of wheat varieties under in vitro drought stress condition. They concluded that fosnutren biological fertilizer has been able to put a more positive effect on the studied indices.

Table 3 - Analysis of variance was assessed in different experimental conditions for different wheat cultivars

Source of Variations	df	Mean Square					
		Coefficient Velocity Germination	mean germination time	germination rate	final germination percent	germination rate index	mean daily germination
Condition	1	6.828 **	4450.291 **	1.059×10^{-3} **	6222.727 **	225.173 **	36.860 **
Fertilizer levels	2	0.354 *	70.154 ns	1.611×10^{-5} ns	192.424 *	5.993 *	1.137 *
Genotype	10	1.052 **	169.772 **	4.620×10^{-5} **	98.181 *	12.535 **	0.581 *
C×F	2	1.349 **	948.466 **	2.223×10^{-4} **	1246.969 **	47.462 **	7.385 **
C×G	10	0.123 ns	54.305 ns	1.984×10^{-5} ns	52.727 ns	2.743 ns	0.311 ns
G×F	20	0.077 ns	33.159 ns	1.019×10^{-5} ns	59.090 ns	1.735 ns	0.349 ns
C×F×G	20	0.139 ns	25.377 ns	6.99×10^{-6} ns	20.303 ns	2.003 ns	0.119 ns
Error	132	0.149	41.184	1.518×10^{-5}	51.010	2.281	0.301
CV (%)	-	3.68	13.12	18.28	7.76	19.28	7.76

* and ** Significantly at p < 0.05 and < 0.01, respectively

Table 4 - Comparison of studied traits for wheat

Genotypes	Characters					
	Coefficient Velocity Germination	mean germination time	germination rate	final germination percent	germination rate index	mean daily germination
Rasad	10.83 ab	52.45 abc	0.0195 bcd	95.55 abc	8.95 abc	7.34 abc
Kuhdasht	10.84 ab	57.58 a	0.173 d	100.00 a	9.79 a	7.69 a
Gascogne	10.36 cd	50.92 bcd	0.0200 abc	97.77 abc	7.90 cd	7.51 abc
Bezostaya	10.74 ab	53.81 abc	0.0186 bcd	97.77 abc	8.98 abc	7.51 abc
Cross Sabalan	10.51 bc	52.60 abc	0.0192 bcd	98.88 ab	8.38 abc	7.60 ab
MV 17	10.82 ab	55.79 ab	0.0182 cd	97.77 abc	9.49 ab	7.51 abc
Saisons	10.88 a	57.13 a	0.0175 d	98.88 ab	9.82 a	7.60 ab
Sardari	10.66 abc	50.14 cd	0.0205 ab	93.33 c	8.32 bc	7.17 c
Azar 2	10.91 a	56.64 a	0.0178 cd	98.88 ab	9.79 a	7.60 ab
Zagros	10.81 ab	56.50 a	0.0180 cd	100/00 a	9.58 ab	7.69 a
Chamran	10.17 d	46.39 d	0.0218 a	94.44 bc	6.85 d	7.26 bc

Differences between averages of each column which have common characters are not significant at probability level of 5%.

Table 5 - Comparison of traits for the different experimental conditions

Experimental conditions	Characters					
	Coefficient Velocity Germination	mean germination time	germination rate	final germination percent	germination rate index	mean daily germination
Water	10.50 b	49.65 c	0.020 a	94.54 b	7.90 c	7.27 b
Aminol Forte	10.66 b	53.73 b	0.018 b	98.78 a	8.84 b	7.59 a
Fosnutren	10.90 a	57.51 a	0.017 c	99.39 a	9.95 a	7.64 a

Differences between averages of each column which have common characters are not significant at probability level of 5%.

Conclusion

Results to this research indicated that Kuhdasht cultivar was the best in several traits and also, using fosnutren liquid fertilizer had the highest effect on wheat germination indices, comparing to the other amino acid fertilizer. Finally, it could be said that using biological

fertilizers, such as fosnutren which contains free amino acids and oligopeptide, along with other biological fertilizers and in various conditions and percentages, could have a great positive role on wheat germination indices.

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Rural women's Intellectual self-reliance

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Abstract: By the activities such as promotional services for increasing the rural women's skills in various fields and by increasing the rural women's knowledge in social, politic, cultural and economic fields and by using micro-credit plans for motivate and support women in economic development and their self-reliance, we can increase the rural women's empowerment. Rural women's financial self-reliance has many social & economic influence as it made them self-sufficiency, it changes economic behavior and it makes women independent, it will be effective in economic development in family & society , it also improve the women's roles in society and it causes self-confidence in women , it builds family strength and it causes to respect the women rights more than before and women will become equal with men in all their rights, of course we won't have patriarchy in the family . The women's empowerment in the rural society will increase because of all the aspects of rural women's self-reliance and their position will be confirmed.

Keywords: financial self-reliance, rural women

Introduction:

Rural women constitute about half of the world's population and in the world production supply they have energetic communion and constitute a great part of agriculture workforce. They constitute% 50 of the workforce and they participate in the production of half of the foods in the agriculture section. As an example the rural women constitute about 70 to% 80 of agriculture workforce in sub-Saharan Africa, %65 in Asia, %45 in Latin American & Caribbean, %80 in Nigeria & Tunisia and %80 in India, but their role in production system is the men's supplements roles and this causes a big responsibility inside their mother & wife duties and it takes a great time and energy of them. Studies in this field show that women spend about two thirds of their time for production, management & organize of their house as the men spend only one third of their time for such things. (Varzegar & Azizi 1367). Poverty spreading in village is a global issue. According to the Fao finding about % 75 of world's poor people that are more than 1 milliard people are living in rural zone and more than % 70 of this poverty people are women. As the most of the people who are poor are living in village and are women is the reason for insufficiency of rural development programs.

One of the other basic barriers in development of rural women is their independent inaccessibility to get credits for investment in their job. Although their illiteracy is the big barrier to use of bank credits, but this view that women are dependent people that their husband should decide about their financial decisions is the other reason that rural women couldn't access to official credits. Maybe these barriers are the reason why rural women are happy about applying micro-credit thought in village. (Najafi, 2007).

It seems that experiences which are obtained from performing financial programs in some villages in the developing countries could answer clearly to such questions.

A glimpse to previous planning about rural development in the world shows that from 1950 many developing countries understood that the main reason for making their economic growth (development) slowly in their countries is the weakness of investment in the agriculture part. Although many countries by patterning from developed societies have proceeded to improve & develop their industrial agriculture part and by this action not only had irreparable damages to many traditional farmers but also the main problem (the lack of capital sources) is also remained in the rural regions. (Rahimi, 2001).

Women's self-reliance and independency were the outcome of giving credits to women and in some cases were the obstacle of receiving credits by women which is necessary to explain about them shortly.

Cultural & social effects of rural women's financial self-reliance

As it mentioned before the traditional culture in villages was the reason for weakening women rights and made them oppressed, it is possible that women's self-reliance & financial independency in villages make some crudities (malformation) in the family and village for a short a short time, but we can't disregard it's positive outcome in the social & cultural occasions in the long time, here we will discuss about some of these outcomes (Goetz and Sengupta, 2003)

1- Preferment of women role and their social place:

Women's financial self-reliance can increase the women's social role & place in the villages. In the new condition some of their assignment roles could change to acquisitive roles. The women should use of all their power & energy for doing their acquisitive roles. Thus they can find active view to different functions. The people & groups could increase their social place in the village with improving their social role. If their role and social place preferment be accompanied with the increasing of social intelligence & knowledge, it can have more effect culturally. (Amiri, 2000)

2- Increasing self-confidence:

Self-reliance in different life aspects can increase people's self-confidence. Rural women who are financially independent can live peacefully. With decreasing their problems in life, their self-confidence will increase. And self-confidence is one of personality & mentally condition for being success in life.

3- Family consistency:

At the first, it seems that rural women's financial independency is not acceptable by their husband and this causes some gaps in their family's relations. But little by little these problems will be solved by increasing the rural people's knowledge. Usually poverty is one of the reasons which will destroy or decrease family's consistency. Women by working and having income can help their husband & family. (Fakhraee, 1381)

4- Change in family's relation:

The rural women with having a job and financial independency can change the viewpoint of people who live in villages and cities and they will not look at the rural women as a weak and dependent people. But also their title and place will increase among their families. So by changing people's view to the women, gently we can see some changes in their family's relation which will have respect to the women's right. By increasing women's knowledge and by introducing new rural institution which give financial & authority service to the women, their stimulus (motivation) for reaching their social rights will increase and they try more than before(Amiri, 2000).

5- Making patriarchy weak in the family:

Gently, with changing family's relation in the villages and by increasing rural people's knowledge, we can make the men and women's right equal and also we wont have patriarchy in the family, although patriarchy has historic and olden root in our villages but with improving women's position and increasing their cultural and social know ledge we can destroy patriarchy in the rural families. . (Chowdhury, 2005).

6- Population and family adjustment:

The practitioner women's view about the number of the children is different; studies show that practitioner women are interested to fewer children to the house keeper women.

By decreasing families in the village and women's financial independency we are more hopeful to adjust family's population in the future because villages have important role in the population increase in Iran. (Shaditalab 75).

Micro-loans as useful tool to fight against poverty and starvation, has proven its capabilities and values to develop these areas. These tools have ability to change and improve human's life, especially poor peoples. Micro loans , saving accounts , and giving various bank services , cause this belief in low income and poor family that , by accessing to these services , their income will increase ,so they can protect themselves against barriers of unexpected problems and their current level of life and also invest on nutrition , housing and their children's education.(Varzgar and azizi, 2001)

Accessing to these conditions is among main goals of third millennium program (i.e. eradicating absolute poverty of human societies).

Nowadays micro-credits and supplying micro financial resources, has changed human's life and cause to revive different societies at poorest and richest countries of world, so that we can see growth in human's power to access to common financial services. By accessing to wide range of financial tools, families according to their priorities, invest on cases such as costs of education, healthcare, healthy and good nutrition or housing.

Applicants for Microfinance resources mostly involved family supervisor women, pensioners, homeless people, frugal workers, small farmers and micro entrepreneurs. These people are divided into four groups: Poor, very poor, relatively poor and vulnerable poor.

Whenever repayment afford , bond terms and accessing to data , in this classification will change , in order to supply sustainable financial needs of various clients , procedures and operation structures will be develop .(Fami, 2001)

Generally, in most countries, micro finance sources are considered for poor women. By women's access possibility to finance services, they committed to loan and ensure its repayment and preserve their saving accounts and also enjoy insurance cover. Supplying programs for micro financial resources have strong message for families and societies. Most of qualitative and quantitative studies and researches have proven that accessing to financial services; will improve women's conditions in family and society. Women's confidence has increased and they are aware of their abilities. (Banihashem, 1999)

Thus, it has proven that supplying financial services for poor peoples is powerful tool to decrease poverty so that make them able to establish finance,

increase income and decrease vulnerability against economic pressures.

In micro-credits programs other than offering and distributing micro loans, there are also small savings and deposits so that they are designed as form of saving-credit programs. The existing term in phrase "micro-credits" points to two basic concepts that is due to dominant perspective on this approach. First term (i.e. credits) points to rural areas and lack of access for many villagers to formal resources that are one of their major problems. And at system of micro-credits, are tried to decrease poor families' access barriers to credit sources and also to increase effectiveness of these markets. Second term (i.e. micro) emphasize on deficiency of development, according to classic economist's method. Emphasizing on concept of "micro" means revising recommendations of market economy at rural society's development.

In all communities, rural women are considered as an important factor in achieving rural development goals and in fact are half of the manpower needed for rural development. However, in the rural community of Iran, there are gaps between the ruling class (capital owners) and villagers, between literate and illiterate, and between men and women. Especially in villages women have fewer possibilities in terms of investment and less power and credit. Role of rural women, over of men, is more influenced with different economic, social, cultural and ecologic factors. Rural women are considered as a noticeable potential in the community either directly (crops production, livestock, handicrafts, cottage industries) or indirectly by helping the agricultural sector (as labor). About 5.6 million women are involved in agricultural production, and activities related to planting... harvesting, preparation of animal food, and taking care of livestock and poultry and some certain activities related to trading and marketing are all different fields of rural women's role and participation. Based on current statistics, women in rural area participate about 50% in conversion industries, 22% in producing crops and livestock, 75% in handicrafts and in areas related to planting…harvesting , respectively, 25, 24 and 4.26. And also in activities related to livestock, they handle 23% of livestock grazing, 42% of animal care and 100 percent of total poultry in the village. Therefore their role in achieving food security is undeniable. But, like most developing countries, this crucial role in society and in process of rural

development, is not obvious. In Iranian rural community, about 80% of women work, but they are mostly considered as housewives, unpaid employment, domestic workers, family workers, or independent employers. The statistics often do not take into account seasonal, part-time, unpaid employment, and housekeeping activities. In economics and social sciences, those of women's activities that have emerged

out of house and affected national economy, are the ones to be noticed. In most research and statistics men are known as the heads of household and they are also the owners of lands and fields. That only 1% of the rural lands are belonging to women does confirm such matter (Samadi Afshar, 2004).

Development is a multidimensional process and has various economic, social, political and cultural dimensions. Rural women's participation has not been active and effective; because this participation's most important aspect, namely economics, is for rural women. However the value of their work in agricultural products is rarely considered as income and they are not independent either (Amiri, 2000).

For an active participation of women in development, first we need to give a definition for their role in development and then barriers related to their role will be discussed. Although apparently there is no difference of gender in development programs but reality is that women are less considered in participatory programs and most of these plans are planned for men. Finally, planner's optimistic look toward women's participation will be greatly helpful improve rural family budget and will increase the difference between urban and rural families. If, by credit, loans and other financial facilities, rural families are able to build up their own business and make a living through the income and become financially self-reliance or independent, no doubt we will witness some social, economic and cultural changes in villages (Varzgar and Azizi, 2001). Rural women constitute about half of the world's population and in the world production supply they have energetic communion and constitute a great part of agriculture workforce. They constitute% 50 of the workforce and they participate in the production of half of the foods in the agriculture section. As an example the rural women constitute about 70 to% 80 of agriculture workforce in sub-Saharan Africa, %65 in Asia, %45 in Latin American & Caribbean, %80 in Nigeria & Tunisia and %80 in India, but their role in production system is the men's supplements roles and this causes a big responsibility inside their mother & wife duties and it takes a great time and energy of them. Studies in this field show that women spend about two thirds of their time for production, management & organize of their house as the men spend only one third of their time for such things. (Varzegar & Azizi 1367).

In the development countries, rural societies which are poverty for geographic reasons such as being far from urban societies or because of mountainous of zone and also as the roads are impassable and some other reason, they became deprived of many human development programs. Unfortunately these societies are suffering of mortality because of poverty but what is clear here is that we can't attribute such privation to geography and nature of the zone. Every country is

tying to solve such critical conditions by applying depoverty policies. (Bakhshoodeh and Salami, 2005)

Poverty spreading in village is a global issue. According to the Fao finding about % 75 of world's poor people that are more than 1 milliard people are living in rural zone and more than % 70 of this poverty people are women. As the most of the people who are poor are living in village and are women is the reason for insufficiency of rural development programs.

One of the other basic barriers in development of rural women is their independent inaccessibility to get credits for investment in their job. Although their illiteracy is the big barrier to use of bank credits, but this view that women are dependent people that their husband should decide about their financial decisions is the other reason that rural women couldn't access to official credits. Maybe these barriers are the reason why rural women are happy about applying micro-credit thought in village. (Najafi, 2007).

Economic effects of rural women's financial self-reliance:
It is possible that rural women's financial self-reliance made some crudities (malformations) in the family for a short time, for example, rural women became proud after financial independency and find the independence & Excellency sense in themselves but such problems will be small and for a short time.

The rural women's self-reliance has positive effects which is useful for women and their family and also will help their economic improvement that we will mention some of them. (Chowdhury, 2005).

3-1- Self-reliance and financial independency:
The income of the rural women makes them financially independent. The financial independency will let them to spend their wage in the ways that they like. Of course their dependency to their family won't let them to spend their wage out of their family needs. Because of this, their financial independency will let them and their family to be self-reliance. (Ghaffari, 2000).

3-2- Change economic behavior:
Although we are familiar with the rural women's role in the village and family's economic, but they direct & indirectly start a new economic relation, with finding modern jobs & financial independency. Catching loan from financial organizations has forced them to have economic schematization for loan reimbursement and to have intellectual economic behaviors. So after that rural women become active in economic activities. In rural traditional economic, women only have productive role and they don't have any role in economic planning, providence and they don't pay any attention to profits and losses. But in this new condition, for managing affairs in best way, the women have to be active in all of the affairs from

production to dispense and also in others economic aspects. In other words, women will not be a productive only; they will contribute in managing of economic activities and will find various economic behaviors. . (Araghzadeh, 2002).

3-3- Independency:
The rural women will not dependent economically to their father or husband because of financial independency, this independency is very important to women who have children or they have lost their husband, because the financial problems have forced the rural women to have marriage which is not suitable for their children & themselves. Although the women can solve their financial problems with this kind of marriage but they will have many cultural, social & mental problems. If these women could manage their life with having a job, they can improve their family & kinship's relation.

The rural men & women should notice that their financial independency is not the meaning of an independency in their family, social & cultural affairs and making consensus between financial & economic affairs is necessary for family's consistency. (Fiona Steele et al, 2008).

3-4- Help to economic growth
The rural women's financial self-reliance will increase their motivation for finding a good job. As a result our rural & urban society will develop by working of women. And it will help direct & indirectly to our society's economic development. As the women constitute about half of the rural & urban's population, so by increasing their production, our society will develop economically. (Jameela, 2010).

Micro-credits:
One of the raised strategy , in order to accelerate investment process and reinforcing financial foundations , and saving , at deprived and rural areas , has been empowering and eradicating poverty of rural societies through efficiency with emphasize on applying micro-credits (Shahnaj and Sajedur, 2009).
Micro-loans as useful tool to fight against poverty and starvation, has proven its capabilities and values to develop these areas. These tools have ability to change and improve human's life, especially poor peoples. Micro loans , saving accounts , and giving various bank services , cause this belief in low income and poor family that , by accessing to these services , their income will increase ,so they can protect themselves against barriers of unexpected problems and their current level of life and also invest on nutrition , housing and their children's education.(Varzgar and azizi, 2001)
Accessing to these conditions is among main goals of third millennium program (i.e. eradicating absolute poverty of human societies).

Nowadays micro-credits and supplying micro financial resources, has changed human's life and cause to revive different societies at poorest and richest countries of world, so that we can see growth in human's power to access to common financial services. By accessing to wide range of financial tools, families according to their priorities, invest on cases such as costs of education, healthcare, healthy and good nutrition or housing.

Applicants for Microfinance resources mostly involved family supervisor women, pensioners, homeless people, frugal workers, small farmers and micro entrepreneurs. These people are divided into four groups: Poor, very poor, relatively poor and vulnerable poor.

Whenever repayment afford , bond terms and accessing to data , in this classification will change , in order to supply sustainable financial needs of various clients , procedures and operation structures will be develop .(Fami, 2001)

Generally, in most countries, micro finance sources are considered for poor women. By women's access possibility to finance services, they committed to loan and ensure its repayment and preserve their saving accounts and also enjoy insurance cover. Supplying programs for micro financial resources have strong message for families and societies. Most of qualitative and quantitative studies and researches have proven that accessing to financial services; will improve women's conditions in family and society. Women's confidence has increased and they are aware of their abilities. (Banihashem, 1999)

Thus, it has proven that supplying financial services for poor peoples is powerful tool to decrease poverty so that make them able to establish finance, increase income and decrease vulnerability against economic pressures.

In micro-credits programs other than offering and distributing micro loans, there are also small savings and deposits so that they are designed as form of saving-credit programs. The existing term in phrase "micro-credits" points to two basic concepts that is due to dominant perspective on this approach. First term (i.e. credits) points to rural areas and lack of access for many villagers to formal resources that are one of their major problems. And at system of micro-credits, are tried to decrease poor families' access barriers to credit sources and also to increase effectiveness of these markets. Second term (i.e. micro) emphasize on deficiency of development, according to classic economist's method. Emphasizing on concept of "micro" means revising recommendations of market economy at rural society's development.

Generally, goals of micro-credits programs are: (Moazami 2005)

- a- increasing access coefficient of low income rural women to credit facilities

- b- considering and focus on low income rural women groups
- c- empowering rural women to enjoy needed job skills
- d- empowering rural women to deal with group works and cooperative activity
- e- equipping non-productive villager's saving (women) to effective and productive investment
- f- planning in order to perform projects that are based on capacities and facilities of that area
- g- breaking poverty cycle and saving rural family
- h- Developing employment and stabilizing jobs which faced financial crisis

Empowering rural women:

Empowerment is capacity that woman can obtain in cultural and social environment, for economic independency and self reliance, by controlling over emotional decision making and far from violation. Empowering means, evolution and developing activities through non governmental organizations (NGOS) that lead empowerment to improve economic dimensions. (Amiri, 2000)

Enabling is process that, during it, people of society do activities to overcome barriers of advancement that finally cause their domination to determine their own density. The term "enabling" means overcoming fundamental inequalities. So it is different from self-reliance. (UNICEF, 1997)

Enabling, enables individual to overcome any problematic condition and consider barriers and problems as part of life and positive campaign. Finally, enabling provides energy to overcome most intellectual barriers and external problems at private life.

Thus, among all what have been said, it is possible to present suitable definition of enabling women, as follows:

"Process of explaining women about themselves (and also men about them) for instances that they must or want to do, and growth of their willingness and courage until they reach to needed competency "(management of rural and tribal women).

it should be noted here , that major factor which should be considered about women's ability , is eliminating individual and social barriers , and finally preparing field of economic and social participation for women at all fields . purpose of women's participation , is because of their dominance on all affairs of village including decision making process , organizations , forums , enterprising posts and … that involve , participation at all social and economic dimensions .

Criteria of empowering women:

Enabling as a theory of policy making for women, in it present five criteria:

Welfare, access, Concientisation, participation and control.

1- welfare criteria :

In this criteria, men and women as human resources of development should enjoy of desirable welfare conditions and equality (Paknazar, 2000).

Most of timing developmental programs, have worked on base of women's welfare. They have considered and provided some services for women who were passive recipient of these services. But these services were limited to physical needs and mostly were considered to revive their role of productivity, again. sometimes , it has been said that this approach has begun at colonial era and has considered women from poor country and intended services for them that dose not exceed from that poverty level . Agricultural and industrial projects were designed for men and social programs for women and children. Most of welfare programs were inadequate or its success was limited. Considerable point in this criteria is that men and women as human resources of development should enjoy equality and desirable welfare conditions. At this stage, women's material welfare and their enjoyment of welfare programs, compared to men (nutrition, death rate and …) were considered. And women's role as producer to supply their own needs isn't very important.

2- access criteria :

Lack of access or limited access for women to sources including (fields, job, capital and training) cause that their functions at production is less than men (Paknazar 2000). Access to facilities, sources, designed program and projects for women and access to schools and … are in this part. Just whenever most of other legal, cultural and social issues being solved, men and women would equally access to sources and facilities. Concept of enabling at this stage is that women have equal right to access to sources at family and greater society.

3- Concientisation criteria

Women should know that their problems aren't due to their individual inefficiency and shortage but it has emerged by social system in which discriminations has become formal and acceptable issue. (Araghzadeh, 2002). This stage is more critical and important than other stages. Because women can participate at development activities not just be passive users. Women have real equality at development, just when be aware. Concientisation will help to increase women's ability to equality at participation at society. At this stage, women face with critical analysis with society and will find that what has been considered natural and unchangeable reality, is changeable. (Bakhshoodeh, 2005).

4- Participation criteria

One the most important items that this criteria has considered , is men and women's equal participation at decision making process of affairs of family at society (Paknazar 2000) . Men and women both should participate at process of assessment needs, designing, performing and evaluation of projects and development programs (UNICEF, 1998). In summary, this criterion means women's participation at all stages of surveying needs, detecting problems, planning, management, performing and valuation.

5- Control criteria

This criterion emphasize on this point that in addition to equal access of men and women to development sources , they must have adequate control on these sources that this issue is balance criterion , between men and women so that no one exceed other one (Paknazar 2000) . Women should have opportunities for decision making at workplace and home. If woman is producer, should be shared with part of her interest and wage. Women like men, should be able to choose her individual and social field and able to make decision and also development activities should be facilitator of these processes.

FAO (food and agricultural organization) addresses these three purposes as strategic goals while enabling women:

1- equality between men and women to access production sources
2- women's participation at policy and decision making
3- decreasing rural women's workload and increasing job opportunity and income for them (Paknazar 2000)

within theoretical framework of enabling women , having control on sources is presented as highest stage at women's participation process on development , but existing data at most developing countries , indicates that not only rural women haven't any control on financial resources of family but even they were deprived to access to sources and credits , specially through formal credits system (Shaditalab, 2002) .

The question that arises here is that what relation is there between enabling women and micro-credits programs? Nowadays, micro-credits are considered as effective mechanism to eradicate poverty for women. Interests of micro-credits further increasing women's income, include:

- improving women's role in family
- Increasing women's confidence, not only through obtain financial success through business activity, but through increasing women's access to social services and communication with other women.
- Changing at social level (social class) at perspective of women's role.

Conclusion & discussion:

If rural women could provide a job for them by getting credits, loan and other financial convenience, through their income they can get self-reliance or financial independency and we will see social, cultural & economic change in village. The question here is that if these changes have positive or negative aspects in the village? It's natural that every change in social phenomenon has both positive and negative aspect, but which is Important here is that which aspect is more than the other and it depends to different condition in various societies. In our rural society there is an especial social & cultural kind that it's outcome maybe different and in some case inconsistent. With these actions rural women could be in idealistic economic condition and they could live without dependency to their husband's income. In most of the villages in Iran there is patriarchy in the families which is not acceptable for the most of the rural people and groups. When rural women became financially independent, it's acceptable to see its cultural & social outcomes.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Shahnaj and chaudhury(2009) in research as "credits and its role on empowering women " concluded that there is meaningful relation between attending in credits programs and empowering women , at economical dimensions .Ruhal amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't. Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability. Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society. Maybe the main challenges that threaten credits associations , is lack of necessary emphasizes on social dimensions and on reinforcing their basics , that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution .

In order to overcoming dominant consideration, experts believe that we should consider following in protection process of these social institutions
-Relating public established institutions with each other and networking established institutions
-Emphasis on stability and self reliance of management system of credits institutions from financial and economic dimensions
-Efforts to gain local confidence and credibility among contacts
-Effectiveness of costs and economic and financial efficiency inside established institutions
Also following suggestions has been offered:

- providing extension educations for men in order to believe economic role of their women , and give them chance of corporation on all economic , credits fields
- Since that base of credit association, forms base on People Corporation, so it's good chance to use these communities to expand extension-education activities. so it is better to consider special programs on different extensional filed such as agriculture , ranching, family health, housekeeping economy and other fields accordance to condition of region and rural women's needs.

Giving the right that women make decision, independency to their family, increasing the cultural knowledge among them& making relation with new institutions, having independency in making decision about marriage, occupation, migration & something like this are the right that women have got it.

Women by getting these rights can make change in the rural cultural & social issues which make disfunction & crudity in their family's relation. However, rural women's self-reliance has caused improvement in the economic, social & cultural issues. For solving women's self-reliance problems we can do these activities:

- Giving promotional services for increasing rural women's skills in various fields.
- Giving promotional instructions to men for believing their women's economic role & their women opportunity to participate in all economic, authority & … aspects.
- Increasing rural women's knowledge in all social, political, cultural & economic fields.
- Making use of micro-credits programs to motivate & support women for doing economic affairs better & finally to make women self-reliance.

Its result is that, exploiter can't access to desirable condition of production efficiency at first. Secondly, he would incapable for loan repayment. Third, his activity doesn't contain consistency. Fourth, remarkable part of provided credits would exit from

production cycle due to exploiter's incapability and lack of skill in exploiter. His technical and occupation skill would improve, if credit is being provided for exploiter as a credit program. and he knows and can applies loan properly and well timed for production and activity, so condition of production and level of income , level of life and … would improve .

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- Making use of micro-credits programs to motivate & support women for doing economic affairs better & finally to make women self-reliance.
- In the new system of advanced agricultural economy, the value of women's work that previously was unpaid labor now must be paid in cash. Expect for agriculture which is rural women's main work field they have rarely participated in tow other fields of economy. The most important issue of women's social and political participation is to take part in planning, decision making, implementation of decisions, and evaluation of results. Generally they have had a little share in such processes. Although in recent years rural women have participated more in villages' management, social and cultural organizations, and cooperative institutions' management; but having a lower level of literacy, education, income and social status than urban women they still have the smaller share of administrative and official jobs. Some barriers to women's participation which can be categorized in 3 groups of personal, familial, and social include: law literacy level, large volume of work both inside and outside of home for many reasons including seasonal migration of men and the great diversity of rural women's activities(nursing, housekeeping, agriculture, handicrafts, livestock,…), malnutrition, law health indicator, Patriarchal structure of society,

father or husbands disagreement with a woman's participation in social and economic activities for various reasons like cultural reasons or unwilling to lose the labor force at home, negative attitudes towards women's abilities, gender discrimination, family's poverty, superstitious beliefs, misleading customs like fatalism, law access of women to credit and facilities, inaccessibility of extension services, men-orientated social activities and participation plans, deficiency of professionals needed to educate rural women, problems of access to health services and social facilities, low income of rural women compared with men, lack of non-governmental organizations dealing with rural women's problems, few women managers in rural area. (Rahimi, 2001)
- Nowadays, micro-credit and micro-financing have changed people's lives; it has brought back life to poorest and richest communities of the world. So we can easily observe a great increase in people's access to general financial services. Facilitating the access of families to financial services, they begin to invest on educational expenses, healthcare, healthy nourishment, trading, and housing based on their priorities. Overall in many countries financial plans mostly focus on women. Women, provided with financial facilities, will receive a loan, guarantee to pay it back, keep their saving account and also they'll have insurance coverage. Micro-financial plans have an important message for families and communities. Many studies have proven that women's access to mentioned facilities may improve their conditions in family and society; it also helps them feel more self-confident and makes them aware of their own abilities. Thus providing micro-credit services for the poor in society is a powerful tool to reduce poverty and so that they are able to create assets, earn more money and become less vulnerable against the economic pressure. Of about 1.3 billion poor in the world there are 900 million poor women, this obviously shows that poverty has a feminine face. According to UN's development fund, 10% of world's income and less than 10% of world's assets belongs to women. While a majority of them never posses the capital needed for their activities, women still play an important role in the economic development of country. Therefore women draw the micro-credit policy maker's attention more than others. Choosing women

as the main target of micro-credit plans is an effective strategy to eradicate poverty; because their income will upgrade the family welfare; furthermore earning money improves their social status. In some countries this choice is influenced by society's attitude and culture (Araghzadeh, 2002).

- For instance founder of Grumman Bank of Bangladesh, Mohammad Yunes, has stated that: "women have plans for themselves, their children, and their family life; they always have an overlook while men just look for fun" to explain why 94% of their clients are women.

- Women's access to micro-credits have shown that their income benefit to improve their family and provide livelihood. In addition to all these another reason of women being the target of micro-credit plans is that women have higher loan recovery rates. Totally, expanding women's access to micro-credits may lead to many useful results which in economy is mentioned as "virtuous spiral"; because their access to micro-credits results in family welfare and in a broader point it'll improve community's welfare and shall be increased welfare this process is repeated.

- Ellen and her Colleagues (2009) used approach called it "credits and education at Bolivia, Ghana, Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

- Ruhal Amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't.

- Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability.

- Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

- A study conducted by Chabokru et al (1384) shows the crucial importance of micro-credits for farmers who do not possess physical financial assets (land, building, livestock, well…) and work in agricultural sector

because of environmental conditions (such as living in a village) or because it's their ancestral occupation.

- So today, women's participation in sustainable economic, social, and cultural development in rural areas is not optional but an essential matter. Those communities that have not seriously considered the necessity of participation faced failures and delayed community's development, welfare and security process. In any community, village, or social group, broad participation of every women in decision-making and any other matter related to national or local development programs, is a key variable in social sciences and in the last few decades, it has interested many scholars of socio-economic and especially cultural issues, and is considered as one of the most fundamental democratic rights of women in a society. As we know in a popular participation, all people are given the opportunity to participate in planning and decision making for their society and for their own future. When in practice women feel that they can be involved in planning, policy making and deciding or solving problems in the society certainly they'll feel more solidarity and become more interested in social, economic, and cultural development programs.

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A Survey of the Life and Time of Aboulkhir Khan the Shaibani as Reflected in the Moghimkhani Biographies
and Sparsely in other Authentic Historical Documents

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Abstract: AboulKhir Khan was the founder of She banyan government in Qabchaq plain in Transoxiana. First he accession to the throne in Tourette, located in western Siberia, in support of most Uzbek tribes, and took the Sheibanyan families under his command by the year 834 A.D. (Hejira) and after a while he could dominate Qabchaq plain. He decided to leave his authority locality in the western Siberia to north lands of Oxus (Amu Darya). He was able to unite the tribes of Uzbek and establish a unified government from Qabchaq field to the borders of sea. What made him powerful was the support of Peter, the Great. Another factor to his authority and great power was the support of great Uzbek tribes. So he could capture major parts of Transoxiana by their help and protection and seized Khoazmia, the important city. He also decided to attack to Samarqand during Alagh-Beig Timurid and because of his authority in the area, Timurid rulers were always regarding him. Then they decided to ask him for help during their battles which is one of the most important and noticeable points in his system of government. He was a person who united vast area of Uzbek tribes during his rule of forty years .The researcher in this paper states that Aboulkhir khans rule in Qabchaq plain shows his forty years government, which has been written using historical authentic texts and the researcher attempted to survey both the sensitive history of Transoxiana and the brilliant history of Central Asia which are useful to scholars

Introduction:

Aboulkhir Khan is a great Uzbek ruler and the founder of Shaibani line in the Ghabchagh region in Mavaranahre. As historians have reported Aboulkhir Khan decided to subjugate his tribe to the government of Russia in the time of Peter the Great in 1726, and was welcomed by the Russians. In fact, doing so, he meant to take over all the related tribes of the region under his control with the support of Russia. He was only 17 years of age when he promulgated himself as the great Khan in Tora region of Siberia. He then managed to invade all the lands north of Sihoon River and also those of Khwarizm and Khireh and add them to his jurisdiction. He became the head of a government which was to be continued by the attempts of his descendents, especially his grandson Mohammad Shaibani. Through the unity that he wrought among the Uzbek tribes, he could establish a unified kingdom all through Siberia to Sear Sea. Important among the events of his time are his clashes with Nader the Afshar and the Timoorian, both Persian dynasties. His

government was stable only till 861(AH) when Ghalmon tribes in his region rose to stand against him causing his downfall. In fact, his constant clashes with the Timoorian and regional tribes finally brought about his demise. As Aboulkhir Khan had played an important role in shaping the history of Middle Asia, we have intended to briefly clarify his 40-yaer-long rule in the region of Ghabchagh as it is reflected in authentic historical documents.

Aboulkhir Khan, the son of Dolat Oghlan, the son of Ibrahim, the son of Polad, the son of Mango Tymmoor Khan, the son of Yadoa Ghol, the son of Jooji Bogha, the son of Bahadoor Sultan, the son of Shiaban Khan, the son of Jooji, the son of Changiz Khan the Mongol is a famous Uzbek ruler and the founder of Shaibani dynasty in the Ghabchagh region. When he was very young, Aboulkhir Khan served a great Shiabani Khan called Jamdagh Khan who was slain by some rebellious warriors of his own. As the commander in charge of his left army, Aboulkhir Khan was also captivated but was soon released in 830 (AH). In 831, with the

support of the heads of prominent Uzbek tribes and those of Vaghas ruled by a certain Monghit in the city of Tora in the west of Siberia, he rose to the throne and managed to take over almost all Shiabani tribes of the region under his rule in a few years. He, in fact, sat on the grand throne of Ghabchagh region (Anoosheh 2001 , 27).

As historians have recorded when 17 only, he was officially announced as the chieftain of all Shaibani tribes which then resided near the Tora River in Siberia. This region is now situated to the west of the present city of Tubolesk. After being established as a the chief of all tribes, Aboulkhir Khan then attacked and took over all the Jooji tribes in the east of Oral River and north of Jayhoon. He later could also invade and take charge of Khwarizm, Organj and all other important towns near the banks of Sayhoon, ranging all through Sanghagh and Uzgand (Reneh 1973, 774). Right at the same time, the weakness of Timoorian rulers in Mavarnahre made him to raid the region with the help of other Uzbeks, and as Timoorian could not stand against their surge soon the region became unsecure and tribal unions broke down, all providing for his full dominance over the whole region. From then on, Middle Asia witnessed the gradual rise of Uzbek rulers whose great leader and founder was doubtlessly Aboulkhir Khan. The dynasty that he founded continued to be through the attempts of his grandson, Mohammad Shaibani, and those of others. He well managed to establish a powerful central government by uniting all the regional tribes; a government which extended all over the Ghabchagh region from Siberia to Sear Sea (Kohestani 1994, 365).

During his reign in 839 (AH), Uzbeks once again attacked and invaded Khwarizm. Till 850, they also conquered such other cities as Saghnagh, Sazgh, Ozgand and Aghgharghan along the shores of Sear Sea, choosing Saghnagh as their capital city and the center of power. Following the death of Shahrookh Timoori (850 AH), his son Alagh Beik left Samarkand, the center of their government, meaning to seize up Herat. As he was away, Aboulkhir Khan set out in 852 to invade Samarkand but did not succeed and after raiding the suburbs returned to his country. In 855, however, being supported by Aboulkhir Khan,

Abu Said Timoori fought and defeated Abdullah, the son of Ibrahim Shahrookh, the other Timoori prince, and finally invaded Samarkand. Abu said sent many gifts to Aboulkhir Khan giving Rudabeh Sultan Bigoom, the daughter of Alagh Beik to his marriage, and finally upon such victory the Uzbeks returned to Ghabchagh Anoosheh 2001 , 28).

Aboulkhir Khan now was rising more and more in power, extending his territories from the present city of Tobolesk to Sayhoon when he was unexpectedly attacked by the great tribe of Iorat or Kalmook, that is, the east Mongols. There happened an titanic war between them in which he was defeated and helplessly returned to Saghnagh while the conquerors raided the northern banks of mid Sayhoon. This was a great destabilizing strike to Aboulkhir's power and authority (Reneh 1973, 786).Recovering from such failure, he, however, soon reconstructed and fortified his military forces and resumed his position of power and dominance in Ghabchagh so that Timoorian sought for his assistance against their rivals. When, for example, Abu Said came into clash with Abdullah Mirza, the son of Alagh Beik, he deceitfully claimed that the Uzbek troops were on their way to his help, and doing so he could release the city, Yesi, an important political center, out of the besiege of Abdullah. Then, upon consulting with his close retainers, he decided actually to ask for the help of Aboulkhir Khan to fight against Abdullah. And although he later on won over his long-hated enemy by the support he received from Aboulkhir, he thanklessly did not allow Aboulkhir khan to enter Samarkand, saying: "You had better reside no in this region as it is of no profit to you." Hearing this, Abulkhir got into rages but had no other way than returning to Ghabchagh. He was not, however, bereft of profits he desired because he achieved the Samin gem and Rudabeh, the daughter of Alagh Beik to his marriage, whom Abu Said gave to him with great honors deserving a great king of piety (Samarqandi 1987, 1016).

Also, as mentioned in historical documents, when fleeing from the swords of prince Alldullatif, the son of Alagh Beik, king Abu Said Mirza went to the court of Aboulkhir Khan

in supplication to serve his as his retainer and the Khan in return, military support. After he spent some time serving the Khan, Aboulkhir Khan also took his troops from Uzbek lands and went to Mavaranahre whose governor, Abdullah-ibne- Ibrahim, came out against him. The armies of Aboulkhir Khan, however, attacked and defeated them as he had sincerely promised to back up Abu Said with no expectation of gains (Sotodeh 1974, 145-6).

The authority and dominance of Aboulkhir Khan was greatly shaken and enfeebled when in 861 Kalmmook tribes managed to do him a decisive strike. Led by Timoor Tashi, they attacked him breaking through his fortifications in Kook Kashaneh zone, upon which Aboulkhir escaped to the Sigman fortress where he was finally forced into peace with the invaders. Before that, of course, Kalmook tribes had raided and destroyed Turkestan, Shahrokhi and suburbs of Tashkent and their related peasants. Despite all these, Aboulkhir khan remained an active agent in the military transactions of the regions. And the competitions among Timoori princes gave him a chance of asserting his power and influence. in 864, for instance, he again took part in such clashes when, supporting Abu Said Mirza who had come out against Mohammad Jooki, he sent a group of his warriors commanded by Bargh Sultan and Beishak Oghlan who raided Mavaranahre forcing Mohammad Jooki to surrender. Thus, the ever present clashes and rivalries among the Timoorian would not let them ignore Abuolkhir Khan. When going out to conquer Khurasan, Sultan Hossein Mirza also went to ask for his help against Abu Said, but was killed after one week and failed to receive the help of the Khan (Kohestani 1994, 350-1).

About the year 870 AH two lesser Khans, descendants of Aurde, the eldest son of Jooji, named Gharaie and Janibeik with a number of their related troops abandoned Aboulkhir and went to Mongolia. Later on also some more nomadic tribes all subordinated to him joined them. These nomads have become famous as adventurous Cossacks during the history. In 872 AH the Timoori Sultan, Hussein Baygheri, meaning to invade Khurasan, came to Aboulkhir to ask for his backup. Aboulkhir welcomed him

kindly and tried to prepare him a large military force but could not do that (Reneh 1973, 745).

Over his 40 years of reign over the vast region of Ghabchagh, Aboulkhir Khan played a decisive role in the history of Middle Asia. About his death historians have provided various accounts among which a more famous one is right before his death he went out leading a large army of forces to fight against Mongols and was finally deceased in a site called Agh Gheshlagh, somewhere near the present Almati (Mirkhond 1998, 131-3).

Another account tells of his being slain in a clash against rebellious Cossacks, and his being buried outside of the city of Saghnagh (Mirkhond 1998, 131). Also, the author of the Aboulkhir History has dated his death to have been at the age of 57 with no reference to the cause (Mirkhond 1998, 32).

In fine, he was a king of grand honor and piety who reigned over an area extending from Ghabchagh to Turkestan and Saghnagh. As a great king, he was widely famous to whom many came in supplication and need. Among them had been such great leaders as Amir Timoor Gorkani, Sultan Abu Said Mirza, his brother Manoochehr Mirza, Mohammad Jooki Mirza and Sultan Husein Mirza all have both served him and had their wishes granted by his generosity. He bore eleven pious sons as; Shah Bodagh, Khajeh Mohammad Sultan, Ahmad Sultan, Mohammad Sultan, Sheikh Hiedar Khan, Sanjar Khan, Ibrahim Sultan, Kochkonji Khan, Soinch Khan, Agbron Sultan, and Seid Baba Sultan (Islamic Encyclopedia 1991, 438-41). Shah Bodagh, his eldest son, died before his father and left two sons, Mohammad Khan Shaibani and Mahmud Sultan.

He reigned for about forty years over the Ghabchagh region, one of the best and richest of lands, and took charge of Turkestan lands with all their suburbs, inhabitants, lords and peasants treating them with justice and compassion. After his death, his fifth son, Sheikh Hiedar, accompanied by government heads, retainers and consultants, succeeded to the throne. And now all great leaders who had been at the service of Aboulkhir Khan became the retainers of Sheikh Hiedar. But as then administrative

policies and rules were not as what had been before, there soon appeared indifference and feelings of frustration among them whose foolish measures gradually brought corruption and defect to the nation. Therefore, they were gradually losing their faith and fidelity to Sheikh Heidar, many of the rulers of the tribes in the region saw the chance ripe for standing against him. Among such rebellious chieftains were Sidak Inagh Khan, the son of Haji Mohammad Khan; Janibeik Khan, the son of Bodagh Khan, and Noorikeh Sultan, the son of Gherai Arab who frequently sat out against Sheikh Heidar. Each time any of them ventured upon that, there happened a decisive clash between them with many killed from both parties. An each time there was such clash, Gharachin Bahador, one of the bravest and strongest of warriors, who was assigned to guard Mohammad Shiabani and his brother Mahmud Sultan, sent an army of his to help the Khan as he believed in his excelency. After some time, however, as Sheikh Heidar was ignorant, Ahmad Khan accompanied by Inagh Khan attacked him. As Sheikh Heidar and his troops were unaware of it, they could prepare only a small band of warriors to defend their rights and so soon lost the war, and Sheikh himself was killed with many a wound from swords leaving the throne to Mohammad Shaibani. He once again could take many of Uzbek tribes under his rule. He opened up Fararood region and sat up a powerful center of Shainbanis there. This also lasted for long time leaving great influences on the political history of Middle Asia and Khorasan for many years (Arab Teghan 2006, 9-16).

Conclusion

As an Uzbek ruler, Aboulkhir Khan was the founder of Shaibani dynasty in Ghabchagh plain. Obviously some major factors are responsible for the stability and strength of his rule. One was the support that he received from Russian court. He also enjoyed the great support of great Uzbek tribes with whose help he could establish a strong central government in Tora in western Siberia. During his reign, he paid special attaention to the Ghabchagh area and could take a large part of it under his rule. That was especially because of the weakness of the

Timoorian in Mavarnahre against the Uzbeks. He also could raid Khwarizm and its related regions adding parts of Sear Sea to his territories. He took the control of Samarkand when Alagh Beik was its governor. From then on the Timoorian always were after his supportive regards when faced with foreign challenges. His other important measure to note was his active participation in the clashes among the Timoorian, when, for example, he helped Mohammad Jooki against Abu Said Mirza. What we can finally conclude is that in his 40-year prosperous reign, Aboulkhir Khan provided for the unity of a large number of Uzbek tribes making a golden epoch in the history of Middle Asia. He finally died in a war against Mongols in a region called Agh Gheshlagh somewhere near present Albania.

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Serum ferritin and iron in diabetic and non-diabetic with acute myocardial infarction

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Abstract: An increased serum ferritin level is presented as a risk factor for coronary artery disease. The role of diabetes mellitus on serum ferritin levels in myocardial infarction has recently been investigated. the present study has been carried out to investigate Comparison of the level of ferritin and iron in type 2 diabetic and nondiabetic patients with acute myocardial infarction(AMI).This case-control study has been conducted on 200 type 2 diabetic and non-diabetic patients with AMI. Blood samples were prepared and analyzed for the comparison of serum ferritin and iron, TIBC, CBC and blood lipids between the two groups. Female gender (OR=6.68) and smoking (OR=4.03) has been found to be significantly related to diabetes (OR=4.03). The mean ferritin level was 171.20 (SD=114.35) ng/dl in the case and 168.80 (SD=124.36) ng/dl in the control group (p=0.8), and the mean iron level was 87.71 (SD=35.58) mg/dl in the case and 62.70 (SD=22.27) mg/dl in the control group (p<0.0001, OR=1.86). Blood iron and ferritin levels were lower than the standard levels in both genders of patients with myocardial infarction (p<0.0001). Regarding the results of the present study, high blood ferritin level does not bring about type 2 diabetes, and the hypothesis of ferritin level association with type 2 diabetes and its elevated level in patients with AMI has not been confirmed; high levels of iron, on the other hand, may underlie development of type 2 diabetes; therefore, further investigation seems to be necessary in this regard.

[Hamid Sharif Nia, Ali Akbar Haghdoost, Yiong Huak Chan, Mohammad Taghi Salehi Omran, Abolfazl Hashemi, Babak Alaei, Mohammad Ali Soleimani, Abolghasem Siyadat Panah and Fariba Tabari. **Serum ferritin in diabetic and non-diabetic with acute myocardial infarction.** *Life Sci J* 2012;9(4):2740-2745]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 403

Key words: Type 2 diabetes, Ferritin, Iron, Acute Myocardial Infarction

Introduction

Diabetes mellitus is a chronic disorder with high coronary artery disease morbidity and mortality.[1, 2] Approximately 150 million worldwide are suffering from this disorder and the number is expected to increase to 300 million by 2025.[3] Patients with both diabetes mellitus and cardiovascular disease have an especially poor prognosis.[4]

former assessments have uniformly pointed remark to the increased early and late mortality after acute myocardial infarction in type 2 diabetic patients.[5] In spite of the fact that type 2 diabetes is more common than type 1 diabetes, less is known about its pathogenesis.[6] Increasing of level of glucose is relative with insulin deficiency, associated with enhanced lipolysis and elevated circulating free fatty

acids, which may damage cardiac cells.[7] Some studies have revealed that increase in blood ferritin level, as an important and independent biofactor, may lead to increased prevalence of diabetes.[8, 9, 10] Moreover, other studies have shown significant relationship between elevated blood iron levels and the incidence of coronary artery disease and myocardial infarction.[11] Ferritin is a protein-iron-phosphorus compound which is considered as an indicator of body iron stores. Iron is responsible for oxygen delivery to tissues and plays a main role in cellular oxidation. High level of serum iron contributes to increase in blood ferritin levels.[12]

Ferritin is the major iron storage protein which exists in cells of the liver, spleen and bone marrow and, to lesser extent, in heart, pancreas and kidney.[13] Although iron is essential for metabolic processes, a hypothesis has been raised on the relation between blood iron level and vessel dysfunction in type 2 diabetes.[14] As a powerful peroxidant, iron can attack cell membrane lipids and proteins and nuclear nucleic acids. It is hypothesized that iron leads to insulin resistance and consequently development of type 2 diabetes through reducing the insulin secretion, [15] and may also eventuate in coronary artery disease (CAD) by enhancing the cholesterol levels.[16]

Positive correlation has been reported by many studies between plasma ferritin level and type 2 diabetes; yet, no serious research has approved the hypothesis on increased concentration of stored iron and development of type 2 diabetes.[17] Although higher plasma ferritin level in diabetic patients compared to non-diabetic subjects has been elucidated in a cohort study by Jehn et al. (2007), no significant relationship has been found between ferritin level and diabetes as a predictable factor in causing type 2 diabetes after adjusting variables such as age, ethnicity, gender, menopausal status, smoking and BMI.[18] Similarly, findings of a study by Sharifi et al. (2004), on 97 patients with type 2 diabetes, no significant correlation has been observed between the serum ferritin and glycosylated hemoglobin and fasting blood glucose among the study samples.[11]

Albeit various studies have confirmed the relationship between high serum ferritin level and AMI,[13, 19, 20] the correlation between serum ferritin levels and the extent of CAD is still not well understood as stated by Samimi et al. (2008).[21]

With increasing prevalence of type 2 diabetes and its impact on cardiovascular disease, the link between ferritin and diabetes may be different between patients with myocardial infarction and healthy subjects, and, in other words, an interaction may exist between MI and level of ferritin on development of diabetes. As a result, this study has been merely confined to patients with myocardial infarction since such a relationship has been more addressed in healthy individuals; in this line, the present study has been undertaken to Comparison of the level of ferritin in type 2 diabetic and nondiabetic patients with acute myocardial infarction

Material and Methods

This case-control study was conducted in the Amol, which is in the north of Iran has the population of one million, from February 2011 to November 2011. The study is powered at 80% with a 2-sided 5% to achieve a statistically significance on a moderate standardized effect size of 0.4 (mean difference/ sd difference) between the Diabetics & controls with acute myocardial infarction on relevant blood samples. 1oo subjects per group were required randomly.

The case group had a history of at least five years of type 2 diabetes and consumption of oral hypoglycemic agents. The control group had no history of diabetes, with fasting blood sugar less than 126 mg/dl.

The study samples were hospitalized in cardiac care unit (CCU) of Imam Reza hospital and received routine treatments on AMI; 12^{cc} of patients' blood sample (2^{cc} of citrated blood and 10^{cc} for plasma separation) were prepared at 8 a.m. after 14 hours of fasting, and blood-containing tubes were immediately placed in the ice container and transported to the laboratory with 10 minutes time interval; the serum was then centrifuged to measure the CBC[1], triglycerides, cholesterol, LDL[2], HDL[3], ferritin, iron and TIBC[4].

All samples were tested in one laboratory by the same person using one kit and a specific system from the beginning to the end of the study. ELISA kits from Pishtaz Teb Zaman Manufacturing Research Company, the Biochemistry kits, and Darman Kav standard kits were applied for the measurement of ferritin and iron level, as well as TIBC measurement using the manual method respectively.

Patients with cardiomyopathy, hemolytic and megaloblastic anemia, alcoholism along with hepatic impairment, diagnosed hemochromatosis, Hodgkin's lymphoma, long and severe gastrointestinal bleeding, premenopausal women, bleeding disorders, and those in use of oral iron tablets during hospitalization were excluded from the study. [12]

Data were analyzed by descriptive statistics, chi-square, one-sample t-test, independent t-test, MANOVA, and logistic regression. In the crude odds ratio, all the independent variables were entered into the logistic regression (enter) model one by one, and in the adjusted odds ratio, all variables were simultaneously entered the backward stepwise regression model.

1- Complete blood count
2- Low density lipoprotein
[3] - High density lipoprotein
[4] - Total iron-binding capacity

A one-way between-groups multivariate analysis of variance was performed to investigate sex differences in diabetes type 2. Three dependent variables were used: ferritin, iron, and LDL. The independent variables were sex and diabetes. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no serious violations noted. $P<0.05$ was considered as a statistically significant level.

For ethical considerations, subjects were given the written informed consent, and no specific therapeutic or diagnostic procedure or additional cost was imposed to them; all the information obtained was kept confidentially and was not provided to any factual or legal reference. The study was approved by the ethics committee of Babol University of Medical Science.

Results

Regarding the results of the present study, 51.5% (N= 103) of patients were male. The mean age of male and female participants was 62.34 (SD=10.93) and 59.17 (SD=11.45) years respectively (p=0.04). The mean age of the study samples was 60.28 (SD=11.21) years in the case and 61.34 (SD=11.36) years in the control group respectively (p= 0.5). The case group consisted of 41 male and 59 female and the control group, 58 male and 42 female. The mean iron and ferritin level was respectively 79.78 (SD=32.24) mg/dl and 167.11 (SD=114.16) ng/dl in patients with a history of smoking, and 72.45 (SD=31.91) mg/dl and 171.74 (SD=114.16) ng/dl in those with no history of smoking (p=NS).

As shown in Table 1, there was a significant difference between gender (p=0.002), history of smoking (p <0.001), LDL (p=0.004), triglycerides (p=0.04), HCT[5] (p=0.05), MCH[6] (p=0.02), MCHC[7] (p=0.01) and type 2 diabetes.

Although ferritin level was 171.20 (SD=114.35) ng/dl in the case and 168.80 (SD=124.46) ng/dl in the control group, the difference was not statistically significant (p=0.8).

According to Table 1, the mean serum iron level was 25 mg/dl higher in the case than the control group (p <0.001).

As presented in Table 2, iron and ferritin levels of patients with MI were lower than the standard level in both genders (p<0.001).

Table 3 exhibits the correlation between independent variables and development of diabetes in logistic regression model. As the multivariate-adjusted model shows, the risk of diabetes development is 2.80 times higher in women than men and 4.03 times more in

[5]- Haematocrit
[6] - Mean corpuscular haemoglobin
[7]- Mean corpuscular haemoglobin concentration

smokers than non-smokers. Based on percentile, the population was divided into four quarters, and regarding the results of adjusted logistic regression model, the risk of developing type 2 diabetes would be approximately 1.86 times higher per each quarter increase in the iron level (p<0.001).

According to MANOVA test results, There was a statistically significant difference between interaction effects of gender and diabetes on the combined dependent variables: $F (3, 194) =3.18$, p=.04; Wilks'Lambda=.95; partial eta squared=.04. When the results for the dependent variables were considered separately, the only difference to reach statistical significance using a Bonferroni adjusted alpha level of .037, was iron: $F(1, 6027)=7.16$, p=.008, partial eta squared=.03.

An inspection of the mean scores indicated that females with diabetes type 2 reported higher levels of iron (M=95.76, SD=39.34) than males (M=76.12, SD=25.61).

Discussion

Although the level of ferritin was not statistically different between the two groups, the serum iron level was higher in the case than the control, and the difference did not change even after exerting the effect of other variables.

Intracellular ferritin is made by smooth endoplasmic reticulum, while the rough endoplasmic reticulum plays the role in the production and secretion of plasma ferritin. Seventy percent of plasma ferritin produces binds to glycogen prior to secretion. Albeit the plasma ferritin has smaller amount of iron compared to intracellular ferritin, there is a correlation between intracellular iron storage and iron secretion.[21]

According to the present research, in spite of the fact that diabetic patients develop myocardial infarction at an earlier age, the difference was not statistically established, which is in accordance with Funk[22] and Devon studies.[23]

Regarding the results of multivariate logistic regression, female gender increases the risk of developing type 2 diabetes to approximately 5.5 times. Other risk factors except diabetes lead to remarkable increment in MI development in males. However, women are less sensitive to the mentioned risk factors, and only the diabetes makes them severely susceptible to myocardial infarction; as a result, the odds ratio has been considerably increased among this group.

Although the actual mechanism of the effect of female estrogen hormone on diabetes is not well known according to Zhang et al. (2002), the biological mechanisms of exogenous estrogen application have been discussed on the process of developing diabetes as antagonistic role of estrogen on insulin, elevated level of growth hormone and glucocorticoids, and changes in glucose absorption from the intestine.[24] Scholl (2005) indicates that high ferritin levels (170ng/ml) in women augment the risk of developing type 2diabetes to three

times within 10 years, without any relation to other risk factors such as BMI, age, and race.[25]

Despite higher ferritin levels in the case than the control group, the difference was not statistically significant, which is consistent with some investigations[6, 18] and inconsistent with others[12, 24]. In a study by School et al. on 1023 pregnant woman, it was found that the chance of developing gestational diabetes is two-fold higher in those with highest percentile of serum ferritin in the first trimester of pregnancy, and the rate will be almost three-fold in the third trimester.[25] Our research contradictory result may be due to ethnic differences, accuracy of ferritin measurement, and/or gender effect.

Findings of the present study suggest that per each quarter increase in serum iron, the risk of developing diabetes increases to more than 90%, which is in agreement with some researches.[12, 26] Diabetes along with high iron level might have made the person susceptible to myocardial infarction.

In a study by Mert et al. (2005) for the comparison of 130 non-diabetic and type 2 diabetic patients with acute myocardial infarction, it has been concluded that although the mean iron level was higher in non-diabetic than diabetic patients, the difference was not statistically significant.[26] Such a discrepancy seems to be owing to allocation of more than 40% of postmenopausal women to type 2 diabetic group, while, men comprised 70% of diabetic samples in Mert study. The mean difference of patients' blood iron levels in one hand, and the same mean age of males and females participated in the present study and Mert investigation on the other can be indicative for the involvement of other factors such as differences in the extent of necrosis in myocardial muscle.

The exact mechanism of the effect of increased blood iron level on diabetes development is still unknown; nonetheless, three key mechanisms are believed to be involved: 1. Insulin deficiency, 2. Insulin resistance, and 3. Hepatic dysfunction.[15]

Through formation of oxygen free radicals and lipid peroxidation, iron catalyzes the cellular reactions leading to coronary artery stenosis and myocardial susceptibility to ischemia and eventually AMI.[26]

The results of this research revealed enhanced possibility of diabetes development with increasing LDL level. Khososi et al. (2005) have regarded plasma oxidized LDL as one of the deleterious vascular complications which takes place even in the presence of small amounts of iron.[27]

Cross-sectional design was one of the main limitations of our research project which did not allow researchers to investigate type 2 diabetes-associated causes and risk factors among the study participants. Small sample size can be regarded as the other constraints of the study. Therefore, it is recommended that subsequent studies be conducted with larger sample size and evaluation of more biomarkers.

Conclusion
Although some studies have put forward the effect of high ferritin levels on the pathogenesis of type 2 diabetes and AMI, our findings have not supported the hypothesis of ferritin impact on type 2 diabetes development in patients with AMI, and only the role of iron, as a powerful antioxidant, underlies development of type 2 diabetes, on which further comprehensive studies seem to be needed.

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Table1. Comparison of the mean, standard deviation and proportion of demographic variables between participants with and without type 2 diabetes

Study variables		Case	Control	P value
Age		60.28 (SD=11.21)	61.34 (SD=11.36)	0.5
Gender	Male	41	58	
	Female	59	42	0.002
Smoking	Yes	51	24	
	No	49	76	<0.001
Cholesterol (mg/dl)		188.65 (SD=36.78)	196.87 (SD=49.25)	0.1
Triglyceride (mg/dl)		119.22 (SD=38.40)	163.64 (SD=38.40)	0.04
LDL (ng/dl)		133.44 (SD=36.58)	118.91(SD=33.84)	0.004
HDL (ng/dl)		43.44 (SD=7.83)	43.03 (SD=10.50)	0.7
Hb		13.76 (SD=1.78)	13.56 (SD=2.72)	0.5
HCT		41.70 (SD=4.67)	39.85 (SD=4.56)	0.005
MCV		89.26 (SD=6.37)	88.43 (SD=7.19)	0.3
MCH		29.90 (SD=2.82)	28.91 (SD=3.19)	0.02
MCHC		33.05 (SD=1.31)	32.37 (SD=2.32)	0.001
Ferritin (ng/dl)		171.20 (SD=114.35)	168.80 (SD=124.46)	0.8
Iron (mg/dl)		87.71 (SD=35.58)	62.70 (SD=22.27)	<0.001
TIBC		34.99 (SD=42.25)	352.38 (SD=56.57)	0.3

Table 2: Comparison of the mean and standard deviation of serum ferritin and iron levels with maximum standard level in 200 patients with AMI

	Results			
Variable		Mean (SD)	95% CI	P
Ferritin	Female [1]	169.33 (108.70)	71-115	<0.001
	Male [2]	170.63 (128.88)	127-177	<0.001
Iron	Female [3]	84.35 (36.09)	58-72	<0.001
	Male [4]	66.59 (25.23)	88-98	<0.001

Abnormal: 1. (>263ng/dl), 2. (>323ng/dl), 3. (>263ng/dl), 3. (>150mg/dl), 4. (>160mg/dl)

Table 3: Predictors diabetes in patients with AMI

Logistic Regression	unadjusted			adjusted		
Variable	OR	95%CI	P	OR	95%CI	P
Gender Male/Female[£]	2.67	1.39 - 5.13	0.003	2.80	1.35-5.28	0.006
History of smoking Yes[£]/No	3.29	1.80-6.02	<0.001	4.03	1.94-8.36	<0.001
HCT	1.09	1.02-1.16	0.006			
Serum iron[¥]	2.07	1.56-2.75	<0.001	1.86	1.35-2.56	<0.001
LDL	1.01	1.005-1.03	0.005			
MCH	1.12	1.01-1.23	0.02			
MCHC	1.23	1.03-1.46	0.01			

[£] Reference
[¥] Blood iron level was divided into four quarters based on percentile and odd ratio was calculated. All variables with p<0.1 in crude analysis were entered in the adjusted model in step 1; then using backward stepwise method, only significant variables were selected in the final adjusted model.

Comparison effect organic humic fertilizers the dry matter maize genotypes in Ardabil region

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Abstract: The use of biological products for feed grains is one of the solutions in achieving the goals of organic production is considered. In order to study the response of maize genotypes to use two types of liquid humic fertilizer based Peat and leonardite, were conducted a experiment split plot on the basis of completely randomized block design in three replicated in Agricultural Research Station of Islamic Azad University, Ardabil branch in 2010.In this experiment main-plots contain of three conditions (peat based humic fertilizer; leonardite based humic fertilizer; without the application of humic fertilizer) and the sub-plots were contain of six maize genotypes. Results showed that between experimental conditions view of percent dry matter of total plant and dry weight of grains per ear there are significant differences in 1 percent probability level. Results from mean comparison of data for experimental conditions (experimental solution) being studied application of application of leonardite based liquid humic fertilizer produced the dry weight of grains per ear (50.13 gr on average) among the conditions being studied, whereas under the condition of without humic fertilizer obtained the lowest value(28.59 gr).

Key word : Organic humic fertilizer, Maize, Dry matter

INTRODUCTION:

Maize (Zea mays L.) is among highly consumed grains and obtains after wheat and rice; it is the main nutritional source in the world. The plant is C4 plant in terms of photosynthesis and has a better growth in tropical and subtropical (Emam, 2008) and native regions of South and Central America. (Khodabandeh, 1998). Maize position in providing seeds, forage and livestock feed and industrial use has increased its importance in Iran. Developing planting maize in Iran in accordance to self-sufficiency program is of significance. Hence, by implementing programs to increase maize seed production during recent years, this crop has quickly grown in cultivation, production and performance (Cakir, 2004).

The use of biological products for feed grains is one of the solutions in achieving the goals of organic production is considered. Humic substances (HS) are the result of organic decomposition and they are the natural organic compounds which comprise 50 to 90 % of the organic matter of peat, lignites, sapropels, as well as of the non- living organic matter of soil and water ecosystems. These substances are the source of the humates used in agriculture. According to the classical definition, HS are "a general category of naturally occurring heterogeneous organic substances that can generally be characterized as being yellow to black color, of high molecular weight and are refractory" (Kulikova et al., 2005).

Gadimov et al (2009) claimed that humic substances are natural technological products with a miraculous biological effect on crops and concluded that a scientific and practical program is required to make use of this technology in the world, particularly in developing countries.

Materials and Method:

In order to study the response of maize genotypes against the application of peat and leonardite based liquid humic fertilizer an experiment was conducted at experimental field of Islamic Azad University, Ardabil Branch (5 km west of Ardabil City) in 2010. The Region has a semiarid and cold climate, where the temperature during winter season usually drops below zero. This region is located 1350m above the sea level with longitude and latitude

being 48.2˚ eastern and 38.15˚ northern, respectively. Average annual minimum and maximum temperatures are -1.98 and 15.18˚C respectively; whereas maximum absolute temperature is 21.8 ˚C; and mean annual precipitation has been reported to be 310.9 mm. The soil of the field was alluvial clay with a pH ranging from 7.8-8.2.

Vegetative material included 6 maize genotypes prepared from Agriculture and Natural Resources Research Center of Ardabil Province. The Experiment was conducted as Split Plot in the form of randomized complete block design with three replications. The main factor included three conditions (peat based humic fertilizer; leonardite based humic fertilizer; without the application of humic fertilizer) and the sub factor included 6 maize genotypes (ZP677, Golden west, OS499, ZP434, Ns540 and Single Cross 704). Each experimental plot included 3, 320cm long rows recurring 80cm from each other containing plants recurring at 20cm distance. Pretreatment of seeds were done on the basis of 220mL per 10 L of water to be applied for 1 ton of seeds.

Weed-fighting was done both mechanically and manually during all growth stages. Liquid humic fertilizer was prepared and applied based on 400mL per 50 L of water for 1 hectare of maize plantation. The prepared solution was sprayed upon the aerial part of the plants during 4-5th leaf stage, appearance of reproductive organs, flowering and grain filling stages. All the samples were taken randomly from competitive plants at middle rows. Studied traits included percent dry matter of total plant, dry weight of grains per ear, dry matter leaves and dry matter shoot.

Analysis of variance of data and mean comparison of them was done using SAS program. Mean comparison was done using Duncan's Multiple Range Test, at 5% probability level.

Results and Discussion

Considering the ANOVA results (Table 1) in studied traits, it was observed that there is a significant difference between percent dry matter of total plant and dry weight of grains per ear at probability level of 1% in experimental conditions. Also, there was a significant difference between studied genotypes based on dry matter leaves and dry matter shoot at probability level of 1% and between percent dry matter of total plant at probability level of 5%. This indicates the genetic diversity between genotypes to choose the desired traits. Furthermore, there was no difference observed between the

interaction of genotype and experimental conditions for any trait being studied.

Shahryari et al. (2011) studied the response of various maize genotypes against chlorophyll content of the leaves at the presence of the two types of humic fertilizers. In their experiment, solutions (two types of peat and leonardite based liquid humic fertilizers and control) and interaction of "genotypes × solutions" produced significant difference at 1% probability level in terms of chlorophyll content of the leaves.

Results to data mean comparison (Table 2) on studied genotypes indicated that ZP 677 genotype with a mean of 268.4gr had the highest dry matter shoot while ZP 434 genotype with a mean of 148.8gr had the lowest dry matter shoot. ZP 677 and Single Cross 704 genotypes formed one group and showed no differences in the studied traits. ZP 677 genotype with a mean of 43gr had the highest dry matter leaves and ZP 434 genotype with a mean of 33.06gr had the lowest dry matter leaves. ZP 677, Single Cross 704 and NS 540 genotypes formed a group and showed no differences in the studied traits. Based on percent dry matter of total plant among the studied genotypes, ZP 434 with a mean of 22.18 percent was the best genotype and ZP 677 genotype with a mean of 19.02 percent was the lowest studied genotype. OS 499 ad Single Cross 704 genotypes formed a groups and showed no differences in the studied traits.

Results to data mean comparison (Table 3) in experimental conditions suggested that applying humic fertilizer based on leonardite with a mean of 22.43 percent had the highest percent dry matter of total plant and with peat based humic fertilizer formed a group and showed no differences in the studied traits. While without the application of humic fertilizer with a mean of 18.35 percent had the lowest percent dry matter of total plant. Applying humic fertilizer based on leonardite with a mean of 37.73gr had the lowest dry matter leaves among the conditions being studied, whereas under the condition of without the application of humic fertilizer with a mean of 40.93gr highest value was obtained. Based dry weight of grains per ear among the studied conditions, applying humic fertilizer based on leonardite with a mean of 50.13gr was the best conditions and without the application of humic fertilizer with a mean of 28.59gr was the lowest studied conditions.

Shahryari et al (2009) found that Potassium Humate increased wheat yield from 2.49 to 3.61 ton/ha under normal irrigation condition. They concluded that Potassium Humate is a miraculous natural material for increasing both quantity and quality of wheat and can be used to produce organic

wheat. Thus, application of biological products such as humic fertilizers to provide nutrition for crops can be one of the useful methods to achieve some of the objects of organic crop production.

Mohammadpourkhaneghah et al(2012) reported that the application of leonardite based humic fertilizer increased biological yield by 46.89% compared to control, whereas peat based humic fertilizer increased biological yield by 34.47% compared to control.

Conclusion

The results showed that the use of liquid humic fertilizers as organic fertilizers, can have a positive impact on maize dry matter. Humic acid can reduce the use of chemical fertilizers has been reduced environmental pollution, and also due to lower consumption of these fertilizers has resulted in lower costs.

Table 1. Analysis of variance of evaluated traits under various experimental conditions for 3 maize genotypes

Source of Variations	df	Mean Square			
		Dry matter leaves	Percent dry matter of total plant	Dry matter shoot	Dry weight of grains per ear
Replication	2	111.02	3.51	6029.88	421.26
Experimental conditions (E.C.)	2	55.13 [ns]	75.45 [**]	1522.72 [ns]	2088.57 [**]
Error 1	4	10.59	3.89	773.97	25.79
Genotype (G)	5	147.76 [**]	15.31 [*]	17154.60 [**]	46.91 [ns]
G × E. C.	10	7.06 [ns]	5.12 [ns]	667.18 [ns]	33.02 [ns]
Error 2	30	21.46	5.59	2104.94	48.41
CV (%)		11.90	11.52	21.68	17.70

* and **: Significant at $p < 0.05$ and < 0.01, respectively

Table 2. Mean comparison of traits being studied for maize genotypes

Genotypes	Characters		
	Dry matter leaves (gr per plant)	Percent dry matter of total plant	Dry matter shoot (gr per plant)
OS 499	35.01 bc	19.82 abc	189.2 bc
ZP 677	43.00 a	19.02 c	268.4 a
Golden West	39.44 ab	21.99 ab	190.9 bc
ZP 434	33.06 c	22.18 a	148.8 c
Single Cross 704	40.44 a	20.56 abc	246.3 a
NS 540	42.55 a	19.60	226.1 ab

Differences between averages of each column which have common characters are not significant at probability level of 5%.

Table 3 – mean comparison of traits being studied for various experimental conditions

Experimental conditions	Characters		
	Dry matter leaves (gr per plant)	Percent dry matter of total plant	Dry weight of grains per ear (gr)
without the application of humic fertilizer	40.93 a	18.35 b	28.59 c
peat based humic fertilizer	38.10 ab	20.81 a	39.15 b
leonardite based humic fertilizer	37.73 b	22.43 a	50.13 a

Differences between averages of each column which have common characters are not significant at probability level of 5%.

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Globalisation and Labour Supply of Single Female Heads of Households in Malaysia

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Abstract: Globalisation is a process in which interlink between countries in the world has become more intense and the flow of inputs between one country to another is much easier. In the context of the labour market, the inflow of labor input from foreign countries is more relevant, because it has implications on the local labour, especially the females in terms of job opportunities. This paper attempts to investigate this issue using data from 261 single female headed households in Peninsular Malaysia. The household production model will be the basis for the analysis. In this model, the basic determinants for female labour supply are own wage and non-labour income. However, other variables like family size, children's age, household's characteristics and the globalisation indicators will also be incorporated as independent variables. The results show that monthly wage, non-labour income and number of children are significant and positively affect female labour supply, while foreign workers is significantly negative.
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Keywords: globalisation, female labour supply, heads of households, own wage, non-labour income, number of children

1. Introduction

Globalisation is a phenomenon that cannot be avoided. The world economy is moving towards global integration. The globalisation issue has already been long debated by researchers. Hoogvelt (1997) characterised globalisation as the increasing interdependency of world habitants in a system. This occurs through trade, ties and co-operation between countries, the existence of international organisations and the global awareness manifested through the exposure of the global community to unify communication through the compression of time and space. From the economic perspective, Globalisation can be viewed as the expansion of companies through national boundaries. Globalisation of trade linked with liberalisation in the trade policy has changed the way people work, think and consume, and reduces barriers to free trade. The negative impact of globalisation towards developing countries is the widespread effect of poverty, unemployment and the human resource development crisis.

A more comprehensive and detailed picture is given by Duncan (2000), who defined globalisation as the process of economic integration between countries, integration of traded goods and services and investment (both the fixed investment and investment portfolio). It can be summarised that globalisation is the distribution of global goods, services and capital including information and ideas. In this respect, globalisation opens the economy, and physically moves goods, services, capital, labour and technology. Economic globalisation is characterised by production, exchanges, distribution, and the consumption of goods and services. Through the globalisation process, the capital moves with ease between countries, as companies that manage production on a global scale can source for cheaper cost and higher profit margins across borders. This results in the expansion of global economic relations through international trade, investment, production, financial exchange, labour migration, organisational practices and international collaboration.

As globalisation allows the free flow of input, including labour, it may affect job opportunities for the locals, as they would face stiffer competition in securing jobs and may end up being unemployed, especially females who are less preferred by employers. This phenomenon may not be so critical for women if they have husbands to support their daily needs. However, for single females, being unemployed is a major problem, especially when they have children to support. In this respect, globalisation may become a threat to them in acquiring jobs or even obtaining good pay from the existing jobs. Therefore, examining the structure of single female labour supply is crucial in understanding household behaviour in the era of globalisation.

The objective of this article is to examine the labour supply of single female heads of households by taking into account the globalisation effect. The analysis will be based on the female headed households collected from the field survey in 2011. The study covers 3,885 households in Peninsular Malaysia, who were chosen using stratified random sampling. However, only 261 are single female headed households, which is the subject of analysis in this paper. The data include information on heads of household, their spouses, families, education

background and employment background. Since the main purpose of the study is to look at the impact of globalisation on the labour market structure, the data also cover questions on globalisation from the points of view of the respondents. This paper is organised into six sections. The preceding section contains the discussion on the trend of female labour supply in Malaysia, followed by the literature review. The next section discusses the theoretical framework and model specification, followed by the results and conclusion.

2. Trend of Female Labour Supply in Malaysia

Labour supply can be defined as the population aged between 15-64 years old working or seeking jobs in a particular period. There are various factors that determine the labour supply, such as birth rate, death rate, migration and labour force participation rate (LFPR). The most important determinant of labour supply is the LFPR, which is defined as the number of the labour force divided by the number of the population aged 15-64 years old.

Table 1 presents the LFPR for Malaysia for the period 1995-2010. It shows that the LFPR for the total economy declined from 64.8 per cent in 1995 to 62.7 per cent in 2010 and that the same pattern is shown for the male LFPR. The LFPR of the males is far higher than that of the females by almost double. The decline in the LFPR can be explained by the higher growth of the population within the working age compared with the number of the labour force, economic slowdown that affects job creation and high unemployment rate. The higher LFPR for males is expected since the dual role of the females could hinder them from being in the labour market even though they are educated or qualified. However, the female LFPR increased from 44.7 per cent in 1995 to 46.1 per cent in 2010. An increase in the female LFPR can be explained by the increase in the marrying age, a decline in the fertility rate, expansion in the economic development, improvement in the educational facilities and high cost of urban living. In addition, the positive attitude of parents and husbands towards women's

education also positively contributes to women's participation in the labour force.

Table 1: Labour Force Participation Rate by Sex, Malaysia 1995-2010

Year	Labour Force Participation Rate (LFRP)		
	Male	Female	Total
1995	84.3	44.7	64.8
2000	83.0	47.2	65.4
2005	80.0	45.9	63.3
2009	78.9	46.4	62.9
2010	78.7	46.1	62.7

Source: Department of Statistics Malaysia, The Labour Force Surveys various years.

Table 2 shows the percentage distribution of female labour force by sector. Three sectors that are dominated by the females in 2009 are the (i) manufacturing, (ii) wholesale and retail trade; repair of motor vehicle, motorcycles and personal and household goods, and (iii) education sector. The manufacturing sector plays an important role in contributing to female employment. The increase in job opportunities in the electrical and electronic industries, and other industries, such as garment, textiles and food processing, also labelled as industrial feminisation, have encouraged more women to work in the manufacturing sector. The participation of women in wholesale and retail trade; repair of motor vehicles and motorcycles, and personal and household goods sector is increasing over time, that is, from 14.6 per cent in 2002 to 16.6 per cent in 2010.

The education sector was the third highest contributor to female employment in 2010, where the participation of women increased from 9.1 per cent in 2002 to 12.1 per cent in 2009. It is often argued that the education sector is deemed suitable for women due to their domestic and so called feminine nature. However, the participation of women in the agricultural sector decreased from 11.5 per cent in 2002 to 8.9 per cent in 2009. The female LFPR in the agricultural sector has coincided with the amazing growth in the secondary and tertiary sector.

Table 2: Percentage Distribution of Female Labour Force by Sector, Malaysia2002- 2010

Sector	2002	2003	2004	2005	2006	2007	2008	2009
Agriculture, hunting and forestry	11.5	10.9	10.4	10.0	9.9	9.8	8.9	8.9
Fishing	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mining and quarrying	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2
Manufacturing	25.1	24.7	22.8	22.0	22.2	20.6	20.0	17.5
Electricity, gas and water supply	0.2	0.3	0.2	0.2	0.3	0.2	0.3	0.2
Construction	1.9	1.9	1.8	2.0	2.0	1.8	2.2	2.0
Wholesale and retail trade; repair of motor vehicle, motorcycles and personal and household goods	14.6	15.3	15.4	15.6	15.6	15.6	16.0	16.6
Hotels and restaurants	8.8	8.6	9.6	9.0	9.2	9.6	10.0	9.9
Transport, storage and communications	2.0	2.0	2.2	2.2	2.5	2.3	2.5	2.4
Financial intermediation	3.5	3.0	3.3	3.6	3.3	3.7	3.7	3.5
Real estate, renting and business activities	4.6	4.4	4.9	4.9	5.2	5.7	5.5	5.9
Public administration and defence; compulsory social	5.2	4.9	5.1	5.7	5.1	5.3	5.6	6.2

security								
Education	9.1	10.3	10.8	10.8	10.7	10.8	11.3	12.1
Health and social work	3.7	4.2	3.8	4.0	4.2	4.3	4.6	4.8
Other community, social and personal service activities	2.3	2.7	2.7	2.8	3.1	3.2	3.	3.5
Private households with employed person	7.2	6.8	6.9	6.8	6.4	6.7	5.9	6.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Statistics Malaysia, the Labour Force Surveys various years.

Table 3: Percentage Distribution of Female Labour Force by Occupation, Malaysia,2002-2010

Occupation	2002	2003	2004	2005	2006	2007	2008	2009	2010
Legislators, senior officials and managers	5.3	5.2	5.9	5.5	5.3	4.7	4.8	4.8	5.2
Professionals	6.1	6.4	6.7	6.7	6.9	7.1	7.3	8.3	8.4
Technicians and associate professionals	12.9	13.3	13.1	13.5	13.9	14.4	15.7	15.7	16.2
Clerical workers	17.3	17.7	17.5	19.0	18.6	18.7	19.3	19.3	19.7
Service workers and shop and market sales workers	17.1	17.4	18.4	18.2	19.4	19.9	20.1	21.0	20.1
Skilled agricultural and fishery workers	10.9	10.4	9.8	9.3	9.4	9.3	8.2	8.2	7.6
Craft and related trade workers	5.6	5.6	5.1	4.5	4.2	4.2	4.1	3.9	4.1
Plant and machine-operators and assemblers	12.5	12.1	11.4	11.3	11.0	10.1	9.4	7.7	8.3
Elementary occupations	12.4	11.9	12.0	12.0	11.4	11.6	11.1	11.2	10.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Statistics Malaysia, the Labour Force Surveys various years

Table 3 indicates that there is a spread of female workers in various occupations, especially in (i) clerical workers, (ii) service workers and shop and market sales workers and, (iii) technicians and associate professionals. More women were in low-status occupations and were highly concentrated in feminised positions, and only a minority of them appears in three high-status occupations, namely: (i) legislators, senior officials and managers and, (ii) professionals. However, female participation in the professional jobs increased from 6.1 per cent in 2002 to 8.4 per cent in 2009.

3. Literature Review

In general, studies on the determinants of labour supply are closely related to studies on wage determinants. Mincer (1974) argued that wage is mainly determined by the level of education and other characteristics of the individual like working experience, types of job, location and gender. The labour supply model, which is based on the Household Production Model (Becker 1977), and Fallon and Verry (1988), demonstrates that the factors that determine the labour supply are similar to the determinants of wages, except that there are more additional variables, such as family size, spouse characteristics and non-labour income. For women in particular, the number of children and children's age structure are more important in determining their labour supply as compared to men (Gangadharan & Rosenbloom, 1996).

The elasticity of the labour supply with respect to the wage rate plays a critical role in the analyses of many economic policies. Most of the empirical results for the elasticity of hours of work with respect to the wage rate significantly differ in sign

and range. It appears from the literature that the first estimation on the labour supply elasticity was made by Douglass (1934) in his 'Theory of Wage'. He collected and aggregated the data for 38 US cities from the census of manufacturers and examined both time series and cross-sectional data concerning the hours of work and hourly earnings. He concluded that labour supply elasticity was between negative 0.1 and 0.2 (citation in Evers et al., 2008). Evers et al. (2008) mentioned that the modern labour supply often separates the income effect and substitution effect and makes use of micro data instead of aggregated data. Using data from US coal mining in the first decades of the 20th century, Manning (2003) showed that the quantitative relationship between employment and wages depends on whether wages are regressed on employment or the other way around, and indicated that this is the reason for the measurement error. He that even though it is reasonable to interpret this relationship as evidence of upward sloping supply curves, such regressions 'are just not very informative' on the supply elasticity.

Blundell and MaCurdy (1999) reported that across 18-20 estimates of own wage labour supply elasticity in various studies, the median elasticity was 0.08 for men and 0.78 for married women. For cross wage elasticity, Killingsworth (1983) pointed out that a median spouse wage elasticity of labour supply was 0.13 for married men and -0.08 for married women. However, a study by Devereux (2003) reported a cross elasticity of roughly -0.4 to -0.5 for women and -0.001 to -0.06 for men. These findings indicate that the labour supply of women is considerably more sensitive to their own wages than that of the men. This difference is usually explained by the traditional division of labour in the family, in which women are seen as substituting among market work, home

production and leisure, while men are viewed as substituting only or primarily between market work and leisure (Mincer, 1962).

Most of the literature on labour supply gives special attention to females because of their different characteristics compared with males, especially when dealing with house chores. Most studies mentioned a strong relationship between female labour supply and family size including the age structure of the children. In addition, their husband's characteristics like level of education and income also affect the female labour supply. For unmarried females, their own characteristics, such as level of education and wage rate, are more important.

One of the studies that support the importance of family structure to female labour supply is by Newman and Gertler (1994). They found that family structure is positively related to household production and female labour supply in Peru. The relationship between children's age and female labour supply was the main focus of the studies by Gronau (1973, 1988); Rosenzweig and Wolpin (1980); and Schultz (1990). All of them demonstrated that children's age structure has a significant impact on female labour supply with a negative effect for younger aged children (<6 years old) and a positive effect for the older age (>12 years old). The study by Wong and Levine (1992) in Mexico, and Tienda and Glass (1985) in the United States supported that mother substitute raised female LFPR. In addition, an increase in female LFPR after the Second World War II was due to a decrease in number of children (Coleman and Pencavel, 1993).

In a more specific study, Schultz (1978) found that when there was a three-fold increase in the number of children, female LFPR would decrease by 8-10 percentage points. The first child is shown to have a greater impact on female labour supply due to the higher attention given to him/her by the parent. For example, Rosenzweig and Wolpin (1980) found that the twin first birth reduced the female labour supply by 37 percentage points for the 15-24 age group and 10 percentage points for the 25-34 age groups. Augrist and Evans (1996) showed that in the United States, between 1970 and 1990, the probability of getting two children for women aged 21-35 years decreased by 18 percentage points, which subsequently increased their LFPR by 21 percentage points. The presence of children aged less than 6 years old has a greater negative impact on the female labour supply (see for example, Euwals 1999; Lehrer 1992); Carlin and Flood (1997) compared estimates of the male labour supply from time-use data with those from conventional survey data using a so called double-hurdle model. Referring to previous studies they noted that the presence of young children normally decreases work hours for women while the effect for males has

typically become insignificant or weakly positive. In Malaysia, Rahmah and Fatimah (1999) found that the number of children aged below 6 years old and 7-19 years old has a negative impact on female hours of work in the handicraft industry (Rahmah and Fatimah 1999).

Most of the studies about the effect of spouse's wages to labour supply focus on the labour supply of wives in response to husbands' wages. Given the traditional gender roles, women are perceived as secondary earners within the family; hence, their labour supply is likely to be more negatively affected by their spouse's wages. Saget (1999) examined the effect on a married woman's labour supply decision of non-labour income and of her own wage rate in Hungary. The micro analysis showed that total monthly household non-labour income has been defined as the sum of two different income components, first, the sum of social transfers that are received by any member of the household, and, second, the monthly share of yearly profits. First, the empirical results indicated that wage elasticity for married woman is estimated to be significantly positive. Second, household earnings other than the wives' (alternatively, earnings of husband when he is head of the household) were estimated to have no significant negative effect on the probability of supplying labour. This implies that Hungarian women take their labour supply decisions independently of their husband's or other members of the household's earnings. Finally, the non-labour income effect is consistent with leisure being a normal good. However, Morissette and Hou (2008) demonstrated that the labour supply of Canadian wives responded strongly to changes in their husband's wages during the 1980s.

Generally, as workers age, they may prefer to decrease their number of working hours due to health constraints or care obligations. As a result, one may expect to observe a steady drop in working hours before full retirement. Penner et al. (2002) concluded that among older American workers, who left their job between 1992 and 2000, about 13 per cent would have stayed in their job if they could have reduced their number of working hours. In Sweden, about 7 per cent of the workers aged 50 years and above claim to have physical problems, which restrict them from continuing work in their present occupation until the official retirement age, but that shortening working hours would solve the problem (Wadensjo 2008).

Education is significantly correlated with economic growth, which, in turn, affects the labour supply pattern. Maglad (1998) found a significant positive effect of education on the female labour supply to the urban labour markets in Sudan. Conversely, Jolliffe (2004) showed that an increase in

the education level is associated with a decrease in the household labour supply and an increase in their off-farm labour supply in rural Ghana. Babikir and Babiker (2007) who studied the labour supply in Sudan, found a negative and significant relationship between education and the labour supply in the agriculture sector. Although the empirical findings are rather varied, a strong research tradition supports the human capital theory as a theoretical framework to clarify and predict the relationship between education and labour supply. Supposedly, labour with a higher educational level is more likely to be active in the labour force since education is an investment that is positively correlated to earnings' potential.

The effects of foreign workers are traditionally viewed in terms of complementarity or substitutability with natives in the production of household services. In the literature review, most of the simple theoretical models of labour supply suggest that an increase of foreign workers in the native labour market may result in lower wages and/or higher unemployment of natives if they are perfect substitutes to immigrants. In addition, empirical studies typically conclude that immigration is economically irrelevant or has no effect on the wages and employment of the native population; see Borjas (1994) for survey, in that foreign workers do not have a sizeable and significant effect on the employment and wages of the native population in the same segment of the labour market, even when the foreign workers supply stock is large. Card (2001) used the 1990 census data to study the effects of immigrant inflows on the United States labour market. He found that immigrant inflows over the 1980s reduced wages and employment rates of low-skilled natives in Miami and Los Angeles by 1-3 percentage points. These findings imply that massive expansion of immigrants may have significantly reduced the employment rates for the younger and less-educated natives in both cities.

The analysis of Borjas (2003) indicated that immigration lowers the wage of competing workers: a 10 per cent increase in supply reduces wages by 3 to 4 per cent. Using German data for the period 1975-1997, Bonin (2005) concluded that the direct impact of immigration on native wages is small, as a ten per cent increase in labour supply stemming from immigration is predicted to reduce wages by less than one per cent, with a stronger negative impact for low-skilled natives. In recent work based on US census data, Ottaviano and Peri (2006) extended the structural modeling approach of Borjas (2003) to assess the overall impact of immigration on wages while allowing for imperfect substitutability between native and immigrant workers. Their empirical estimates point to a negative, but small, direct partial effect: an immigration shock that increases the labour force in a particular skill cell by ten per cent reduces the wages of natives of the same group by approximately one per cent. However, Peri and Sparber (2009) argued that increased specialization might explain why many empirical analyses of the impact of foreign workers on wages and employment for less-educated native born find a small effect. They found that foreign workers specialized in occupations that require manual and physical labour skills while natives specialized in jobs that required more intensive communication and language tasks. Mocetti and Porello (2010) showed that immigration in Italy had a displacement effect on low educated natives (both for males and for females).

4. Theoretical Framework and Model Specification

The theoretical framework for the analysis, which focuses on single female heads of households' labour supply, is based on the household production model developed by Fallon and Verry (1988). In this model, it is assumed that household maximising utility is subject to 3 constraints, household production function, household income and time. The equations can be written as follows:

$$U = U(X_i, L_h, L_w) \qquad (1)$$
s.t.
$$X_{Di} = f_i(H_i) \qquad (2)$$
$$X_{mi} = W_h M_h + W_m M_w + Y_n \qquad (3)$$
$$T_i = L_i + H_i + M_i \qquad (4)$$

Where, X is household's consumption, L_h is husband's leisure time, L_w is wife's leisure time, X_D is goods and services produced at home, X_m is goods and services produced at the market, W_h is husband's wage/market income, W_w is wife's wage/market income, M_h is husband's hours of work, M_w is wife's hours of work, Y_n is non-labour income, T is total hours per day, H is total hours of household work per day, L is total hours of leisure per day, M is total hours of market work per day and i is household.

Using the Lagragian for equation (1) until equation (4), the family labour supply equations are obtained as below:

$$M_i \quad = \quad M_i (W_h, W_w, Y_n) \qquad (5)$$
$$H_i \quad = \quad H_i (W_h, W_w, Y_n) \qquad (6)$$
$$L_i \quad = \quad L_i (W_h, W_w, Y_n) \qquad (7)$$

Apart from these three basic variables, there are other factors that could determine labour supply, such as number of children and the individual's characteristics, education, age, experience, training and so forth, which can be summarized as Z_i. Therefore, equations (5), (6) and (7) can be written as,

$$M_i = M_i (W_h, W_w, Y_n, Z_1, Z_2 \ldots) \qquad (8)$$
$$H_i = H_i (W_h, W_w, Y_n, Z_1, Z_2 \ldots) \qquad (9)$$
$$L_i = L_i (W_h, W_w, Y_n, Z_1, Z_2 \ldots) \qquad (10)$$

Another important aspect is to look at the income effect and substitution affect of labour supply as a result of wage and income change. For example, from the female labour supply function of equation (M_w) below, the most important variable is family income, (Y_f), which comprises non labour income (Y_n), husband's income ($W_h M_h$) and female's income ($W_w M_w$) as well as wife's wage rate and husband's wage rate (Cain 1966). Equation (8) can be written as:

$$M_w = a_1 Y_f + a_2 W_w + a_3 W_h + \ldots \quad (11)$$

$$M_w = a_1 (Y_n + W_w M_w + W_h M_h) + a_2 W_w + a_3 W_h + \ldots \quad (12)$$

$$M_w = a_1 Y_n + a_1 W_w M_w + a_1 W_h M_h + a_2 W_w + a_3 W_h + \ldots \quad (13)$$

$$M_w = a_1 Y_n + (a_1 M_w + a_2) W_w + (a_1 M_h + a_3) W_h + \ldots \quad (14)$$

In equation (14) the coefficient from W_w consists of income effect ($a_1 M_w$), which is hypothesized to be negative and the substitution effect (a_2) is assumed to be positive. The coefficient of husband's wage rate (W_h) also comprises two components, i.e., income effect ($a_1 M_h$) and substitution effect (a_3). Both effects are hypothesized to be negative. From equation (17), we derive:

$$\frac{\partial M_w}{\partial W_w} = a_1 M_w + a_2$$

But $a_1 = \dfrac{\partial M_w}{\partial Y_n}$

$a_2 = \dfrac{\partial M_w^c}{\partial W_w} =$ substitution effect

Then $\dfrac{\partial M_w}{\partial W_w} = \dfrac{\partial M_w}{\partial Y_n} M_w + \dfrac{\partial M_w^C}{\partial W_w} \quad (15)$

Or in the elasticity form:

$$\frac{\partial M_w}{\partial W_w} \cdot \frac{W_w}{M_w} = \frac{\partial M_w^C}{\partial W_w} \cdot \frac{W_w}{M_w} + M_w \frac{\partial M_w}{\partial Y_n} \cdot \frac{W_w}{M_w} \cdot \frac{Y_n}{Y_n}$$

.

or $\eta = \eta^C + \eta_{yn} \left(\dfrac{W_w M_w}{Y_n} \right) \quad (16)$

Rearranging equation (16), we obtain:

$$\eta^c = \eta - \eta_{y_n} \left(\frac{W_w M_w}{Y_n} \right) \quad (17)$$

and $\eta_{y_n} = (\eta - \eta^C) \left(\dfrac{Y_n}{W_w M_w} \right) \quad (18)$

Equation (17) is the substitution effect and equation (18) is the income effect.

4.1 Model Specification

The estimation model is specified to achieve the objective of this paper. These models can be written as follows:

$$M_{Wi} = \alpha_0 + \alpha_1 AGEF_i + \alpha_2 EDF_i + \alpha_3 NUMC_i + \alpha_4 WF_i + \alpha_5 NLY_i + \alpha_6 GLOB_i + \alpha_7 FOR_i + \mu$$
$$(19)$$

Where, Mw is hours of female's market work, AGEF is female age, NUMC is number of children, EDF is female year of schooling, WF is female's wage, NLY is non-labour income, GLOB is female's perception on globalisation after 1995, FOR is foreign workers and i is individual.

4.2 Data

The analysis will be based on the data collected from the field survey in 2011. The study covers 261 single female heads of households in Peninsular Malaysia who were chosen using stratified random sampling. The data include information on families, education background and employment background. Since the main purpose of this study is to look at the impact of globalisation on the labour market structure, the data also covers questions on globalisation from the points of view of the respondents.

5. Results

5.1 Profile of Respondents

Table 4a and Table 4b present the profile of the respondents. The majority of the respondents are aged between 46-55 years old (38.3 per cent), only 1.5 per cent are aged less than 25 years old and 17.2 per cent are aged more than 56 years old. The majority of respondents have 3-5 children and very few have more than 5 children. About 47.1 per cent of the respondents have secondary education, 31.4 per cent have tertiary education and only 21.4 per cent have primary level or less. The majority (31.4 per cent) receive income between RM2, 501-5,000 per month and more than half of them are involved in the services sector (68.1 per cent).

Table 4a: Profile of Respondents

Variable	Frequency (N= 261)	Per cent (%)
Age (Year)		
<25	4	1.5
26-35	37	14.2
36-45	75	28.7
46-55	100	38.3
>56	45	17.2
Number of Children		
1-2	192	73.6
3-5	62	23.7
6-8	7	2.7
Level of Education		
Primary and less	56	21.4
Secondary	123	47.1
Tertiary	82	31.4
Years of Schooling		
0-5	6	2.3
6-10	50	19.2
11-15	172	65.9
16-20	33	12.6

Source: Field Survey 2010

Table 4b: Profile of Respondents

Variable	Frequency (N= 261)	Per cent (%)
Monthly Wage		
0-1500	113	43.3
1501-2500	49	18.8
2501-5000	82	31.4
5001	17	6.5
Job Sector		
Services	179	68.6
Manufacturing	28	10.7
Agriculture	42	16.1
Construction	12	4.6

Source: Field Survey 2010

5.2 Descriptive Statistics

Table 5 presents the descriptive statistics of the variables. The mean monthly wage is RM2, 465.89 and the monthly non-labour income is RM937.06. All females in the sample attended formal education with an average year of schooling of about 10 years, 47 per cent attained secondary education and 31 per cent attained tertiary education. The balance of 22 per cent attained primary level of education.

Table 5: descriptive Statistics of the Variables

Variable	Mean	Min	Max	Std. Deviation
Monthly wage	2465.89	300	15500	2283.620
Year of Schooling	10.9234	0.00	17.00	3.59405
Secondary Education	.47	0	1	.500
Tertiary Education	.31	0	1	.465
Age	46.12	22	73	9.446
Non-Labour Income	937.06	350	2000	432.735
Number of Children	1.62	0	8	1.645
Min score for (after 1995)	5.45	1	7	1.154
Foreign Workers	.38	0	1	.487
Daily Hour of Work	8.18	4	14	1.546

The average age of single female heads of households is 46 years. Not everybody in the sample has children with the minimum zero and maximum 8 and the average of 1.62. The mean score on whether globalisation after 1995 affected their working environment is quite high at 5.45 and 38 per cent of the respondents say there are foreign workers at their workplace.

5.3 Regression Results

The estimation process involved checking for multicollinearity and heteroscedasticity. The multicollinearity was checked using the VIF test. The results show that all variables have a VIF value of less than 10. The White test was performed to check for heteroscedasticity and the result shows that the estimation has this problem. To correct this problem, we estimated weighted least squares regression; the estimation results are shown in Table 6.

The results demonstrate the expected sign for the coefficient of own wage and number of children, which are positive and significant. However, an increase in female non-labour income will increase the hours of work, which is against the theory. This can be explained by the nature of single females who are the sole breadwinners in the family; therefore, even though the non-labour income increases their labour supply will also increase. The non-labour income may provide females with initial capital to do business in the case of those who are involved in the business sector. The presence of foreign workers has a negative effect on female labour

The human capital variables, which are assumed to be positively related to the female labour supply, are found to be insignificant in both measurements year of schooling and level of educational attainment. This may be due to the involvement in the informal sector that is less dependent on the education level but where opportunity plays a more important role. As shown by

the national figures, 60 per cent of female employment is in the informal sector.

5.4 Income Effect and Substitution Effect

Using equation (16) and equation (17), we compute the substitution effect and income effect. The value of substitution effect is 0.5498, which implies that a one unit increase in female wage holding income constant will increase female market work by 0.5498 units. The income effect is 0.1143, which implies that a one-unit increase in females' income will increase their market time by 0.11143 units. The total effect is 0.6641, which implies that the single female headed household supply curve is upward sloping, which is in accord with the theory of labour supply. The slope is very steep, which reflects the low elasticity of female labour supply in the sample. This means that female labour supply is less responsive to the wage change, which is reasonable for the single head of household. Any changes in the wage rate make cause change in the hours of work to support the family because she is the sole breadwinner. Using equation (16) and equation (17), we compute the substitution effect and income effect. The value of substitution effect is 0.5498, which implies that a one unit increase in female wage holding income constant will increase female market work by 0.5498 units. The income effect is 0.1143, which implies that a one-unit increase in females' income will increase their market time by 0.11143 units. The total effect is 0.6641, which implies that the single female headed household supply curve is upward sloping, which is in accord with the theory of labour supply. The slope is very steep, which reflects the low elasticity of female labour supply in the sample. This means that female labour supply is less responsive to the wage change, which is reasonable for the single head of household. Any changes in the wage rate make cause change in the hours of work to support the family because she is the sole breadwinner.

6. Conclusions

The estimated results from single female heads of households' labour supply equations support the theory of labour supply except for the non-labour income. It is shown that their own wage is positively related to their supply of labour and non-labour income is significantly positive as well. However, the schooling variable, which is assumed to positively influence labour supply, is not statistically significant. In addition, the coefficient of age variable is negative and does not significantly determine the female labour supply. Number of children has a significant effect on the single female heads of households labour supply, which means that the larger the number of children the more hours women devote to their work. Another interesting finding is that the presence of foreign workers will reduce the female labour hours of work, which may be due to substitutability between the females and the foreign workers in their respective workplace. The female single head of household labour supply is found to be less responsive to wage change, which implies that single women have to work to support the family even though the wage rate is low and vice versa.

The results have some implications for policy, especially on wages and foreign workers. In order to encourage the participation of females in the labour market, wages should increase and this must be in line with productivity enhancement. Even though the female labour supply in the sample is less responsive to wage change, a wage increase will definitely enhance the welfare of the women's family. The study finds that the presence of foreign workers has a negative impact on women's labour supply. As such, the country must control the inflow of foreign workers, especially in the sector where the locals are willing to be involved, such as the manufacturing and services sectors.

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Table 6: Estimation of Results from the Labour Supply Model

Variable	Year of Schooling		Level of Education	
	I	II	III	IV
Intercept	4.139 (18.815)***	4.355 (17.049)***	4.058 (22.696)***	4.276 (18.390)***
Monthly wage	0.01 (14.103)***	0.01 (14.184)***	0.01 (13.582)***	0.01 (13.757)***
Years of Schooling	-0.001 (-0.119)	-0.004 (-0.326)		
Secondary Education			0.042 (0.567)	0.021 (0.285)
Tertiary Education			-0.436 (-1.163)	-0.508 (-1.372)

Age	-0.033 (-0.852)	-0.023 (-0.600)	-0.023 (-0.606)	-0.013 (-0.341)
Non-Labour Income	0.001 (2.775)**	0.001 (2.908)**	0.001 (2.724)**	0.001 (2.817)**
Number of Children	0.146 (8.792)***	0.160 (9.415)***	0.144 (8.481)***	0.159 (9.149)***
Min Score for effect of Globalization (after 1995)		-0.032 (-1.100)		-0.035 (-1.227)
Foreign Workers		-0.210 (-3.021)**		-0.209 (-3.001)**
R^2	0.538	0.556	0.542	0.560
N	261	261	261	261

Note:**significant at 5% significance level
   *** significant at 1% significance level

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Heteroplasmy of Leber hereditary optic neuropathy and clinical expression in Chinese pedigrees with 11778A mutation

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Objectives To investigate the proportion of 11778A mutation in Chinese individuals with Leber hereditary optic neuropathy (LHON), analyze its relationship with **prevalence (penetrance)** and the severity of visual loss.**Methods** Seven Chinese pedigrees of LHON with 11778A mutation were investigated and clinically evaluated. Peripheral blood was drawn from 96 maternal relatives and the proportion of mutant 11778A was measured by fluorescence-based primer extension and restriction fragment length polymorphism analysis. The relationships between the proportion of mutant 11778A with prevalence and severity of visual acuity were compared. **Results** One hundred maternal relatives (46 male, 54 female) were contained in the 7 pedigrees and 22 male, 15 female were affected. The visual loss can be great difference for members from different pedigrees but may be similar in the same pedigree. In 4 pedigrees, the proportion of mutant 11778A was 100% (homoplasmy) in each of the 55 members. In other 3 pedigrees, which included 41 individuals and 16 of them had symptom and 25 without symptom, except one without symptom had normal genotype, the proportion of mutant 11778A was 27% to 92% (mean 75.1%) in symptomatic members and 12% to 96% (mean 69.1%) in asymptomatic individuals (heteroplasmy). There was no statistical difference between the proportion of mutant mtDNA in these two groups ($P = 0.31$, T test). And there was no relationship between the proportion of mutant mtDNA with the severity of visual loss.**Conclusions** Most individuals who possess similar proportion of 11778A mutation have different prevalence of LHON and severity of visual loss. The proportion of mutant 11778A itself cannot explain the variation in the clinical phenotype of LHON.
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Key Words Leber's hereditary optic neuropathy; 11778A mutation; heteroplasmy; mtDNA

Introduction

Leber hereditary optic neuropathy (LHON) is a maternally inherited blindness occurring predominantly in young adult males. Over 95% patients harbor one of the three point mitochondrial DNA (mtDNA) mutations: 11778A, 14484C, 3460A[1]. All of these mutations affect complex I of the respiratory chain leading to mitochondrial dysfunction and selective damage to the papillomacular bundle of the optic nerve[2]. The disease typically presents with acute or subacute visual loss but the severity of visual loss and the penetrance vary among different pedigrees and even members within the same family. Thus, the presence of one of the primary mutations is a necessary but not sufficient condition for disease development. Other factors such as secondary gene, level of mtDNA mutation and /or environment are thought to take part in the developing of the disease.

Disease causing mutations in mtDNA, unlike neutral polymorphic nucleotides (Lagerstr鳇-Fermér et al., 2001), are typically heteroplasmic with normal and mutant sequences coexisting in the same cell (Wallace, 1999). This is analogous to the heterozygous state in mendelian genetics but because each cell may contain thousands of copies of the mitochondrial genome the level of heteroplasmy can vary from 1% to 99%. Hence, a female harboring a mtDNA mutation may transmit a variable amount of mutated mtDNA to her offspring, which can potentially result in considerable clinical variability amongst siblings within the same family.

Initial reports from Wallace and Vilkki et al found that 11778A mutation was present in all mtDNA molecules of the individuals within the maternal lineage; that is, the individuals were homoplasmic for the 11778 mutation (Wallace et al. 1988; Singh et al. 1989; Vilkki et al. 1989). But subsequent studies recognized (Holt et al. 1989; Bolhuis et al. 1990; Lott et al. 1990; Vilkki et al. 1990; Newman et al. 1991) that, in some pedigrees, the mutant and wild-type mtDNAs coexisted as a heteroplasmic mixture within an individual. Furthermore studies from west countries shown that approximately 15% of LHON pedigrees include family members who are heteroplasmic for the primary LHON mutation [Newman et al., 1991; Smith et al., 1993; Howell et al., 1994]. In recent years, heteroplasmic individuals with the primary mutations of LHON were also found in Asian populations (Chuenkongkaewet al. 2001; Sudoyo et al. 1998, 2002). The aim of present study was to report 3 heteroplasmic

pedigrees of LHON with 11778A mutation in central China and study the correlation between the proportion of mutant mtDNA and its clinical expression.

Material and Methods
Pedigrees selection

During 2004 and 2005, 12 pedigrees of LHON that had the typical clinical neuro-ophthalmic features were examined in our hospital for the scanning of 3460A, 14484C, and 11778A mutations with polymerase chain reaction (PCR), single strand conformation polymorphism (SSCP) and DNA sequencing. All of the family members are Han Chinese of Henan Province (Central China). Results showed that 10 pedigrees had 11778A mutation, one 3460A mutation and no primary mutation in the other family. After discussion with them, the maternal relatives in 7 pedigrees (six 11778A and one 3460A) received further study for proportion of mutation. Heteroplasmy was found in 3 pedigrees of 11778A mutation.

All the study was approved by the Zhengzhou University Ethics Committee. Clinical ocular examination was performed by an ophthalmologist and data of age, gender, age at onset, maternal relation, and best corrected visual acuity (BCVA) were recorded. For statistical analysis, BCVA was converted to logMAR (logMAR = log 1/Snellen visual acuity). The unmeasured visual acuities were at the following logMAR values: counting fingers corresponding to Snellen visual acuity 6/600 (logMAR = 2.0) and hand motion corresponding to Snellen visual acuity 6/6000 (logMAR = 3.0).

Quantification of mutant mtDNA

Whole blood samples were obtained with informed consent. Total genomic mtDNA was extracted using standard techniques. The proportion of mutant mtDNA was quantified by fluorescence-based primer extension and restriction fragment length polymorphism analysis[9]. A polyactylamide gel-purified 5'-JOE-labeled nested primer with the sequence   5'–GCGAGGCTTGCTAGAAGT-3' (nucleotides 11836 -11853 of the H-strand) and Vent (exo-) DNA polymerase in the primer extension reaction was used. The primer extension products, a 214-bp fragment for the sample, are restricted with the endonuclease Tsp45 Ⅰ(New England Biolabs, Schwalbach, Germany), which cleaves the wild-type mtDNA into 138-bp and 76-bp fragments. The mutant mtDNA remains uncleaved. The level of mutation was measured in at least three independent reactions and averaged for each DNA sample using PCR-amplified DNA as a template.

Results

Pedigrees information

In the 3 heteroplasmic pedigrees, Pedigree A consisted of 32 maternal members, including 11 affected persons (6 males and 5 females) and 21 carriers (7 males and 14 females); Pedigree B consisted of 7 maternal members, including 4 affected persons (1 male and 3 females) and 3 carriers (0 male and 3 females); and Pedigree C also consisted of 7 maternal members, including 4 affected persons (2 males and 2 females) and 3 carriers (1 male and 2 females). Because the earliest age of onset of LHON was 5 years old, a girl in Pedigree A younger than that of age was excluded this study. Also in Pedigree A, three asymptomatic relatives (2 males and 1 female) older than 75 years refused to do examination and 1 symptomatic man has been died. Thus, 41 maternal members were studied here.

Of the 41 maternal members, 18 (43.9%) were symptomatic and 23(56.1%) were asymptomatic. The onset age of LHON was from 5 to 31 years old, but most between 13 to 21 years and the averaged age was 17.5 years. The age at onset of visual loss ranged from 5 to 30 years (mean = 15.9 years) in women and from 9 to 31 years (mean = 19.6 years) in men. Though the average onset age of LHON in male is higher than that of the female, there is no statistical difference between them ($P = 0.33$, T test). In the symptomatic individuals, there were 8 males and 10 females; in the asymptomatic ones, 6 males and 17 females. The corrected incidence ratio between male and female was 2.23:1.

The proportion of mutant mtDNA

In the 41 individuals, the proportion of the mutant mtDNA ranged from 0% to 100%, 46% to 87% and 27% to 92% in Pedigree A, B and C respectively. The proportion of the mutant mtDNA was 27% to 100%(mean = 71.11%) in the 18 symptomatic members, and 0% to 96%(mean= 65.48%) in the 23 asymptomatic individuals. There was no statistical difference between the proportion of mutant mtDNA between this two groups ($P = 0.408$, T test).
In the 14 male and 27 female individuals, the proportion of mutant mtDNA ranged from 27% to 82% (mean = 68.2%) and 0% to 96% (mean = 68.9%).

The proportion of mutant mtDNA was also no statistical difference between these two groups ($P = 0.79$, T test). In pedigree A, B and C, the proportion of mutant mtDNA in affected individuals ranged from 62% to 100% (mean = 76.5%), 59% to 68% (mean = 64%), and 27% to 92% (mean = 64.8%) respectively. There was no statistical difference for the proportion of mutant mtDNA among these 3 pedigrees (P=0.31, F Test). Furthermore, in 18 affected persons, the proportion of mtDNA was 62% to 92%(mean=75.1%) in females and 27% to 100% in males. The load levels between them also had no significant

diffenrence(*P*=0.188, T test). All of the above results showed that there was no significant correlation between the proportion of mutant mtDNA and the onset of disease.

Relationship between proportion of mutant mtDNA and severity of visual acuity loss

Although every affected people had 11778A mutation, their visual acuity loss varied widely, especially among individuals from different pedigrees.

But individuals from the same pedigree always had similar corrected vision (Table 1). In Pedigree A, the BCVA in symptomatic cases was from 0.70 to 3.0 logMAR(mean=1.39 logMAR), but in Pedigree B and C, they were 0 to 1.4 logMAR(mean=0.28 logMAR) and 0.04 to 0.70 logMAR(mean=0.46 logMAR) respectively. Correspondence analysis showed there was no correlation between the proportion of mtDNA with visual acuity (r=0.439, *P*=0.07).

Table 1. Proportion of mtDNA (%) and visual acuity

	Pedigree A											Pedigree B				Pedigree C		
Pro	62	76	67	74	84	74	77	89	100	62	59	64	65	68	57	92	27	83
BCVA	2	1	1.40	0.70	1.22	0.82	0.92	0.82	3	2	0	0.40	1.40	0.30	0.40	0.70	0.04	0.70

Pro: proportion; BCVA: logMAR = log 1/Snellen visual acuity

Discussion

The incomplete penetrance of LHON and its predilection for males to lose vision imply that additional genetic factors (such as nuclear genes and mtDNA background role) and environmental factors must modulate the clinical expression. Alternatively, the gender bias could also result from a combination of subtle anatomical, hormonal, and/or physiological variations between males and females.25 56 91. In these additional factors, heteroplasy has been extensive studied in east countries, especially in west Europe. Reports from Newman and Smith showed that the majority of LHON patients and family members carry homoplasmic mutant mtDNA, only approximately 14% of LHON patients harbor a mixture of mutant and wild-type mtDNA (Newman et al., 1991; Smith et al., 1993). Jacobi et al studied 167 families of LHON, the prevalence of heteroplasmy for the 11778A, 3460A and 14484C mutations was 5.6%, 40% and 36.4%, respectively (Jacobi et al., 2001). Furthermore, the relationship between mutation load, or threshold, in the blood cells and the risk of developing optic atrophy was studied. In the study of Smith, they estimated that the threshold is 75% to 80%, mutation load higher than this level has a higher risk of visual loss. (Smith et al., 1993). Chinnery et al. (2001b) analyzed 17 pedigrees of LHON with 11778A mutation, in addition to clinical expression, he also found that heteroplasmy influences the inheritance of the 11778 mtDNA mutation. The frequency of blindness in males was related to the mutation load that individual's blood. Mothers with 80% mutant mtDNA in blood were less likely to have clinically affected sons than mothers with 100% mutant mtDNA in their blood. However, in the family presented by **Huoponen,** the proband had only 50% of mutantion in his blood but had severe LHON. Jacobi et al also found an affected male patient with 3460C mutation only harbored 26% in his blood cells. In another study, Black et al. (1996) reported that the amount of mutated mtDNA was only 15% in white

blood cells of one affected patient with the 3460 mutation. Because all of the 3 primary mutations will affect the respiratory chain complex I, the level of mtDNA heteroplasmy was examined with respect to biochemical effect of the 3460 mutation by Kaplanova et al(Kaplanova et al., 2004). Results showed there was no direct correlation between the mutation load and the biochemical defect. Thus，so far, we cannot detect the persons with risk for optic atrophy by the proportion of mtDNA mutation .

In this study, heteroplasmy of mtDNA mutation was found in 3(42.9%) of the 7 pedigrees of LHON in peripheral blood leukocytes. The heteroplasmic level is nearly 3 times of that white individuals, but similar to the 37% reported in Thai populations. High prevalence of heteroplasmy was also reported in other studies and different mtDNA background was thought to be the causes (Mroczek-Toñska, 2002, Man, 2003, Phasukkijwatana, 2006). In the 41 analyzed heteroplasmic individuals, 18 individuals had symptom and 23 were carriers, the penetrance is 43.9%. It is difficult to compare this result with those reported previously because most of them included both homoplasmic and heteroplamic families. In the 18 symptomatic patients, the proportion of mutant mtDNA was 27% to 100% (mean =76.67%), and 0% to 96% (mean= 65.47%) in the 23 asymptomatic individuals. Although the mean proportion in symptomatic group is higher than that of asymptomatic one, the difference of mean levels between them is not significantly different. Persons could be affected with load of mutant mtDNA from as low as 27% to as high as 100%. Between the 8 symptomatic male and 10 female, the proportion of mutant mtDNA was 67.4% and 75.1% separately, and there was no singnificant difference between them. All of these results showed that there is no direct relation between proportion of mutant mtDNA and penetrance.

In most reports of LHON with 11778A mtDNA mutation, visual acuity loss is usually severe and

permanent, and the correlation between the proportion of mutant mtDNA and the likelihood of visual loss also existed in some studies. One study found that the median final acuity is $1/60^{13}$, and vision acuity recovery in 11778A LHON patients is rare. In our study, although all the affected patients had 11778A mutation, the severity of visual acuity varied considerably. This phenomenon was more obvious between pedigrees. In Pedigree A, visual acuity was lower than 6/60 in half of the 10 patients, and the best visual acuity was 12/60. But in pedigree B and pedigree C, 7 of 8 patients had visual acuity of equal or better than 12/60, and the best one was 60/60. However, the proportion of mutant mtDNA among them was similar. That is to say, there is no correlation between proportion of mutant mtDNA and the severity of visual acuity loss.

In summary, although the validity of this pilot is limited by its small size, all data suggest that heteroplasmy itself cannot be responsible for the differences in the expression of LHON. More studies with larger sample size are needed to understand the role of heteroplasmy in the clinical manifestation.

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Providing optimal model for water resources management based on trade approach in virtual water

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Abstract: This study explores the relationship that is between water resource management and virtual in terms of maximization to get the best desired results. Water resource management is defined as the process of ensuring that the water resources are not misused and depleted. On the other hand, virtual water is defined as the amount or volume of water that is required for the production of a given commodity or service, though it is widely employed in relation to water needed for the production of agricultural produces. The study aims at coming up with a model that can maximize water resource management in relation to virtual water. This will help in answering the research questions. The study will mainly employ the use of secondary data collection methods. The nature of the study required the application of the inductive approach to research, and come up with the accurate and relevant information. This will be the best method as the collection of primary data would be impractical because of visiting all the regions that are arid and semi-arid. The findings show that the adoption of virtual water concept is highly significant, regarding the conservation of water resources in the areas that are highly affected by water scarcity. It also promotes trade and the specialization in the production of products that are best suited for the conditions in a given country.

Keywords: Virtual water, Water resource, Water resource management

1. Introduction

The current water crisis is largely based on the exploitation of water resources without any consideration into the use of agriculture, domestic and industrial use. In many different areas, both the ground and surface water have disappeared thus; there is an impendent danger of global water crisis which will lead to undesired effects unless it is properly managed. This study is going to focus on how water and its resources, can be managed to use a conceptual model based on trade approach in virtual water. Water resources can be defined as sources of water that are considered to be potentially useful or non-useful. Therefore, water resource management can be defined as the process of ensuring that the water resources are not misused and depleted (Chapagain, 2006).

The virtual-water content of a given commodity is made of three components, these include; blue, green and grey components. The green component in relation to virtual water content of a given commodity is said to be the amount of rainwater, which may have evaporated during the process of production (Ramirez-Vallejo, 2004). This is primarily associated with agricultural products, and refers to the overall rainwater evaporation while the products

were still growing in the fields (Rijsberman, 2006). Moreover, it also includes transpiration and any other type of evaporation that is experienced by the plants.

The blue component in relation to virtual water content of a given commodity is said to be the amount of ground or surface water, which evaporated during the production process of the product. In relation to crop production, it can be said to be the overall evaporation of water used for irrigation in the fields, in the artificial storage reservoirs and the irrigation canals. On the other hand, in relation to domestic water supply and industrial production, the blue water content is considered to be equal to the water that was drawn from surface or ground water and evaporated (Wichelns, 2005).

The grey component in relation to virtual water content of a given commodity is said to be the amount of water that is polluted during the process of production. It is arrived at by calculating the amount of water that is needed to dilute the pollutants, which are emitted to the natural water system at the time of production to a given point where the quality of water remains at a state that is over the minimum standards of water quality (Lenzen, 2002).

This study seeks to determine an optimal model and its concept in relation to water resources

management based on trade approach, in virtual water mainly in the countries that have scarcity of water. According to the study it is evident that water crisis has been a paramount concern and this resulted in the establishment of virtual water. This was largely based on some of the countries that largely depend on the importation of food because there is no adequate water to provide for food production. Therefore, it is essential to come up with a model that can maximize the aspect of water resource management in relation to virtual water globally.

2. Research methodology

Saunders viewed research as a method of collecting information in a systematized manner with the objective of increasing knowledge. This definition emphasize on systematic manner of inquiry into the unknown. This is among the prime pillars of scientific research. To establish this systematic manner, there needs to be a methodology of carrying out a research project. Methodology is the theory of how research should be conducted. This explores the procedure of a research activity, the scientific principles that inform the research activity and strategies that are employed to objectively answer the research questions. The data involved in this research is of qualitative and qualitative nature.

There are various methods adopted for each type of data while in certain cases, a mixed approach has been adopted. The researcher noted that there was little practicality in collecting primary data this being in a sense that it would take an extremely long period of time and money. Also, it might end up leading to biased data or information since the work would be done in a hurry so as to save time. Therefore, researcher had to largely rely on secondary data.

2.1 Data collection

As earlier stated, this study will primarily rely on secondary data. The data was mainly used to evaluate how a conceptual model can enhance water resource management in relation to virtual water. Publication on the conceptual aspect of virtual water trade in relation to dealing with the challenge of water crisis will also be used to evaluate what possible solutions that can be adopted by countries which are facing water scarcity. This will also come up with ways of optimizing the given situation that they are in without overlooking any aspect.

This study in its effort to achieve its set objectives it had to apply the use of various data sources, which were available in relation to coming up with a conceptual model that would fully optimize the aspect of water resource management in relation to virtual water. The various sources came largely from secondary data so as to help in coming up with the necessary knowledge and information that is based

on the subject of the research. These sources included government and international organizations publications. The researcher analyzed different and numerous number of publications mainly by other scholars, world bank and the united nations in relation to water scarcity.

3. Research objectives and focus issues

1. To explain how an optimal model for water resource management and its application to the aspect of virtual water works
2. To explain how the importance of water resource management in relation to trade approach in virtual water trade affects countries
3. To explain how to come about with the best way to maximize virtual water in countries that are highly affected by water crisis
4. To explain why virtual water is significant

4. Research questions

1. How has the significance of virtual impacted the world in relation to water crisis?
2. Why is having a model that optimizes water resource management in relation to virtual water important?
3. How can virtual water be best put into use to help in dealing with water crisis?

5. Research hypothesis

The research hypothesis in this study is; how can the best conceptual model that can maximize the effect of water resource management in relation to virtual water trade be put into use?

Type of relationship / Variable	Negative relationship	Positive relationship	Lack of relationship
Virtual water trade and water resource management		Has a positive relationship that results in better use of water and taking care of the water sources.	
Virtual water and arid and semi arid regions	Are highly dependent on the virtual water trade	Results in the saving of water and the production of food that does not take up much water.	

6. Literature Review

Since the establishment of the concept of virtual water, there have been numerous studies, debates and research conducted on the subject. Virtual water is considered to be both politically silent and economically invisible (Neubert, 2008). Hence, this is believed to have made it possible in the past for countries which have water scarcity to be able to deal with water shortage by importing food from other countries with better water resources without the establishment or development of a policy discourse that is directly linked to national water scarcity (Bouwer, 2000).

The term virtual water is believed to have been developed in mid 1990s and has over the years received considerable attention among scientific communities, policy makers and the general public (Zimmer, 2003). The debates on virtual water are highly intense and largely focus on the importance of the concept of virtual water, and the feasibility of importing virtual water to deal with the issue of local water scarcity.

According to Yang (2002), the volumes of overall cereal import in countries which are in the southern Mediterranean were correlated inversely to the available water resources. For instance, in countries such as Libya and Israel where water resources is highly scarce, an estimate of over 90 percent of the domestic supply of cereals is largely based on importation (Craswell, 2007). According to Allan (2011), over the past few decades, there have been numerous challenges that come up in relation to management and allocation of water mainly in the semi-arid and arid regions, where the demand for water regarding social uses and economic uses has been on the rise.

A given nation can preserve its domestic or local water resources through the importation of product that are considered to be water intensive, rather than trying to produce them domestically (Gleick, 2002). These methods of water saving can be employed in the production of alternative, higher value agricultural products, to promote environmental services or to deal with some of the other growing domestic needs (Ioris, 2005). Over the recent years, the concept of virtual trade water to help deal with water scarcity in countries which are affected by this has gained recognition, both in the political aspects and in the scientific aspects (Hoekstra, 2005). However, there are some scholars who believe that the idea of the concept is highly ambiguous and thus; should be worked on more critically. This is in the sense that the concept varies between an analytical, descriptive concept and a political influenced strategy. In relation to being an analytical concept, virtual water trade refers to an instrument or tool that creates room for the assessment and identification of policy options that are not only based on the scientific aspects, but also in the political aspect (Fraiture, 2003). On the other hand, in relation to a political influenced strategy, it raises questions as to whether virtual water trade can be established in a manner that is considered to be sustainable, whether the establishment can be managed in an ecological, economical and social manner, and which are the countries that the concept of virtual water provides a meaningful option (Rockstro¨m, 2001).

The virtual water measures are believed to have some of the following demerits; it relies too much on the given assumption that all the water resources such as rainfall or irrigation system have the same value (Falkenmark, 2006). It does not act as an indicator of potential harm to the environment, or does not give any form of information of whether the water resources are being employed within sustainable limits of extraction (Rahman, 2008). Another limit is that it is based on the assumption that the volume of water that would be saved by reducing a high water use activity can be used in other activities that require less water (Merrett, 2003).
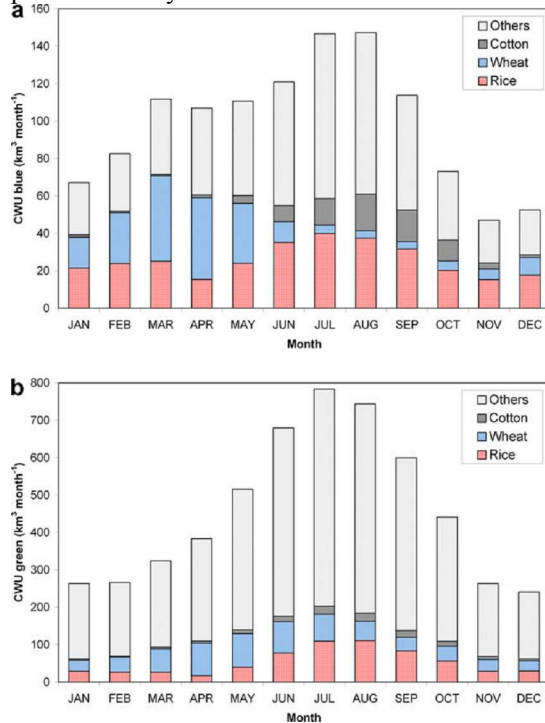
7. Findings

Virtual water volume and crop water productivity are both directly and indirectly linked to crop water usage in relation to crop production in different parts of the world. This has in turn resulted in dependence largely on the given fraction of crop biomass that can be produced or harvested and is usually termed as harvest fraction. Crops that are considered to have a huge harvest fraction such as fodder grasses, forage crops, sugar beets and sugar cane have low virtual volume and huge large crop water productivities. This shows that there is a direct relationship between the two concepts. On the other hand, crops that have low harvest fraction such as spices, coffee or cocoa have large virtual water volumes and low crop water productivities.

Countries that have challenges of water scarcity through the global crop water model have shown to rely largely on virtual water trade for food production. The significance of virtual water trade has helped in the coming up with crops that can be grown in areas that have water scarcity, and these has in turn ensured that water resource management is effective and efficient. Different crops have different water usage in relation to their production. The global crop water model has acted as a guiding tool in distinguishing these crops, and has proved to be the best in relation to water resource management. In addition to this it has helped in the great promotion of the concept of virtual water.

The graph below shows the global average monthly consumption of water use in relation to blue water and green water top and bottom respectively regarding crops such as cotton, wheat and rice in km2 in accordance to the global crop water model for a period of four years 2008-2011.

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8. Conclusion

The semi-arid and arid areas in relation to water scarcity have been a topic that has brought about numerous debates on how best to come up with a solution, which will ensure they get water and methods of how to manage their water resources. Having the knowledge and understanding of the concept of virtual water and its value is critical. Through the use of the global crop water model the concept of virtual water has greatly been improved, but there is still question of how best the model can be improved to more efficient and effective to both developed and developing countries.

Differentiating the water consumption and usage of crops has acted as the guiding principle in the effective application of virtual water trade. In addition to this, it has largely been based on different models that are applied in association with the concept of virtual water trade. Currently the model of global crop water is proving to be the most effective in terms of optimizing the aspect of water resource management, and is being adapted by many of the countries globally.

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