

Life Science Journal

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Life Science Journal 2012 Volume 9, Number 4, Part 33 ISSN:1097-8135



Volume 9, Number 4, Part 33 December 25, 2012 ISSN:1097-8135

Life Science Journal



 **MARSLAND PRESS**
Multidisciplinary Academic Journal Publisher

Websites:
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Life Science Journal

Acta Zhengzhou University Oversea Version
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Marsland Press / Zhengzhou University
PO Box 180432, Richmond Hill, New York 11418, USA
<http://www.lifesciencesite.com>; <http://www.sciencepub.net>
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The Relationship between Organizational Trust and Organizational Learning among Faculty Members

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Abstract: The present study was conducted to examine the relationship between the organizational trust and the organizational learning among faculty members at Azad University of Khorasgan (Esfahan) in 2011-2012 in a descriptive-correlational way. The statistical population of the current study was all 310 faculty members at Azad University of Khorasgan (Esfahan) from whom 172 were selected through Kokran (1994) sampling formula and clustered random sampling suitable for the sample size to take part in the study. The research instrument were Mayer and Davis (1999) and Macknight et.al (2002) standard questionnaire of organizational trust which was confirmed by Ellonen et.al (2008) as well as Gomez et.al (2005) standard questionnaire of organizational learning. The questionnaires' face validity and reliability was proved. Their reliability, too, was calculated 0.91 for organizational learning questionnaire and 0.98 for organizational trust through Cronbach alpha coefficient. In order to analyze the research data, the descriptive statistics including the average, percentage, standard deviation and frequency and also the inferential statistics involving correlation coefficient and step-by-step regression were applied. The results of analysis indicated that there is a significant relationship between all aspects of organizational trust including lateral trust, vertical trust, institutional trust, and organizational learning ($P < 0/05$). According to determination coefficient 47.7%, 63.2%, and 61.5 % of the variance has been common between lateral trust, vertical trust and institutional trust with organizational learning. Moreover, there has been a significant relationship among the aspects of organizational trust with the aspects of organizational learning; i.e. managerial commitment, systematic view, openness and experimentation, knowledge transfer and integration. The results of step-by-step regression showed that the best predictor of organizational learning at first step was vertical trust, at second step, lateral trust and at third step institutional trust.

[Maryam Rahmanimanesh, Badri Shahtalebi and Mohsen Zamani Cheryani. **The Relationship between Organizational Trust and Organizational Learning among Faculty Members.** *Life Sci J* 2012;9(4):4926-4935] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 739

Keywords: organizational trust, lateral trust, vertical trust, institutional trust, organizational learning, faculty members

Introduction

As new organizational behavior faces increasingly complexities; it is necessary for managers and staff of organizations to know these complexities and suitable strategies to deal with them. Trust-based management is a new expression of an old thought whose place in today relationships is well defined and utilizing its mechanisms can be effective in obtaining organizational and individual effectiveness. There is a fact in management world which is called "environmental selection". On this basis, environment usually and with absolute atrocity selects among existing competitors in a special working area, and the organizations which are able to respond better to environmental requests and attract their staff's trust and try to keep it, will emit their competitors from competition field (Zarei Matin & Hassanzadeh, 2004, p 80). Therefore, desired performance depends on various variables including trust and learning. Trust is undeniable as an important

factor in plating and making required atmosphere to rear and train human capital and more importantly to keep human legacy (Mohseni Tabrizi & Shirali, 2009). In addition, Driks & Ferrin's overview of the history of role of trust in organizational environments indicates that trust has direct or modulatory effects on desired performance and behavioral consequences variables. In their overview, trust facilitates other determinants on performance and behavioral consequences, as trust provide conditions in which certain consequences including organizational learning more possibly occur (Driks & Ferrin, 2001). In his research, Dodgson (1993) has stated three reasons for increasing organizations' interests in organizational learning issue; he believes learning of organization has found a great deal of popularity among organizations which look for adjustment and accountability to environmental changes. He also believes that technological changes and broad analytical value of organizational learning are reasons

of increasing organizations' interests in learning and desired performance (Templeton, Morris, Synder & Lewis, 2004). As pundits have emphasized, learning should be the focus of duties of university. In dimension of education, these institutes should provide possible learning opportunities on one hand, and help students, faculties and other staff to gain skills, attitudes and knowledge which increase the zeal to continue learning and the ability to do it, on the other hand. Achieving this goal seems to be possible in the light of organizational trust (Karimi, Nasr & Boghratian, 2009, p 164). Blomqvist & Sthale (2000) believe that trust has a significant role in increasing organizational partnership. Trust between individuals and organizations leads to form regular and logical relationships and interactions and be an opportunity to cooperate organizations, thereby increase organizational investments (Farhang, 2010). The level of trust on individuals relates to the level of their ability. Also, different duties can be given to staff according to the level of trust. The concept of trust in human relationships has attracted a lot of attention. Most of the literature about human relations has focused on defining to develop and maintain trust (Franklin, 2004). Organizational trust is considered as individuals' positive expectations. This kind of trust refers to individuals' expectations of qualification, reliability and benevolence of organizational member and also institutional trust between individual and organization (Mayer et al, 1995; Macknight et al, 1998). Organizational trust includes both impersonal and interpersonal trust. Interpersonal trust can be categorized into two dimensions:

- A) Horizontal trust which refers to trust among staff.
- B) Vertical trust which refers to trust between employees and employers (Costigan et al, 1998)

This trust might be on basis of qualification, reliability and benevolence (Mayer & Davis, 1999). Institutional trust is on basis of roles, systems and expressions which are perceived interpretations about a person's reliability. In most cases, institutional trust is determined by efficiency and adequacy of broad organizational systems such as human resources policy (Costigan et al, 1998).

Table 1: indicators of trust in other studies

Authors	Used indicators in other studies
Salmons (1960)	Benevolence
Jones, James & Brone (1975)	Ability, behaviors related to individual needs and desires
Gabaro (1978)	clearness, previous results and achievements
Larseler & Hoston (1980)	Benevolence, honesty
Liberman (1981)	Qualification, honesty
Batlor (1991)	Availability, qualification, compatibility, caution, justice, honesty, loyalty, clearness
Ring, Van di Van (1992)	Honesty, morality and goodwill

(Reference: Mohammad Javad Ghorbani, 2007, p 11)

Mayer et al (1995) consider ability, benevolence and honesty (reliability) as three elements of trust.

- 1) Ability has been defined as a set of skills, eligibility and characteristics of a department which can affect others. This is why trusted person may have high abilities in some skills which increase the possibility of being trust by others.
- 2) Benevolence is a range in which trusted person believes that he wants to do a good job for truster and there is no motivation of gaining benefit for trusted person within this range, benevolence represents that trusted person has certain achievements for truster. An example of these achievements is communicating between trusted person and truster. Trusted person wants to help truster, however he is not required to help and there is no external reward for him.
- 3) Honesty (reliability) includes perception of truster about this fact that trusted person is committed to a set of principles which is also acceptable for truster.

Each of above dimensions is important in trust process and yet is different from each other but it does not mean that they are independent from each other. They have an inextricable link (Mayer et al, 1995). Trust dimensions in Simons's studies (2002) are similar to those presented by Mayer et al which include ability-based trust, honesty-based trust and benevolence-based trust. Ability-based trust states that individual (member) believes that other members of the team have required knowledge, skill, experience and intelligence. Honesty-based trust is an extent in which a member believes that members of team are reliable and honest and benevolence-based trust refers to the extent in which individual believes other members of team act in the direction of his benefits and interest (Simons, 2002). So, according to previous reviewed studies and researches, it can be found that three factors, ability, benevolence, honesty, have been used as the main effective factors on trust, in most conducted researched on trust.

Dimensions which constitute organizational trust include two dimensions which the first one is interpersonal trust and many dimensions have been given and used to measure interpersonal trust in the literature by different researches and pundits. Ability, honesty, reliability, qualification, helpfulness, tendency, veracity, dependence and . . . are some constitutive dimensions of interpersonal trust (Chathote et al, 2011, 2007). The next dimension is impersonal trust which includes two dimensions: normative trust and structural trust.

Normative trust, in fact, is trust of situational norms which roots in appearance. This imagine that people and objects are ordinary and natural and everything is in its right place, comes from this approach. With respect to this definition, when an organization places in a normal situation, normative trust means that the possibility of organization is high. ellonen et al believe that normative trust includes three main indicators as below:

A) Benevolence and trust:

Include individual's belief on this issue that organization meets its commitments and there is coordination between organization's action and speech. On the other hand, individuals consider the organization as a benevolentone, as pays attentions to staff equally and pays a special attention to their well being and future and always considers benefits of all members.

B) Vision, Strategy and Communication:

Include individual's belief on this fact that organization director has a strong strategic vision to face to future challenges and can direct the organization well; this trust requires that individual be aware of how to do actions in the organization.

C) qualification:

Involves interpersonal technical skills and knowledge and refers to individual's trust about this fact that organization has update, advanced technologies, and high quality working processes are to ongoing improve. On the other hand, the individual believes that organization director has enough managerial skills and ability (ellonen et al, 2008).

The next dimension which constitutes impersonal trust is structural trust. Structural trust represents required underlying conditions such as information systems, human resource management approaches, and . . . to achieve organizational trust (ellonen et al, 2008).

On the other hand, huge organizations with traditional structures do not have the required ability and flexibility to be aligned with changes of environmental surrounded especially with respect to globalization issues, so they have to either change structurally or be equipped with such tools to gain the ability to deal with universal

changes, for their survival. One of the most important tools is creating a learner organization and internalizing organizational learning (Khalili Araghi, 2003). Gomez et al have also defined organizational learning as gaining or creating knowledge, transfer it and integrating it. On this basis, they have considered these three organizational processes as the ability of organization to process knowledge. On the other word, they have defined organizational learning as the ability to create, gain, transfer and integrate knowledge and modify organization's behavior to reflect the new situation with an attitude to improve organization's performance. Gomez et al have noted that four conditions are essential to develop organizational learning ability: first, organization director should provide a strong support for organizational learning and support programs on it. Second, presence of a collective intelligence to see the organization systematically and presence of a common perspective among staff are necessary in the organization. i.e. staff should be consciously be able to see the entire organization and its problems, comprehensively. Third, organization needs to develop organizational knowledge by transferring and integrating individual obtained knowledge. Fourth, only compatibility and adaptation to changes of environment is not enough to make learning as a source of creating competitive advantage, but the organization should move beyond adaptive learning which is only adapting to changes of environment and should reach to generative learning so that the organization can make a change with its values and in the environment and this kind of learning requires an open mind and experimental behavior (Gomez et al, 2005).

In Gomez's point of view, dimensions of organizational learning include:

1. **Manager's commitment to organizational learning:** manager should understand the importance of learning and create a culture in which achieving, creating and transferring knowledge are considered as a core value in the organization. Manager should state clearly that learning is strategic, as organizational learning is a valuable tool to gain long run results (Sinckula, 1994; Stata, 1989; Garcia et al, 2007). Manager should also make sure that staff understands the importance of learning, since it is a fundamental factor in organization's achievement.
2. **Systemic vision:** systemic approach requires gathering organization's member around a public entity. Different individuals, departments and organizational atmospheres should have a clear attitude of organization goals and know that how to contribute to development (Gomez et al, 2005, p 717). Organization should be considered as a

system that although it constitutes of different parts with special functions, it works coordinately with each other (Stata, 1989; Leonard Barton, 1992).

3. **Open atmosphere and experimentation:** generative learning or learning of second loop needs an open atmosphere in which new ideas and opinions are valued inside or outside of the organization. This kind of learning also causes to improve, renew and expand individual knowledge all the time (Leonard Barton, 1992; Slocum et al, 1994; Sinkula, 1994). Creating an open area requires manager's commitment to create a variety of duties and cultures in the organizations, so that there is a readiness to accept all kinds of opinions, experiences and also learning from them. Also, it should be avoided from egocentricity-based approaches which consider individual values, opinions and experiences better than others'. Experience needs a cultural atmosphere to be a suitable bed for creation, the ability to do important actions and readiness to do controlled risks to support this idea of one can learn from others' errors (Gomez et al, 2005, p 717).
4. **Transferring and integrating knowledge:** fourth capability returns to two completely related processes, that is, transferring and integrating inter knowledge. Instead of being sequent, these two processes occur simultaneously. Efficiency of these two processes depends on the presence of previous capacity in capturing knowledge. The absorbing capacity is the ability to recognize, achieve, understand and utilizing knowledge and it can remove internal obstacles in the organization (Yaghoubi et al, 2010; Farhang, 2010). Transferring refers to internally passing along the obtained knowledge on individual level, particularly through conversation and interaction between people (on the other word, through communication, conversations and mental debate). Easy communication is more based on presence of a quick information system which guarantees accuracy and availability of information. In regard to conversation and discussion, working teams and staff meetings are ideal forms of freely sharing ideas. Team learning places on a higher level of individual learning which includes transferring, interpreting and combining achieved knowledge, individually. This combination of knowledge resulted in creating connected bodies of knowledge which are originated in organizational culture, working processes and other components which constitute organizational memory.

Therefore, knowledge can be recovered and used in different situations appropriately, so that guarantees ongoing learning of the organization despite to natural turnover of organization's members (Hajipour & Nazarpour Kashani, 2010, p 187).

Different studies try to explain the relationship between these two variables including the study of Taheri Lari et al (2012) which is called the relationship between organizational trust, organizational learning and entrepreneurship, they concluded that there is a relationship between horizontal, vertical, institutional trust and organizational learning. The general conclusion of this study is that increasing in organizational trust causes to increasing the level of organizational learning. And similarly, Farhang's study (2010) on the relationship between organizational learning, organizational trust and the expansion of staff in Medical and non-Medical governmental universities in east south of Iran showed that there is a significant relationship between horizontal, vertical, institutional trust and organizational learning. In foreign studies, it can be referred to Janowicz & Noorderhaven's study (2009) called understanding the role of organizational learning and trust which concluded that organizational trust influences sharing learning. The other conclusion is that paying attention to organizational trust can be stimuli for participants in learning process. Lobo & Dolke (2012) concluded that there is a relationship between the dimensions of trust, namely, organizational trust, managerial trust, trust among colleagues and organizational learning and all of its dimensions including achieving knowledge, sharing it and using it.

Study hypothesizes

- 1) There is a relationship between organizational trust, its dimensions and organizational learning in faculties.
- 2) There is a relationship between organizational trust, its dimensions and organizational learning in the dimension of management commitment among faculties.
- 3) There is a relationship between organizational trust, its dimensions and organizational learning in the dimension of systematic vision among faculties.
- 4) There is a relationship between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation among faculties.
- 5) There is a relationship between organizational trust, its dimensions and organizational learning in

the dimension of transferring and integrating knowledge among faculties.

- 6) Organizational trust and its dimensions have the capacity to anticipate organizational learning.

Methodology, community, sampling and analyzing data of study

Method of this study is descriptive-correlative. Statistical community of this study includes all faculties of Islamic Azad University of Khorasgan (Isfahan) in number of 310 who are working in academic year 2011-2012. Of this statistical community, 172 people were selected and increase statistical potential by using Cochran's sampling formula and were also used according to random sampling. In order to measure organizational belief variable, a standard 48-question questionnaire of Mayer & Davies (1999) was used which measures trust in three dimensions including horizontal trust, vertical trust and institutional trust. Perpetuity of the questionnaire were computed 0.98 by using

statistical package of social sciences software, ellonen et al (2008) reported this questionnaire's Cronbach's Alfa 0.89.

Also, a standard 14-question questionnaire of Gomez et al (2005) was used to measure organizational learning variable. This questionnaire measures dimension of management commitment, systematic vision, open atmosphere and experimentation, transferring and integrating knowledge. Its perpetuity was computed 0.91 by using statistical package of social sciences software.

The data from the questionnaires was analyzed by using Pierson's correlation coefficient, step by step regression and variance analysis. The analysis was done by using statistical package of social sciences software (spss).

Study findings

The main hypothesis: there is a relationship between organizational trust, its dimensions and organizational learning.

Table (1): correlation coefficient between organizational trust, its dimensions and organizational learning

Reference variable	Organizational learning		
Statistical indicator	Correlation coefficient	Square of correlation coefficient	The level of significance
Organizational trust	0.829**	0.678	0.001
Trust among staff (horizontal trust)	0.691**	0.477	0.001
Staff's trust on manager (vertical trust)	0.795**	0.632	0.001
Institutional trust	0.784**	0.615	0.001

P<0.05

Findings shown in table (1) indicate that correlation coefficient between organizational trust, its dimensions and organizational learning is significant. According to coefficient of determination (r^2) there 68.7, 47.7, 63.2, 61.5 percent variance were common between organizational trust, trust among staff (horizontal trust), staff's trust on manager (vertical trust), institutional trust and organizational learning, respectively. So, the main hypothesis is confirmed which based on, there is a relationship between organizational trust, its dimensions and organizational learning.

Hypothesis 1:

there is a relationship between organizational trust, its dimension and organizational learning in the dimension of management commitment.

Table (2): correlation coefficient between organizational trust, its dimensions and organizational learning in the dimension of management commitment

Reference variable	Management commitment		
Statistical indicator	Correlation coefficient	Square of correlation coefficient	The level of significance
Organizational trust	0.678**	0.460	0.001
Trust among staff (horizontal trust)	0.524**	0.274	0.001
Staff's trust on manager (vertical trust)	0.669**	0.448	0.001
Institutional trust	0.692**	0.479	0.001

P<0.05

Findings shown in table (2) indicate that correlation coefficient between organizational trust, its dimensions and management commitment is significant. i. e. there is a significant relationship between organizational trust, its dimensions and organizational learning in the dimension of management commitment. According to coefficient of determination (r^2) there 46.0, 27.4, 44.8, 47.9 percent variance were common between organizational trust, trust among staff (horizontal trust), staff's trust on manager (vertical trust), institutional trust

Table (3): correlation coefficient between organizational trust, its dimension and organizational learning in the dimension of systematic vision

Reference variable	Systematic vision		
Statistical indicator	Correlation coefficient	Square correlation coefficient	of The level of significance
Organizational trust	0.664**	0.441	0.001
Trust among staff (horizontal trust)	0.552**	0.305	0.001
Staff's trust on manager (vertical trust)	0.630**	0.397	0.001
Institutional trust	0.637**	0.406	0.001

P<0.05

Findings shown in table (3) indicate that correlation coefficient between organizational trust, its dimensions and systematic vision is significant. i. e. there is a significant relationship between organizational trust, its dimensions and systematic vision. According to coefficient of determination (r^2) there 44.1, 30.5, 39.7, 40.6 percent variance were common between organizational trust, trust among staff (horizontal trust), staff's trust on manager (vertical trust), institutional trust

Table (4): correlation coefficient between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation

Reference variable	Open atmosphere and experimentation		
Statistical indicator	Correlation coefficient	Square correlation coefficient	of The level of significance
Organizational trust	0.802**	0.643	0.001
Trust among staff (horizontal trust)	0.679**	0.461	0.001
Staff's trust on manager (vertical trust)	0.784**	0.615	0.001
Institutional trust	0.749**	0.561	0.001

P<0.05

Findings shown in table (4) indicate that correlation coefficient between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation is significant. i. e. there is a significant relationship between organizational trust, its dimensions and open atmosphere and experimentation. According to coefficient of determination (r^2) there 64.3, 46.1, 61.5, 56.1 percent

and management commitment, respectively. So, the hypothesis1 is confirmed which based on, there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of management commitment.

Hypothesis 2: there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of systematic vision.

and systematic vision, respectively. So, the hypothesis 2 is confirmed which based on, there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of systematic vision.

Hypothesis 3: there is a significant relationship between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation.

variance were common between organizational trust, trust among staff (horizontal trust), staff's trust on manager (vertical trust), institutional trust and open atmosphere and experimentation, respectively. So, the hypothesis 3 is confirmed which based on, there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation.

Hypothesis 4: there is a significant relationship between organizational trust, its dimensions and organizational learning in the dimension of transferring and integrating knowledge.

Table (5): Correlation coefficient between organizational trust, its dimensions and organizational learning in the dimension of transferring and integrating knowledge

Reference variable	Transferring and integrating knowledge		
Statistical indicator	Correlation coefficient	Square of correlation coefficient	The level of significance
Organizational trust	0.661**	0.437	0.001
Trust among staff (horizontal trust)	0.569**	0.324	0.001
Staff's trust on manager (vertical trust)	0.616**	0.379	0.001
Institutional trust	0.604**	0.365	0.001

P<0.05

Findings shown in table (5) indicate that correlation coefficient between organizational trust, its dimensions and organizational learning in the dimension of transferring and integrating knowledge is significant. i. e. there is a significant relationship between organizational trust, its dimensions and transferring and integrating knowledge. According to coefficient of determination (r^2) there 43.7, 32.4, 37.9, 36.5 percent variance were common between organizational trust, trust among staff (horizontal trust), staff's trust on

manager (vertical trust), institutional trust and transferring and integrating knowledge, respectively. So, the hypothesis 4 is confirmed which based on, there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of transferring and integrating knowledge.

Hypothesis 5: organizational trust and its dimensions have the capacity to anticipating organizational learning.

Table (6): multiple correlation coefficient between organizational trust and organizational learning abilities among faculties

Statistical indicator	Anticipating variable	Multiple correlation coefficient	Square of multiple correlation coefficient	Square of adjusted multiple correlation coefficient	F coefficient	Level of significance
Organizational learning ability	Step 1 Staff's trust on each other	0.791	0.626	0.623	219.580	0.001
	Step 2 Staff's trust on manager Trust among staff	0.811	0.658	0.653	125.059	0.001
	Step 3 Staff's trust on manager Trust among staff Institutional trust	0.822	0.676	0.669	89.890	0.001

P< 0.01

As findings in table (6) indicates, the best anticipator is organizational learning ability in step 1 which is staffs trust on manager (vertical trust), among studied variables in the regression. In step 2, in addition to staffs trust on manager (vertical trust), there is trust among staff (horizontal trust) and in step 3, in addition to staffs trust on manager (vertical trust) there is institutional trust. According to the results of step by step regression analysis, trust among staff (horizontal

trust) and institutional trust are significant. On this basis, coefficient of staff's trust on manager dimension explains 62.6 percent variance of organizational learning ability, in step 2 dimensions of staffs trust on manager and trust among staff 65.8 percent variance of organizational learning ability and in step 3, dimensions of staff's trust on manager, trust among staff and institutional trust 67.6 percent variance of organizational learning ability. The observed F on level

of $p < 0.01$ is significant, so this regression is generalizable to the statistical community.

Table (7): Beta coefficient in anticipating organizational learning ability of faculties

Reference variable	Statistical indicator	Anticipating variable	Multiple correlation coefficient	Square of multiple correlation coefficient	Standard Beta coefficient	T coefficient	Level of significance
Organizational learning ability	Step 1	Staff's trust on each other	0.612	0.041	0.791	14.818	0.001
	Step 2	Staff's trust on manager	0.466	0.058	0.603	8.089	0.001
		Trust among staff	0.221	0.064	0.259	3.470	0.001
	Step 3	Staff's trust on manager	0.224	0.099	0.316	2.461	0.015
		Trust among staff	0.210	0.062	0.246	3.370	0.001
		Institutional trust	0.222	0.082	0.326	2.710	0.008

$P < 0.01$

Findings in table (7) indicate that Beta coefficient increases organizational learning ability to 0.316 units per increasing 1 unit in the dimension of staff's trust on manager (vertical trust) and to 0.246 units per increasing 1 unit in the dimension of trust among staff (horizontal trust), and to 0.326 units per increasing 1 unit in the dimension institutional trust.

Anticipation equation of 5th question of the study is as follow:

Organizational learning ability = constant coefficient (9.96) + staff's trust on manager (0.244) + trust among staff (0.210) + institutional trust (0.222)

Discussion and Conclusion

During this study, some evidences were obtained from the relationship between organizational trust and organizational learning in regard to findings in table 1. Gomez et al (2005) proposed some significant evidence in which they suggested organizations need to expand knowledge according to management commitment, and in this condition, manager understands the importance of learning and emphasizes on creating and transferring knowledge as a core value. These findings are in a same direction as Lobo & Dolke (2012) and Farhang (2010)'s attitudes based on there is a relationship between dimensions of trust, organizational learning and all of its dimensions including achieving knowledge, sharing and using it. Presence of positive relationship between organizational trust and organizational learning means that the more organizational trust is in an organization, the easier to share knowledge. On the other hand, the higher organizational trust is, the more serious is using learning tools.

The findings of present study indicate that there is a relationship between organizational learning in the

dimension of management commitment (table 2). It seems that, if manager understands the importance of learning and creates an atmosphere of trust, achieving, creating and transferring knowledge as core values, will find a specific place in the organization. In an organization where staff trusts each other and also there is trust between manager and staff, trust on structures and policies finds a high place. This part of findings is in a same direction with Adler & kwon's attitudes (2002) based on there is a relationship between social capital and transferring knowledge in organizations and also is in a same directions with Farhang's attitude (2010) who concluded that there is a relationship between institutional, organizational and vertical trust and organizational learning which means organizational learning changes by decreasing and increasing trust in an organization.

In other part of these findings (table 3), it was shown that there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of systematic vision. These findings are in a same direction with the study of Taheri Lari et al (2012) based on there is a relationship between organizational trust and organizational learning. These are the same as the study of Kazemi Jagnab(2002). Since, in organizational learning-based organization where staff is responsible for their learning, they consider the relationship between their responsibilities and organization's goals as a whole. In this condition, staff is expected to learn from their colleagues and also teaches them and in this situation working culture is coordinated and integrated with organizational learning (Hajipour & Nazarpour, 2010). Presence of trust in the triple vertical, horizontal and institutional dimensions increases the

interactions between organization employees and creates a secure atmosphere in the entire organization. It is obvious when all organizational resources trust each other and also manager, a holistic approach governs on the organization and holistic, systemic thinking will be some important areas in organizational learning. Therefore, the relationship between these variables will be explainable.

Findings in table 4 indicate that there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of open atmosphere and experimentation. This finding is relatively in a same direction with Dovey's study (2009) called the role of trust in learning and innovation process and its results show that trust is a social capital and influences learning and innovation. Since, it can be cited that open atmosphere and experimentation are fields of organizational innovation. Presence of open atmosphere and experimentation are features of organizations with organizational learning. Learning as a kind of modification also needs open atmosphere and experimentation. It is obvious when staff did not experience organizational trust and afraid to do creative actions and concerns about their colleagues and leaders' responses, they will not enter into an open and experimentation atmosphere.

Results from table (5) indicate that there is a relationship between organizational trust, its dimensions and organizational learning in the dimension of transferring and integrating knowledge. this finding is compatible with Ribier & Tuggle's studies (2005) on the role of organizational trust and knowledge management based on organizations with high level of organizational trust are more successful in knowledge management projects especially transferring knowledge. This finding is also compatible with Lajavardi & Khan Babaei (2007) about emphasis on the presence of supplementary skills and atmosphere of trust as the most important factors in facilitating knowledge management in both creating and transferring knowledge components. In general concept, transferring, integrating and avoiding filtering information occur in a trust-based atmosphere. Presence of trust in organization among staff and managers provide information exchange. Organizational learning raises a mode in which learning is not a top to bottom process, but it is a process which flows throughout the organization, vertically, horizontally and diagonally.

However, the evidence of this study showed that organizational trust and its dimensions have the capacity to anticipate organizational learning (Table 6). This finding is compatible with ideas of some researches such as Lobo & Dolke (2012), Taheri Lari et al (2012) and Farhang (2010). On the other word, improving learning statue in the organization leads to improve organizational learning process. Trust as stimuli for

organizational learning is an essential growing framework to share knowledge along organizational and geographic boundaries.

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The relationship between emotional intelligence and organizational commitment of principals of schools in Najaf Abad in 1390-91

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Abstract: This study analyzes the relationship among emotional intelligence and organizational commitment of principals of elementary, middle and high school in Najaf Abad in 1390-91. The research method used in this study was correlation and research populations were all principals of three school period of Najaf Abad comprising 205 people. By using Cohen table and a stratified random sampling proportional to sample size, 136 people were selected to participate in the study. Research tools for data collection were two standard questionnaires: Schutte emotional intelligence questionnaire (1997) consists of 33 questions and Allen and Meyer organizational commitment questionnaire (1984) consists of 24 questions. Their formal validity was confirmed by some experts. In order to measure the reliability, Cronbach's alpha coefficient was used. The coefficient for emotional intelligence questionnaire was 0.78 and for organizational commitment questionnaire was 0.80. In order to analyze the data, inferential statistics including Pearson correlation coefficient, multiple regression were used. Data analysis showed that among all the dimensions of emotional intelligence involves assessing and feelings expression ($p < 0.05$, $r = 0.25$), emotion regulation ($r = 0.31$ and $p < 0.05$), utilization of emotion ($r = 0.17$ and $p < 0.05$) and organizational commitment, there is a significant relationship.

[Sadighe Homayoni Najaf Abadi and Badri Shahtalebi. **The relationship Between emotional intelligence and organizational commitment of principals of schools in Najaf Abad in 1390-91.** *Life Sci J* 2012;9(4):4936-4943] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 740

Keywords: Emotional intelligence, Organizational commitment, Education, Principals

Introduction:

The most important goal of each organization is reaching the highest level of efficiency or improved efficiency using efficient factors such as: capital, tool, methods of work, workforce. Certainly, skilled and efficient workforce is one of the most important tools to reach organization goals, since workforce has an important role in increasing and decreasing efficiency of organization, that is if an organization has the largest amount of capital and best technology and facilities, but does not have motivated and productive workforce will not reach to its goals (Mehdad, 2010). Various factors affecting employees' motivation and efficiency, one of the factors which impacts organizational behavior is emotional intelligence.

Adeoye & Emeke (2010) defined emotional intelligence as the ability to recognize your feelings and the feelings of others and also your relationships with others (Adeoye & Torubelli, 2011, page 215).

It is observed in investigating the history of emotional intelligence; Mayer et al have conducted the first studies. In 1990, they presented emotional intelligence definition in four fields, considering psychological processes:

- 1) Emotion, evaluating and expressing emotions: recognizing and entering verbal and non-verbal information to emotional system

- 2) Emotional facilitation of thinking: utilizing emotions as a part of recognition such as creativity and resolute
- 3) Understanding and analyzing emotions: cognitive process of emotion and obtained information about yourself and others
- 4) Adjusting and recovering emotions to grow and develop emotional intelligence: controlling system and subjugating emotional affairs of others and yourself (Livarjani and Ghafari, 2010).

In early of 1990s, Mayer and Salovey presented a model of emotional intelligence. Their model defines emotional intelligence as the capacity to understand emotional information and reason by emotions. The initial model which was presented by them, considered 3 main components for emotional intelligence which included "emotional perception", "emotional adjustment" and "emotional productivity". Emotional perception means the ability to truly recognize in you and others and also the ability to recognize difference between honest and sincere emotions. Emotional adjustment refers to the ability to monitor and change the intensity and direction of your emotions and others.

Emotional productivity, indeed, is, understanding and using emotions and emotional information (Ghaaei et al, 2008). This model is basis of many other theories on emotional intelligence including Shat's emotional intelligence (1998). Shat also introduced three components for emotional intelligence which are evaluating and expressing emotion, adjusting emotion and utilizing emotion, and explained his self-report questionnaire based on three dimensions of emotional intelligence.

Caruso & Mayer & Salovey (1990) also determined four dimensions for emotional intelligence which include:

1. Recognizing emotions in yourself and others (Perceiving Emotional): the most necessary ability related to emotional intelligence is that one is aware of his emotions and feelings. The ability of self-awareness allows individuals to identify their strengths and weaknesses and can trust on their values. Often, self-evaluation skills in this area, do not match with individuals' actual ability to read correctly others' emotions. As a result, employers may obtain valuable information in interactions with colleagues and customers. Though, they believe that they cannot understand correctly others' emotions.
2. Using Emotional: means the ability to use emotions in direction to help obtaining desired results, solving problems and using opportunities and emotions to motivate individuals in this dimension of the main core is a professional work.
3. Understanding Emotional: the ability to understand complex emotions and awareness of their reasons and how the emotions change from one state to another is called understanding emotional. It can be found what causes motivating or not motivating individuals or groups by helping this awareness.
4. Managing Emotional: it means managing your emotions and others' with a specific situation of denying emotions, avoiding difficulties, confirming general state of the situation without confirming its process, utilizing emotions to solve problems and coordination emotion and thinking within managing emotions. (Jahanian, 2011; Stayes & Brown, 2004; Mayer et al, 2004).

Other variable which has an important role in organizational behavior and one of the important cases which can impacts the proceedings and moving to goals

is employees' organizational commitment. The concept of organizational commitment in workplaces is still one of the studying challenging concepts in fields of management, organizational behavior and human resource management (Gol Parvar & Gharizi, 2008). One of the indicators in superiority of an organization to another is having committed workforce. Research results demonstrate that organizational commitment is related to many employees' job behaviors (Bahrami et al, 2010). Organizational commitment has different definitions; Chatman & Oyrayli (1986) defined organizational commitment as emotional bonding and support with organization's goals and values, because of organization itself and avoidance its tool values (Hosseini & Mahdizadeh Ashrafi, 2010; Behravan & Saeidi, 2009).

Allen Mayer is one of the important theorist about organizational commitment, in Allen Mayer's model which was designed in 1993, employees' organizational commitment is categorized in three kinds including emotional commitment, continuous commitment and normative commitment. The interface of these three kinds of commitments is defined as follow: commitment is a mental state which 1- identifies the relation of person with organization, 2- implicitly refers to the decision to stay at or leave an organization, 3- reduces the likelihood of turnover.

Affective Commitment: occurs when employees are willing to stay in the organization because of affective bonding. It can be also defined as a kind of fixation in doing tasks. The aspect of affective commitment creates a relation between job and individual identity, so that the individual finds organizational goals in the same direction with his faith. He enjoys being a member of organization. This commitment can be the indicator of anticipating of absence and abandoning job. This element is the most important factor of organizational commitment which refers to active presence of employees in organization and their sense of unity with organization. Usually the employees who have affective commitment are willing to stay in organization and this is one of their dreams (Khodadadi & Pasha, 2009; Baharifar & Javaheri Kamel, 2010; Khanifar et al, 2009; Borjali loo & Doaei. 2010).

Continuous Commitment (rational, the cost-based approach): it is a commitment which is based on conceptual cost of leaving an organization; in fact it is the trend to stay in the organization because of cost of leaving organization or rewards from staying in organization. It is believed that this commitment is awareness of impossibility of another social identity because of large losses (financial loss and social costs) due to change. Continuous commitment is one of the significant indicators of commitment which justifies commitment in terms of aforesaid investment (like time, life, effort). The more amount of investment is, the less

possibility of leaving job, and individual cannot leave the organization. In other word, this commitment is one which is related to valuating organization and in its light; employee participates in organization life (Yaghoubi et al, 2009; Ghafouri & Gol Parvar, 2009; Mirkamali et al, 2009).

Normative commitment (moral responsibility or binding approach): this dimension of commitment is truth of believing in individual responsibility to organization. Individuals stay in organization because they consider it as an ethical commitment. This commitment is considered as a belief in relation to individual responsibility to organization, normative commitment is a kind of mutual ethical commitment. Employees with high level of normative commitment feel that they have to continue working in organization because they have no time to join to another one. Individuals' experiences before entering and after entry into the organization (e.g. organizational socialization) are the factors affecting this kind of commitment. (Yousefzadeh, 2010; Hosseini Nasab et al, 2010; Nazem & Parsa Moein, 2010; Balali, 2010; Mahdavi Rad, 2010; Ahmad et al, 2011; Mohammadian et al, 2010, Ebadi et al 2010).

Several studies have been conducted on emotional intelligence and organizational commitment. Rezaeian & Koshtehgar (2008), Ostavar & Amirzadeh Khatouni (2008), Bakhshi Sourshjani (2010), Adiomo (2007), Lordanoglou (2008), Rathi&Rastoy (2009), Sanosi, Outman & Vanogra (2009), Rangriz & Mehrabi (2014), Adeoye & Torubelli (2011) demonstrated in their studies that there is a relation between emotional intelligence, organizational commitment, and emotional intelligence is enable to anticipate organizational commitment.

Study purpose

1. Identifying the relation of emotional intelligence and its dimensions with managers' affective commitment
2. Identifying the relation of emotional intelligence and its dimensions with managers' continuous commitment
3. Identifying the relation of emotional intelligence and its dimensions with managers' normative commitment

Study methodology of community:

As the present study aims to investigate the relation between emotional intelligence dimensions (evaluating and expressing emotion, adjusting emotion and utilizing emotion) and organizational commitment dimensions (affective, continuous, normative commitment), the research methodology is correlative – descriptive. Statistical community of this research was all male and female managers of each educational course school, junior high school and secondary high school in academic year of 2011-2012 in number of 205 people which the sample was estimated 136 people with respect to Cohen et al (2001) table. In this study, two questionnaires were used as follow:

- A) Self-report scale of Shat's emotional intelligence (Shat et al, 1997): this questionnaire designed and adjusted based on theoretical model of Mayer & Salovey's emotional intelligence (1990) by Shat et al in 1997. Mayer & Salovey (1990) obtained it Cronbach's alpha coefficient as 0.8. In this study, reliability of the emotional intelligence questionnaire has been calculated as 0.78.
- B) Allen Mayer's organizational commitment questionnaire: in this study, Allen Mayer's standard questionnaire on organizational commitment has been used to measure organizational commitment. This questionnaire contains 24 questions and also 3 components (continuous commitment, affective commitment and normative commitment). In this study, reliability organizational commitment questionnaire has been calculated as 0.80.

Findings

Question 1: is there any relation between emotional intelligence and its dimensions with managers' affective commitment?

Table (1): correlation coefficient of emotional intelligence and its dimensions with managers' affective commitment

Reference variable Statistical indicator	Affective commitment		
	correlation coefficient	Square of correlation coefficient	Significance level
Anticipation variable			
Emotional intelligence	0.112	0.013	0.197
Evaluating and expressing emotion	0.088	0.007	0.310
Adjusting emotion	** 0.263	0.069	0.002
Utilizing emotion	0.007	0.001	0.935
P<0.05			

Findings in table (1) demonstrate that correlation coefficient between utilizing emotion and affective commitment is significant. It means there is a significant relation between utilizing emotion and affective commitment. According to coefficient of determination (r^2), 6.9 percent variance was common

between utilizing emotion and affective commitment. Also, there is no significant relation between evaluating and expressing managers' emotions and adjusting emotion with affective commitment.

Question 2: is there any relation between emotional intelligence and its dimensions with managers'

continuous commitment?

Table (2): correlation coefficient of emotional intelligence and its dimensions with managers' continuous commitment

Reference variable Statistical indicator	Continuous commitment		
	correlation coefficient	Square of correlation coefficient	Significance level
Anticipation variable			
Emotional intelligence	**0.252	0.064	0.003
Evaluating and expressing emotion	**0.301	0.091	0.001
Adjusting emotion	**0.237	0.056	0.006
Utilizing emotion	0.159	0.025	0.065
P<0.05			

Findings in table (2) show that correlation coefficient between emotional intelligence in evaluating and expressing emotion and adjusting emotion with continuous commitment is significant. According to coefficient of determination (r^2), 6.4, 9.1, 5.6 percent variance was common between emotional intelligence, evaluating and expressing managers' emotions and adjusting emotion with continuous commitment,

respectively. Also there is no significant relation between utilizing emotion and continuous commitment.

Question 3: is there any relation between emotional intelligence and its dimensions with managers' normative commitment?

Table (3): correlation coefficient of emotional intelligence and its dimensions with managers' normative commitment

Reference variable Statistical indicator	Normative commitment		
	correlation coefficient	Square of correlation coefficient	Significance level
Anticipation variable			
Emotional intelligence	*0.194	0.038	0.024
Evaluating and expressing emotion	*0.174	0.030	0.043
Adjusting emotion	*0.191	0.036	0.027
Utilizing emotion	**0.240	0.057	0.005

P<0.05

Findings in table (3) show that correlation coefficient between emotional intelligence, evaluating and expressing emotion, adjusting emotion and utilizing emotion with normative commitment is significant. According to coefficient of determination (r^2) 3.8, 3, 3.6, 5.7 percent variance was common between emotional intelligence, evaluating and expressing emotion, adjusting emotion and utilizing emotion with normative commitment, respectively.

Discussion and Conclusion

According to the study results, the first question is that there is a relation between utilizing emotion and affective commitment. Affective commitment is defined as affective attachment and fixation to do tasks and trend to stay to continue employment in organization. This dimension is the most important element in organizational commitment. It is also refers to employees' active presence in organization and their sense of unity. Usually, employees who feel commitment are willing to stay in organization and this is one of their dreams. In contrast, utilizing emotion, in fact, is using emotions and emotional information in thinking, acting and solving problem. Solving problem means the ability to identify, create and utilize effective solutions. Manager who can identify problems and find their solutions can give employees peace of mind and even can use the best solution in junctures which considers both benefits of employees and organization. In such situations, employees can trust on actions which are created by manager and it also warms their hearts. In respect to what was said, managers can keep employees in organization and pretend their absence using emotional information and accepting organizational values. Increasing this dimension of emotional intelligence, the level of employees' affective commitment that is, accepting organizational values and tendency to stay in organization will increase. Therefore, the relation between these two variables will be explainable.

Other result of this study represents lack of relation between adjusting emotion dimension of emotional

intelligence dimensions and affective commitment. Individuals have to gain more abilities in order to use their recognition. They should have a state of accepting and refusing experience, creation and emotion and should acquire some skills in involving in some behaviors which are followed by appropriate emotions. Adjusting emotion refers to the ability to review and reconstruct intensity and direction in which emotion exists in you and others, and includes adjusting negative emotions and changing their directions to compromise and keeping enjoyable emotions. In addition to adjust their emotions, individuals should be able to manage others' emotions. That is, they should have the ability to adjust and replace emotions. Adjusting emotions represents individual's ability to reduce negative emotions or keep positive emotions. Therefore, the relation between adjusting emotions and affective commitment will be explainable. Lack of individuals' ability to reduce negative emotions or keep positive emotions in workplace are some reasons of lacking relation between these two variables in the present study.

Lack of relation between evaluating and expressing emotion and affective commitment was the result of this study. In explaining this study finding, it can be said that evaluating and expressing emotion refer to expressing emotional state for others, describing your emotions and expressing feeling. However, individuals usually avoid expressing their emotions and feelings in workplace due to different reasons and they are not easily able to express their emotions, therefore they like to keep their secrets instead of expressing them. The reason can be attributed to lack of trust in workplace and unreliable atmosphere. Usually, in different organizations including educational ones, expressing emotional states will harm employees and it is basis of judgment and making decisions. Therefore, employees usually hide their emotional states and avoid expressing their feeling. Lack of relation between these variables can arise from the matter.

Findings in table (2) show that correlation coefficient between emotional intelligence in evaluating and expressing emotions and adjusting them with continuous commitment is significant. According to coefficient of determination (r^2) was common 6.4, 9.1, 5.6 percent variance between emotional intelligence, evaluating and expressing managers' emotions and adjusting them with contiguous commitment, respectively. Also, there is no significant relation between utilizing emotions and continuous commitment.

From the study results, the question is that there is a relation between emotional intelligence, evaluating and expressing managers' emotions and continuous commitment.

Continuous commitment includes a commitment based on the costs associated with staff leaving.

Continuous commitment is one of the significant indicators of organizational commitment which justifies commitment in terms of aforesaid investment (like time, life and effort). The more amount of investment is, the less possibility of leaving job, and individual cannot leave the organization. In other word, most of individuals simply are not willing to leave the service and continue working essentially based on need to their work. In this dimension of commitment, staff will stay in the organization, as they need to stay and have a high level of loyalty in the organization. Staying members in the organization is not due to sense of moral obligation or emotional attachment.

In other hand, understanding emotional dimension (evaluating and expressing) means the ability to properly identify emotions in you and also the ability to distinguish the difference in others and honestly and sincerely express emotions. Being emotionally able, simplifies facing to challenges of life for people, as a result, they will have more sanity. When director of an organization can identify his positive and negative emotions and also others' and has the ability to recognize his emotions and others' in physical and psychological dimensions, to express accurately emotions and also the ability to separate correctly and not correctly expressing feeling can increase the sense of attachment to the organization in himself and others, when people reach to this level of trust in which the organization values their emotions, they make a commitment to the organization and gain true belief with their responsibility. Paying attention to individuals' positive and negative emotions and understanding them cause increasing commitment to organization goals and organization itself, therefore lead to decreasing turnover, absence, lack of responsibility for self and others, delay and so on.

The other result of this study represents the relation between adjusting emotion dimension of emotional intelligence dimensions and continuous commitment.

Adjusting emotion refers to the ability to monitor and change the intensity and direction of emotions in yourself and others. When a school manager have all emotions including enjoyable, annoying ones, the ability to review and reflect on emotions, the ability to keep and continue emotional states and reconstruct them based on whether they have been evaluated useful, and the ability to manage emotions in himself and others can easily keep their staff in the organization. In this manner, individuals are willing to adhere to the organization and consider organization's development as their own. If a school manager wants to make a situation in which staff enjoy working and or provide some actions which make the staff happy, they work with more motivation and willingness and this causes they have more commitment to the organization. Staff will have more sense of unity to the organization and also active presence, they accept organization's values and tendency to stay in the organization will increase, paying attention to hedonic values (adjusting emotion) and continuous commitment will be justifiable.

Lack of relation between utilizing emotion and continuous commitment was the result of this study. The aspect of utilizing emotions indicates the ability to use emotions to facilitate creative thinking. Some people work better in certain emotional situations. Therefore, emotions affect their cognitive system and change it and impel the person to see thing from different perspectives and think more deeply about an issue. People with high level of utilizing emotions can reevaluate important events and distinguish important issues from non-important ones. Workplaces are usually places where face to different problems and difficulties and staff who works in such environment tries to adapt themselves with ongoing changes and regulations of the organization. In today workplaces, people cannot utilize emotions without preplanning due to changing situations, and also cannot think deeply and evaluate accurately. Therefore, lack of relation between these two variables can be a result of this phenomenon.

Findings in table (3) shows that correlation coefficient between emotional intelligence, evaluating and expressing managers' emotions, adjusting emotions and utilizing emotions and normative commitment was significant. According to coefficient of determination (r^2), 3.8, 3, 3.6, 5.7 percent variance was common between emotional intelligence, evaluating and expressing managers' emotions, adjusting emotions and utilizing emotions and normative commitment.

Form the results of this study, the question is that there is a relation among three dimensions of emotional intelligence and normative commitment. Normative commitment includes this concept that people consider working and continuing it as their duty and responsibility and thereby they meet their commitments to the organization. Individuals' experiences before

entering and after entry into the organization (e.g. organizational socialization) are the factors affecting this kind of commitment.

Other result of this study represents a relation between evaluating, expressing emotions dimension of emotional intelligence dimensions and normative commitment. Perceiving and expressing emotion which perceive and identifying different aspects of emotions lead clear understanding for individual in an emotional context and therefore increase commitment. Emotional abilities are important, as individuals who can rapidly and carefully evaluate and express their emotions, can better interact with environment and other people. Individuals' abilities to understand accurately others' feelings are different and people, who can understand others' feelings, can better respond to their social environment and make a supportive social network.

When organization leader can identify his positive and negative emotions and staff's, and also has the ability to recognize his emotions and other's in physical and psychological dimensions, express accurately emotions, the ability to separate correctly and not correctly expressing feeling can increase the sense of attachment to the organization in him and others.

The other result of this study represents the relation between utilizing emotion dimension of emotional intelligence dimensions and normative commitment. In explaining this finding of the study, we can say that utilizing emotion means using emotional information in thinking, acting and solving problems. Solving problems means the ability to identify, create and utilize effective solutions. The manager who can identify problems and find their solutions with cooperation of staff can give them peace of mind that can even use the best solutions in hard situations and junctures and consider the benefits of the organization and staff. In such situations, staff trusts on manager's actions and behaviors, and considers working and continuing it as their duty and responsibility and thereby they meet their commitments to the organization. Therefore, the relation between understanding your emotions and other's and normative commitment is explainable.

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Challenges of last governor (Vali) of Poshtkouh (Eilam) in Confronting Reza Khan

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Abstract: Turmoil, social restlessness, lack of internal and local safety in post-constitution movement, the weakness of the Qajar, the unstable situation inside the country, the conspiracies of England, general need of the society to safety and stability, personal ambitions and several other factors led to the rise of Reza Khan in the political arena of Iran, there were scattered power centers and each one of them ruled independent from central government in its governing zones. Gholamreza Khan as the last governor of Poshtkouh was one of those local power centers. The goal of present paper is to describe the policies and strategies of Poshtkouh governor in confronting Reza Khan. Did Poshtkouh governor able to earn the trust of Reza Khan to remain in his title of being the governor of Poshtkouh? Gholamreza Khan, like his ancestors, had founded its ruling based on distrust. As he heard the news of proceeds of Reza Khan's troops to Poshtkouh, he retreated to his properties in Iraq and let his ancestral territory to fall in the hands of the central government. When the last governor of Poshtkouh failed in earning Reza Khan's trust, he changed his position and encouraged and motivated the tribes and leaders of clans to rebel against Reza Khan and ultimately, in 1929 a rebel emerges against Reza Khan in Poshtkouh.

[Golnaz Saeidi. **Challenges of last governor (Vali) of Poshtkouh (Eilam) in Confronting Reza Khan.** *Life Sci J* 2012;9(4):4944-4948] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 741

Keywords: Reza khan, Gholamreza Khan, the governor of Poshtkouh, Eilam

1. Introduction

During the Qajar dynasty, the governors of Poshtkouh were brave border keepers and during their dominance over Poshtkouh territory, they fought against Ottoman invaders who crossed the borders to lute the properties of habitants persistently and defeated them hard several times. Despite weakness and lack of enthusiasm of Qajar government, the governors stayed loyal and always showed humbleness and subordination to the Qajar kings. Governors used to maintain local military forces (gunmen) in their territory, and during Hosseingholi Khan's government, those gunmen were known as "servants" (Amaleh). In addition, in critical times, they would mobilize the habitants to guard the area. In spite of wisdom, brevity and loyalty of governors in protecting Poshtkouh borders, they did not have brilliant records in social affairs and good conducts with the serfs. The poor and distressed people of Poshtkouh made collective migration to Iraq many times to escape from the cruelty and unjust behaviors of the governors. In times, the governors would levy heavy taxes to people under different excuses and in any event, the governor owned the soul and property of people.

As Reza Khan ascended to power and by the shifts of the government towards tribes and large clans, a new chapter was opened in the relationship of government and Poshtkouh zone that was not pleasant for the traditional rulers of that zone. The main concern of this paper is to show the dual

policies of the last governor of Poshtkouh against Reza Khan.

Governors of Poshtkouh and Central Government

The tribes of Lor and Kurd in north and west of Lorestan lived in tribal way of life to the mid 12th century. Davoudi, Abbasi, Mohammad Kumari, Jangruy...were among the tribes of Small Lor. Those tribes had no particular organization to mid 12th century. In 1381, Hessameddin Soheli Nami was named as the ruler of Small Lor and Khuzestan by the Saljuqid. After the death of Hessameddin, Shojaeddin Khorshid became the independent ruler of the entire Small Lor. After Shojaeddin Khorshid, a dynasty of his predecessors ruled Small Lor and the last governor of that dynasty (Atabakan of Lorestan) known as Verdi khan was executed by Shah Abbas Safavi and that dynasty was extinct. (Zaki Beyk, 2002: 205). Shah Abbas Safavid assigned Hossein Beyg of Silvizi clan, the nephew of Shahverdi Khan to rule Small Lor. and after him, his descents, Shahverdi Khan, Manouchehr Khan, Hossein Khan Sani, Alimardan Khan...ruled Small Lor. Fathali Shah released Pishkouh from influence of Hassan Khan the governor and the power and influence territory of the governors was limited to Poshtkouh. According to Lord Kerzen in separation of Pishkouh from Poshtkouh, "Small Lor or the Minor Lorestan is a region between Dezfoul in south and Kermanshah in north, between Dez Water in east and the Ottoman frontiers. In west, it is divided into two territories: Pishkouh and Poshtkouh and Zagros Mountains that is called Kabir Kouh in between. Up to Qajar Clan,

no political differences were between the two zones. Agha Mohammad Khan separated Pishkough from Lorestan governor and from that time, he contended itself to Poshtkough government. From that point, the Eili File that included the entire Small Lorestan was limited to Poshtkough in public opinion and the Fili was a name given to all individuals and population that inhabited that area and the Fili and their families consist of 210,000 people and Fili means rebel.” (Kerzen, 230/2).

Limiting the territory of governors to Poshtkough, due to the mountainous geographic condition of the zone caused more authority to governors versus central government.

Gholamreza Khan

The era of Gholamreza Khan’s governing (the last governor of Poshtkough) was important from two perspectives; one in terms of taking Poshtkough out of the political isolation of Hossein Gholi Khan era and arrival of Gholamreza Khan in the political sects of constitutional movements; followed by, the second era, of emergence of Reza Khan in the political power of Iran and confrontation of Gholamreza Khan with the political challenge of Reza Khan’s centralization policy.

Gholamreza Khan has mentioned Pishkough as a part of his territory and authority. there have been a few years since the Seyfi, Malkhatvi and Baghsaei lands that are parts of the sacred soil of Iran and used to be victims of invasion and destruction by the Ottoman government. and finally Javad Khan the colonel with three to four thousands horsemen and gunmen in 1908 in order to force the soldiers of Ottoman out of the region. Their troop had two canons. they defeated the soldiers of the Ottoman government

During his ruling as governor, Gholamreza Khan faced the rebel of his eldest son, Amanollah Khan. “Saremolsaltaneh the third, also known as Amanollah Khan rebelled against his father in 1902 and Gholamreza Khan, the senior general was forced to find shelter in Ivan. Later, the father and son settled their disagreements and Gholamreza Khan earned his former authorities in Poshtkough.” (Bamdad 2008: 170).

As it has been stated, the period of Gholamreza Khan was the time that Poshtkough came away from political isolation. During the Constitution movement in Iran, Gholamreza Khan who had no knowledge of the nature of Constitution took different sides. (Torkaman, 1991: 427).

On objection of the governor to constitution, Valizadeh Moajezi writes that the governor of Poshtkough was not in good term with the constitutionalists and disliked the constitutionalists very much. When he heard that the Constitutionalists

Association of Khorramabad had initiated vast activities, he caused many troubles for them through his minister, Vezir Mir Seyed Mohammadkhan Ashrafolashayer and destroyed their motivations and enthusiasm (Valizadeh Moajezi, 2001:458).

Gholamreza Khan was in favor of “King-centered” tradition in country affairs and as it is written in the diary of Ali Akbar Khan Sanjabi, “People like Poshtkough Governor respected the concept of Shah and royal government in Iran out of good intension and believed serving king as their duties.” (Sanjabi, 2001: 538).

The ruling time of Gholamreza Khan coincided the ruling of Mozafareddin Shah, Mohammad Ali Shah, Ahmad Shah and the beginning of Reza Khan. He mostly acted as a conservative and was concerned of not putting his interests in risk. After the victory of the constitutionalists, establishment of Constitution system in the Capital and overthrowing Mohammad Ali Shah from power, Poshtkough’s governor too, despite his conservative political attitude waited for subsequent events and as Reza Khan’s emergence to power and shift in the policies of the central government towards local rulers, Gholamreza Khan made a political turn and established the “Committee of Ghiam Saadat (Prosperity Rebel) to back constitution, along with Sheikh Khazal and some of the chiefs of Bakhtiar tribes. The goal of the members of the committee was to support constitution and bringing back Ahmad Shah Qajar to thrown. Nonetheless, the committee practically did nothing.

In terms of running local affairs and the good conduct of the governor in handling the peasants, unfortunately, Gholamreza Khan did not show better records than his father and during that time too, the migrations became larger and people of Poshtkough still lived in poverty and distress (Center of Documents and National Library 240004610).

To legitimate their government, the governors claimed to be followers of Imam Ali among their Shiite people and peasants as much as based on the family tree available today, the governors introduces themselves as descendents of Hazrat Abolfazl Alabbas (Khital, 1997:145).

On the defeats of the Ottoman soldiers by Gholamreza Khan, Ali Razmara writes: “In 1820, like previous years, the Ottoman dispatched army divisions made of two battalions and an artillery to Mehran to collect the products of peasants. However, Gholamrezakhan the governor sent a group of gunmen and local people, led by Seyed Javad, his uncle, to destroy the troop and preventing the Ottomans. As a result, a harsh and bloody

confrontation took place and all Ottoman soldiers were either killed or captured and the border trespassing events came to an end. From that date on, a group of gunmen were assigned by the governor in Mehran- Changuleh- Dehloran, the invasion paths of the Ottoman and up to the International War where the borders of the two countries were set by delegates of four countries, due to on time and serious actions, no trespassing and invasion took place in the Iranian borders and when the Baghsaei (Bakhsai) borders were restricted, the drinking waters of Changuleh- which are now parts of Iraq- were transferred to Gholamreza Khan, the governor as his property.” (Razmara, 1941: 107).

During the Great War, the Iranian government was occupied by Russia and Britain despite its declaring neutrality; however, Poshtkouh was kept safe from turmoil and war news in those years and none of the countries at war stepped into Poshtkouh.

At last, the rise of Reza Khan and his centralization policies tightened the chain around Gholamreza Khan particularly with the claim that Reza Khan the governor “was standing in the back of Khazal with an equipped troop.” (Reza Shah the Great 1976:11). Reza Shah had once travelled to Poshtkouh before emerging to power. That trip was in time of Gholamreza Khan Aboughaddareh’s government and in his first trip to Poshtkouh, he (Reza Shah) was known as Captain Reza Khan Savadkouhi and had been sent to mission by Salaraldoleh, the Qajar prince to ask for the hand of the daughter of Gholamreza Khan, the governor of Poshtkouh for Salaraldoleh. In “The Book of Lorestan” in Sayahan’s Travel Account, it is quoted from Ezzelmolk Ardalan on the trips of Reza Shah to Lorestan that to strengthen his power, Salaraldoleh decided to marry the daughter of Poshtkouh’s governor and for that purpose, he sent Captain Reza Khan Savadkouhi to ask her hand by offering a jewel-stone ornamented sword. There is no accounts on marriage arrangements but the fact is that at last, Salaraldoleh did marry Gholamreza Khan’s daughter (Arya, 1997:148)

In 1924, Reza Khan’s troops arrived Poshtkouh and the governor left Poshtkouh with a number of his forces and seek shelter in Iraq territory (Zarbatieh City).

The monuments and buildings that are left from governors’ time in Eilam, including the building (Ghaleh Vali [Governor’s Castle]) in the center of Eilam city and other castles around the city show that to make his and his family’s name eternal, Gholamreza Khan imitated the great kings of ancient Iran and ordered to engrave the political history of his ancestors on a rock in 520cm length and 810 cm

width on the entrance of Eilam to Mehran Road and that manuscript is now famous as “Takht Khan” engraved rock.

A brief history of Reza Khan

In July 1914, Ahmad Shah who had reached the legal age is crowned. One month later in August 1914, the First World War (The Great War) breaks in the world. The Iranian government announces its neutrality; however, Iran becomes the arena of fights and wars of great European states. Following those invasions, parts of south and north of Iran were occupied by English and Russian forces. Several popular uprisings emerged to fight against invaders and occupiers. Mirza Kuchak Khan in north Iran raise the flag of resistance and in south Iran, the forces of Chief Ali Delvari, the Dashtestani and the Tangestani stepped into battle to weaken the pillars of Qajar dictatorship; however, they failed in establishing a national unity and integrity, and a governmental authority (Abrahamian, 1998:101).

The provinces were practically out of control of central government and insecurity was governing the country. In August 1918, Vossoughdoleh was assigned to form his cabinet. He signed a treaty with Sir Percy Cocks the Britain’s minister in Tehran that put Iran under practical guardianship of England (1919). The news of that treaty led to serious internal and external reactions and the contents of the treaty practically were not realized. The government of England who found their puppets unable to execute the provisions of treaty 1919 plotted a coup in Iran and on February 22, 1921, the coup succeeded. The principal actor in the plot was no one than Reza Khan Mirpanj. The failure of treaty 1919 and the danger of communism influence in Iran, followed by the victory of the Bolsheviks in Russia (1917) endangered the interests of England. Therefore, England was urged to change its policies in Iran.

Britain sacrificed the small dependent local powers for Reza Khan and instead directed their investments on him.

Reza Khan was first appointed as the Minister of War, followed by becoming prime minister. He tried to provide grounds to establish a political centrality and put an end to the feudalism in Iran, improve safety and overthrow the fading Qajar dynasty. The actions which were adopted in this approach included putting an end to the Jungle Rebels with the dramatic act of showing the head of Mirza Kuchak Khan in Tehran (Fall 1921). Surpassing the rebel of Colonel Mohammad Taghi Khan Pesian in Khorasan and the most important than all, surpassing the rebel of Esmaeil Agha Kurd known as Semitqo (Semko) in Azarbaijan, overthrowing Sheikh Khazal and the ruling of Valian (the governors) in Poshtkouh Zone.

The Committee of Sa'adat Rebel

The policy of Reza Shah against tribes included military operations and full subordination of them. Reza Khan believed that there will be no peace and security as long as tribal rebels and turmoil continued. Reza Shah planned to modernize the traditional society of Iran fast and soon even if it required using force.

Sheikh Khazal, the governor of Khuzestan was one of the symbols of feudalism. In a political settlement and compromise, Sheikh Khazal put himself under protection of English government in 1914 and his mission was to protect and guard South Oilfields plants for Britain (Houshang Mahdavi, 1996: 382).

Sheikh Khazal who realized that confronting Reza Khan was inevitable and had lost all hopes of enjoying the protection provided by England was distressed to maintain his position. He was seeking allies that like him had their interests in risk. A tertiary alliance was established by Gholamreza Khan, the governor of Poshtkouh, a group of Bakhtiari chiefs and Sheikh Khazal, named "Committee of Sa'adat Rebel". The goal of the Rebel Committee was to return Ahmad Shah to the country and expel Reza Khan.

Until emergence of Reza Khan, England used to follow the policy of strengthening and supporting local chiefs and leaders to build a stronghold against penetration of the Soviet Bolshevism; however, as Reza Khan strengthened his power and took side against local authorities in aiming at political centralization, England deserted her friends to stand alone before the new power and merely watched their being sacrificed by Reza Khan. Simultaneously by sending troops to Khuzestan, Reza Khan dispatched forces to Poshtkouh. After the arrival of Reza Khan's troop to Khuzestan, Sheikh Khazal who did not see the strength to resist, he was transferred to Tehran and was placed in Shemiranat under surveillance. Sa'adat Committee; too, never found an opportunity to help Sheikh Khazal and ultimately, he was killed by the order of Reza Shah in 1936.

The camp he sent to Poshtkouh proceeded to Mansourabad (Mehran); however, one day before arrival of army; that is, on January 3, 1925, Gholamreza Khan, the governor, left Poshtkouh with his gunmen and migrated to his private properties in Baghshahi (Moradi Moghaddam, 2006: 150).

After capturing Khuzestan, Reza Khan went as a pilgrim to the holy Shrines in Iraq. In Iraq, he sent a message to the Governor that the latter would receive pardon if he would come to Reza Khan. The governor who was fearful from Reza Khan sent his

son (Esfandiar Khan) accompanied with Seyed Abdolhossein Reshnavadi to Reza Khan.

After returning to Tehran, Sardar Sepah (Reza Khan) sent Sardar Ashraf, the attorney of Lorestan and Abolfath Mirza from court to the governor and ordered him to return to Poshtkouh. Gholam Reza Khan; too, sent a letter to Sardar Sepah and declared his loyalty and innocence. Reza Khan, too, sent an order for the government of Poshtkouh with an ornamented sword to the governor and he returned to Poshtkouh to continue his job. (Valizadeh Moajezi 2001: 176). The governor has been in his office to 1928 and during this time, he has been serving the government of Reza Khan in collecting taxes, disarming tribes...in Poshtkouh. In the beginning of 1928, Reza Shah changes his decision on Poshtkouh and he plans to take over the territory of governor. (Katouzian, 2000: 371)

Upon agreement of Reza Shah on uprooting the chain and dynasty of governors, brigadier general Koupal was assigned to capture Poshtkouh from Amir Ahmadi, the commander of West Battalion. As the governor heard the news of military arrival to Poshtkouh, he migrated to Iraq territory. As general Koupal was stationed in Ghaleh Vali, the ruling time of Poshtkouh's governors was finished.

After capturing Poshtkouh, the governor received pardon letter to go to Tehran; however, Gholamreza Khan who had no trust to the central governor, like his ancestors, refrained to do so. After making some failed attempts to win Reza Khan's trust, tried in secret to motivate Poshtkouh tribes and clans to rebel against central government. Gholamreza Khan, the governor, made attempts behind the curtain but was not apt to attract any suspicious and cautiously encouraged his sons to force tribes to rebel. Aligholi Khan (governor's son) who was the governor of Kurd Region maintained his communication with his father. They tried to have the support of tribes but they couldn't resist the central government forces. And their ruling period came to an end.

Conclusion:

Poshtkouh governors played role in the Iranian history for two centuries. The rise of Reza Khan and the policy of centralizing the scattered centers of power challenged the traditional ruling of Poshtkouh governors. Gholamreza Khan tried to build trust in order not to let Reza Khan's forces arrive to Poshtkouh. On the other hand, Reza Khan sent his troops to Poshtkouh and ultimately the governor made no efforts to fight back and left Poshtkouh to Iraq accompanied with his family and servants. Then through negotiations and mediation of Gholamreza Khan and correspondences, and declaring loyalty to Reza Khan, the governor returns

to Poshtkouh once again and serves in the new government. Nonetheless, the governor who had ruled Poshtkouh for many years with absolute power realized that there was no place for his authoritarian ruling and Reza Khan had already dismantled all authority pillars of the clan and tribe powers and was planning to direct the country from traditional society into a modern country. At the end, the last the forces of Reza Khan captured Poshtkouh and the last governor of Poshtkouh immigrated to Iraq forever. Although in an unsuccessful attempt, the governor of Poshtkouh tried to prove his innocence that traditional policy proved futile and the governor changed his strategy in secret and without trying to raise suspicion incited the chiefs of the tribes and clans to rebel. As the grounds of rebels which is described in details in another paper, were present, a rebel was formed in Poshtkouh in 1929 that made Reza Khan's forces busy for one month and was ultimately surpassed by General Ali Razmara.

After the failure of rebels, the foundations of central government were stabilized in Poshtkouh and following that, in 1932, the name of Poshtkouh was changed into Eilam. From that date on, a new chapter was opened in the political, social, economic and cultural life of Eilam and the chain of the governors vanished from Eilam forever, as the name Poshtkouh faded with it.

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10/4/2012

Study the written versions on Garshasp in literary, religious and historical texts of Ancient Iran and Islamic Era

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Abstract: Myths and religions are among the most unknown and valuable areas in the human cultural scope and the mythical elements are linked with the disciplines of that area like thick branches. One of those characters is a hero called Garshasp that according to the religious texts does many difficult tasks to save the earth and men from the Divas and dragons; however in literary texts such as Shahnameh, there is no manifestation of him and his tasks. Garshasp is one of the mythical heroes of ancient Iran of Pishdadian hero. This hero of ancient Iranian religious texts has many heroic acts in his records; although, due to his disrespect to fire, Urmazd prevents his ascendance to the heavenly paradise and even Zoroaster's meddling is not able to include him in the list of paradise goers and Izad (Zoroastrian God) does not allow him to enter into paradise. Nonetheless, in the national versions, his place and description of heroic acts are all given to Rostam and Shahnameh becomes a book of describing the heroic acts of Rostam. However, Assadi Toosi creates a masterpiece called Garshasp Nameh to return the heroic acts to Garshasp. Garshasp, this ancient hero belongs to Indo-Iranian era. The myths about this pre-Zoroastrian hero entered into religious narrations and tales and take the Zoroastrian themes. The different versions of those tales make it difficult to distinguish the time and character of Garshasp in the mythology field. It is true that this hero has no relationship with the Kiani Family; however, his presence became the origin of dynasties in many stories and tales that in national versions have close ties with Kianian history. Garshasp is immortal. This myth belongs to ancient time because in one of the oldest parts of Avesta, the maintenance and saving Garshasp's body has been noted. This strong hero who has been named underline many religious tales and Yasht(s) for fulfilling many adventurous and heroic acts does not receive much attention in our national stories and mythology, as seen in Persian and Arabic histories. As both the Avesta religion and Iranian mythos were developed and formed in east Iran of ancient time, is it possible to say that the mythological beliefs have been put in the sacred levels of the Avesta knowledge? Our goal in this research is, first, to describe Garshasp in the religious texts of ancient Iran, followed by Pahlavid texts, the Islamic era resources and the poetry pieces and in conclusion, those subjects have been compared and duly analyzed. This research has used literature review, taking notes and comparing the subjects in notes and selecting the best materials, describing and analyzing them as well as using descriptive method. The data has been collected via literature reviews, checking libraries and reviewing the religious and non-religious ancient texts, comparing and studying the notes and selecting the topics that are completely related to the subject by using both ancient and new sources. In addition, the new studies have been used in the research as well. In order to have better results, the author studied the texts of other nations to introduce similar materials as found in other texts too.

[Golnaz Saeidi. **Study the written versions on Garshasp in literary, religious and historical texts of Ancient Iran and Islamic Era.** *Life Sci J* 2012;9(4):4948-4961] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 742

Keywords: Garshasp, myth, Avesta, Dinkerd, Garshaspnameh

1. Introduction

Kershasp¹ of whom Avesta has some description is the unique hero of the ancient Iran and

¹ Garshasp, in Pahlavid language, : karsāsp, karišasp, in Avesta: kərəsāspa- in Persian, Garshasp is one of the Avesta heroes and it seems that in Shahnameh, many of his heroic acts and glorified character have been absorbed by Rostam (A Research in Iranian mythology, P. 239, 2010).

The first Iranian rulers and the Indo-Iranian rulers were clergys; that is, they performed the royal and religious duties at the same time. It is not unlikely that the members of Sam family who lived in east parts of Iranian territory, who were also known as

if the Iranian myths could find fame across the world, Garshasp could be famous as Hercules. There have been already some detailed researches and researchers have given different ideas. The most important controversial theory about him is Marcurat's idea on conforming Garshasp and Rostam and believing both to be but one. Believing both heroes to be one was first brought up in Yasna Hat 9. In this part, we know his father's name and it is described that Garshasp was a brave boy who, whose family (or clan) were honored to have the son because of keeping the Hume, or being the monk that saves the sacred plant (Hadumea):

Hirbods, were also considered as local kings too (Research on Iranian mythology, P. 239, 2010).

He then answered me as, “This pure Hume keeps away death: The profit of the most favorable Saam, prepared me to appear among human people for the first time; that is the reward which has been given to Saam. This great happiness was given to him as two sons were born to him, Urvâxšaya and Garshasp. The first one is a judge and bringer of laws and the second is the long-haired that carries club (*Gadavarān*). (Daneshnameh, P. 1606, 2002).

Two are killed by him, the Gandrodiva Zarrinpashneh (the golden heel Gandro Diva) and Golden Crown Hitaspa, one of whom is the murderer of Bradesh and the other one was from Diva race. Garshasp scarifies for the water goddess, Aredovisvar- Anahita to find victory over Gandro and succeeds: For me, O’ Zoroaster, worship Spantamen, this Aredovisvar, Nahid, the one ...Nariman Garshasp scarified one hundred horses, a thousand oxen and ten thousand sheep for her on the shore of Pišingha lake – Pišansi in Pahlavid literature and asked her to bestow the pleasure. You, the pure and good, you the most power, you, Aredovisvar Nahid. (ibid, P. 1607)

Keresâspa (owner of thin horses)

Garshasp, the young club-bearing long-hair youth is another dragon killer heroes of ancient Iran. He is not a god like Fereydoun and for that reason, the Zoroastrians do not worship him, though they make sacrifices for him for special wishes. There are many myths- or better to say tales- about this great adventurous hero but only few are left. It has been said that he killed *Gandarūwa*², the golden heel dragon who moved on earth with mouth wide open to devour and his head reached sun. It could devour twelve men in one bite. It is said that fight with the dreadful beast took nine days and nights in “Cosmic Sea” (John Hitles, 2007, P. 61).

This ancient hero belongs to Indo-Iranian era. The tales of this pre-Zoroaster character arrived into religious stories and found Zoroastrian theme. The variety of the narrations has caused difficulty in tracing back the time and character of Garshasp in mythology. Garshasp is the son of Soritha³ He was the most powerful man in Saam family and is the third person among men that pressed Hume according to

² Trith, Serith, Atrat and Asrath in some Persian and Arabic text.

³ The first Iranian rulers and the Indo-Iranian rulers were clerics; that is, they performed the royal and religious duties at the same time. It is not unlikely that the members of Saam family who lived in east parts of Iranian territory, who were also known as Hirbods, were also considered as local kings too (Research on Iranian mythology, P. 239, 2010).

the traditions and as a reward, two sons are born to him, one is called Urvâxšia, the legislator and the other is Garshasp Gisvar (with curled hair), Narmanesh (brave), Gorzvar (club-bearer) and the strongest among men. Therefore, in chronological order in this story, Garshasp is after Jamshid and Fereydoun and before Zoroaster. It is true that Fereydoun found victory over Zihak but, destruction of Zihak in the last millennium of mankind, when he (Zihak) frees himself, will be in hands of Garshasp. The heroic acts of Garshasp starts by killing the horned dragon (Zhaleh Amouzegar, 2009, P. 62). Both Avesta and Pahlavid texts are filled with the heroic acts of this magnificent man (Garshasp) and he is the one who will play a major world at the end of the world and as one of the immortals, he is the destroyer of Zihak when the world is coming into end (from Myth to History, 2011, P. 227).

The story of Garshasp’s soul in Avesta is one of the most significant and specific stories of Garshasp in ancient texts.

Garshasp persisted on the Urmazd creation and saved many; however, as fire showed discontent for Garshasp, he was not accepted in heaven. The spirit of Garshasp complained to Zoroaster and said he wished to live in time of Zoroaster to convert in his (Zoroastrian) religion and would be then saved from purgatory. He then gave an account of his great tasks and heroic arts and asked to be accepted in heaven for them. Again, the god of fire, who gives permission for entering into heaven did not forgive him. Garshasp then asked to have another life to clean the purgatory from divas (beasts); however, it was not yet the time. The heavenly gods and the worldly gods cried and Zoroaster called Urmazd as grudging. Zoroaster accepted that when fire blesses Garshasp, he (Zoroaster) will teach people to keep fire (A Research in Iranian Mythology, 2010, P. 233)

And it is known that fire is blessed then Urmazd said to Zoroaster, “When you see well, whose spirit the heaven would like more, the one that answers to, perceive of and understand the (divine) greatness?” and Zoroaster answered, “the soul of Garshasp” (A Research in Iranian Mythology, 2010, P. 234)

Urmazd ask Garshasp’s soul. The soul of Garshasp gave the news of evil he had seen in the purgatory to Zoroaster, saying, “I was the Hirbod of strong and moon and sun backed me. I went to the world in seek of life and the world looked ugly in my eyes and the world was afraid of my deeds.” Urmazd said, “Stand up you the soul of Garshasp! As you seem ugly in my eyes as you killed my son and you did not turn your back to that (murder).” (Ibid, P. 234).

The spirit of Garshasp said, “Forgive me O’ Urmazd and grant me another time (to live) [because I] killed the horned dragon whose horse was load and death and (each of) his tooth was as big as my arms and his hear was in size of fourteen mat (hats) and his eyes were as big as a wheel and his horn was long branch. I ride on his back for half a day until I had his head and I hit it with a club and killed him. If I had not killed him, your whole creation would come to destruction and you would never be able to challenge the devil⁴ (A Research in Iranian Mythology, 2010, P. 234).

Urmazd answered, “Stop! As you killed fire, my son.” (Ibid P. 235)

Garshasp said, “O’ Urmazd, let me in the heaven otherwise, give me time, as I killed Gandaruwa who devoured twelve men in one attack. When I looked into the teeth of Gandaruwa, I saw dead men hanging in his teeth. The beast took me from my beard and dragged me into the sea. We fought in the sea for nine days and nights in the sea. I then became stronger than Gandaruwa and took the heel of Gandaruwa and pulled its skin up to its head and tied Gandaruwa hands and legs with it and pulled him from sea to the shore and handed him over to Akharverg⁵. I killed fifteen horses and ate them and then I slept in the shadow of the animals.” (Ibid, P. 235)

“Gandaruwa and Akharverg killed my friend, and killed her who was my wife and my parents⁶, it awakened all my people (?). I stood up and search one step to thousand steps and it smashed whatever it was under my foot. It destroyed everything and then, he was put in fire. I left to sea and returned them and I took Gandaruwa and killed him. If I had not killed it! Devil would then become the king of your creation.”

Urmazd said, “Stop, as you are ugly in my eyes, that you killed the one who was my son.” (Ibid, P. 235)

Garshasp said, “O’ Urmazd! Bestow me the heaven or give me another time, as I killed bandits whose bodies were huge and when they walked,

people would assume stars and moon were under them a sun was floating below their feet and the sea was to their knees and I was only as tall as to their ankles. And I destroyed them in their ankles. They fell down and in their fall, they ruined a mountain. If I had not destroyed those bandits, the devil would rule your creation”⁷

Urmazd said, “Stop, as you are ugly in my eyes as you killed fire, my son.” (A Research in Iranian mythology, 2010, P. 235)

Garshasp said, “O’ Urmazd! Bestow me the heaven or another time, as I frustrated Renchevo. The divas betrayed the wind and said to it, “You are stronger from any creators. Now, believe that no one is stronger than me. Garshasp moves on the land and ignores divas and people and he looks down at you, the wind, too.” (Ibid, P. 235)

“When wind heard those words, it uprooted any huts and trees in its way and scattered the dust on its way and dark took [over] everything (Ibid, P. 236).

“When it came to me, Garshasp, it knew that it could not shake me and I stood up and pushed [it]down on earth. I stood on its body until it took a pledge to return below the earth and never leave it and do whatever Urmazd had said to it to do and keep the land and sky. And, if I had not done that, devil would rule over your creations.”

⁷ In “Sad” book in Bondoheshn in Persian, in the wind story, there is a tale which is lost in Pahlavid text and is written here (A Research in Iranian mythology, 2010, P. 240):

The spirit of Garshasp said, “O’ Urmuzd God! Bless me, and place my soul in the heaven. It must be known that when Kamag (bird) appeared, it opened its wings over all people of the world and the world went dark. Each drop of rain that fell from sky would land on its back and its tail drove rainfall into the sea. And the bird would not let a drop of rain on the earth. The whole world was destroyed by plaque and need. People were dying and the springs and rivers were drying. People and animals were devoured by death like harvesting wheat by people. No one could find a cure. I took my arrow and bow and shoot my arrows like rain falls. I hit both his wings for seven days till his wings were so loose that fel on the ground. Many people were buried under those wings and were destroyed. I destroyed his beaks and if I had not done that, the whole world would be ruined and no one would stay alive. This power and strength was given to me by you, O’ Urmuzd ; otherwise, I had not such power.” (A Research in Iranian mytho, 2010, P. 240)

⁴ In Avesta (19th Yasht, clause 40) it is said that Garshasp has put a pot on the back of the dragon and cooked food. The dragon was distressed by the heat and leaped to free itself from the pot and the boiling water poured down and Garshasp the brave was afraid and pulled himself aside (A Research in Iranian Mythology, 2010, P. 240).

⁵ Āxrūrag, Avesta: rauxra (A Research in Iranian Mythology, 2010, P. 240)

⁶ Yegda, meaning nurse and keeper; however, in Iranian dialects and languages such as Hamadani and Kurdish, such terms are also meant as mother too (A Research in Iranian mythology, 2010, P. 240)

Urmazd said, "Stop, as you are ugly in my eyes as you killed fire, my son." (A Research in Iranian mythology, 2010, P. 235)

Garshasp said, "O' Urmazd! Bestow me heaven or another time. As it is written in the religion that when Zihak frees himself from captivity, I am the only one who can destroy him. For that reason, bestow me the heaven or give me another time and if it is not heaven or another time for me, then return me the power and victory I had when I was still alive; for, with that power I could kill devil and the divas. I will then uproot darkness from the purgatory and I will then sit in it and will stay inside it." (Ibid, P. 236)

Urmazd said, "I will not give it to you, O' the spirit of Garshasp! For, while people sin and while people do not sin, you will not receive life, and other people could not be given life again; as in the judgment date, all people should be innocent. When people die and their spirit is in captivity, then they will lose all comforts and all [evils] will be enforced upon them." (Ibid, P. 236)

When Garshasp saw his deed in that manner, the spiritual and the human gods cried in tears and Zoroaster, the son of Spitema cried and said, "O' Urmazd, even though you are not deceitful, in my eyes, in treating the spirit of Garshasp, you are deceitful; for, if Garshasp was not in body and soul, none of your creatures would survive on the earth." (A Research in Iranian Mythology, 2010, P. 236)

When Zoroaster was silent, fire stood up and spoke of Garshasp's sin towards it and said, "Never have I allowed him into the heaven!" Fire said those few words and stood silent. Zoroaster stood up and prayed fire and said, "I will not send him to the purgatory as he has made many good deeds for me." Goshoron god said those few words and stopped. Then Zoroaster stood up and prayed to fire and said, "I will save you and I will spread the world on your deeds. I will say to Goshtasp and Jamasp to see as Garshasp showed penance and begged for forgiveness, the fire gave up vengeance and blessed him" (Ibid P 237)

Zoroaster asked Urmazd, "Who is the first corpse you will raise?"

Urmazd said, "That of Garshasp." Zoroaster was unhappy for that and asked Urmazd, "If Garshasp's deed was killing people, for what reason his corpse will be the first to be returned?"

Urmazd said, "It comes hard to you, O' Zoroaster! For, if it was not for Garshasp and if he had not performed those few deeds as said, neither you nor any of my creatures would survive." (A Research in Iranian Mythology, 2010, P. 237).

And in that millennium Oshidar Mahan, people will have the craft of medicine. They will bring medicine and healing and will take and bring, as no

one will die unless by accidents; if being stabbed by knives or swords (Ibid, P. 237).

And a renegade asks public treasure to have some share from the traditional grants, he will not receive it because of evil and blasphemy (Ibid, P. 237).

The renegade will then turns to Damavand mountain which is the captivity place of Biverasp (Zihak) in rage and will open his mouth and will say, "There have been nine thousand years since Fereydoun is not alive. For what reason, you do not tear your chain and rise because this world now belongs to people and they are fulfilled with their wishes." (Ibid, P. 237)

When the renegade says those words, Zihak who is staying in captivity for the fear of Fereydoun sculpture that resembles to (physical shape of) Fereydoun, he does not unchain the first chain and thus, the renegade pulls out the chain pedestal from its roots. Then, the power of Zihak improves and he unties his body and chains and starts attacks. In that place, he brings the renegades. He attacks the world, sins and commits numerous evil doings. He takes one third of people, cattle and other creatures of Urmazd and destroys water, fire and plants. He commits grave sins (Ibid P. 238).

On those events, water, fire and plants take complaints to Urmazd the god and beg him as, "Return Fereydoun to the world to tie Zihak; for, if you, Urmazd do not release him, we cannot survive." Fire says, "I will not shine" and water says, "I will not float" (Ibid P. 238).

Then, I, Urmazd the god will say to Soroush and Narivsang god "To shake the body of Garshasp, Saam to rise up." (Ibid, P. 238)

Then, Soroush and Narivsang god will go [to] Garshasp and cry loud three times and in the fourth time, in victory, Saam will rise up [to] take Zihak. He (Zihak) will not listen to him and he (Garshasp) will hit his head with his club and will kill him (Ibid, P. 238).

Then deceit and Patiareh will leave this world for millennium to end. Then Soshians will revive pure creatures and the judgment day and the after body will come to stay (A Research in Iranian Mythology, P. 238).

Saam is asked to stay unconscious. In that time, the religion of Mazdisnan is disregarded. A Turk boy [who is called] Nohin, throws an arrow to Garshasp when [Garshasp] is sleep in Pishansa valley⁸. Bushasp the evil takes him, he falls into the

⁸ In Bondaheshn (P 198, clause 11) it is written that Bishansa valley is in Kabulestan (the land of Kabul) which is known to be the most apparant height in Kabulestan. Pishansa valley is in that

damage⁹. Snow falls on him; for when Zihak rises, he (Garshasp) could stand up and challenge him. Ten thousands of angels and righteous people guard him (Ibid, P. 238).

(And about) Zihak, also called Biverasp it is said, “Fereydoun could not kill Zihak from the place he (Fereydoun) defeated him; therefore, he (Fereydoun) chained him in Damavand mountain. When he (Zihak) becomes unbleached, Saam will rise and will kill him with club.”¹⁰

In Assadi Toosi's Garshasp Nameh it has written that, after being defeated by Zihak, Jamshid flees to Sistan and there he falls in love with the daughter of King Gorang and marries her. A son is born for them whom they call Toor. However, Zihak finds the whereabouts of Jamshid and he (Jamshid) is forced to flee. He goes to India and then to China and at last, Zihak finds him in China and cuts him in half by using a saw (22/43 Shahnameh 206/4). After Jamshid, his son Toor and all his descendents; Shidasp, Torag, Sham and Asrath, rule Sistan till Garshasp is born for Astarth and from this part on, it is the story of Garshasp. The first heroic act of Garshasp is killing a dragon when he is fourteen years old. He does the act at the request of Zihak, when he (Zihak) goes to the feast of his father, Atrath. From that time, Garshasp is accepted in the court of Zihak and leads troops to India. Garshasp's most important acts of Garshasp is his fight with Baho and the other is his discussion with Brahman and the third is visiting magnificent scenes in the Indian Islands. After returning from India, he leads troops to Ghirvan and other lands and kills Manharas Diva. He does many magnificent acts and then goes to Rome and marries the daughter of their king and returns to Iran. He discusses with the Roman priests and leaves that territory and returns to Iran. After his return to Iran, their father dies and Fereydoun becomes king. Garshasp starts serving Fereydoun. From this part on, Nariman who is the nephew of Garshasp in Garshasp Name steps into the story and he; too, shows many great acts and leads troop to Tooran and sees many magnificent acts. Nariman; too, is accepted in the service of Fereydoun and marries the daughter of the king of Balkh and a boy is born to them who is called Saam. The last adventure of Garshasp is his battle with Tanjeh king in Garshasp's seven hundredth birthday. Garshasp dies at the age of 733 and with his

territory. There, Pishasa is the heighest peak, Today the valley is called Pishin-Dasht. It is a very vast place (A Research in Iranian Mythology, 2010, P. 240)

⁹ The meaning is not known by the author (A Research in Iranian Mythology, 2010, P. 240)

¹⁰ 19th section (A Research in Iranian Mythology, 2010, P. 240)

death, the book finishes too (Iran Nameh, Jalal Khaleghi Motlagh, 1st year, 1983, vol. 3, P.379). Fereydoun ascends to throne and from this point on, the name of Garshasp in the stories of kings becomes vague in some extent. In the 8th book of Dinkerd, chapter 13, clause 22 (the eighth book, chapter 12, clause 12 of Pashoutan Sanjana publication, quoted from Chehrdad Nasak) and the book Minog Fart of Kiani dynasty and in the seventh book (chapter one, clause 32), Garshasp's name has been mentioned after Manouchehr and Zaab and before the name of Keyqobad, the first king of Kiani dynasty (Christiansen, 2008, P. 152).

In Yasna 9 Garshasp's name is between Fereydoun and Zoroaster, in Yasht 9, his name is between Fereydoun and Farangarsin and in Yasht 15, the name is between Fereydoun and Keykhosrow. Thus, in all cases, his name, with respect to the chronological order is mentioned after Fereydoun, as the second heir of the Jamshidi's grace (Ibid, 152).

In Datstan Dinig (chapter 37, clause 35), Garshasp's place in the chain of kings is between Manouchehr and Keyqobad; however, in the Iranian version of Bondaheshn, his name is placed between Keykhosrow and Lohrasb (Ibid, P. 153).

In Avesta, Garshasp's name is Crespasa and his title is Nairimana; meaning male like and his family name is Sama; meaning keeper and savor. In Bondaheshn, Garshaspnameh and other Pahlavid texts and Farsi, he is called Garshasp, Nariman and Saam. In Bondaheshn, Ferdowsi's Shahnameh, Bolmavid's Shahnameh and many other texts, the name (Saam) is for the son and grandson of Garshasp; however, in Garshaspnameh, the name is for his nephew and grandson of his brother. In some Pahlavid texts, Saam is the very Garshasp. In Birouni's Asarolbaqie (part 104), Garshasp is the very Saam and son of Nariman. In Masoudi's Moravejolzahab too, Garshasp is Nariman's son (Jalali's Irannama, Jalal Khaleghi Motlagh, 1st year, No. 3, P. 407).

In Aburrehyan Birouni's Assarolbaqia, the ancestors of Garshasp is listed as follows: Zaab, son of Tahmasb, son of Kamjhubar, son of Zuban Hushab, son of Vidink, son of Dosar, son of Manoushjar Garshasp; and, Saam, son of Nariman, son of Tahmasb, son of Ashk, son of Ush, son of Dosar, son of Manoushjehr... As the story continues, Rostam Dastan is called as the son of Garshasp. He is descended from Keykavous son of Kinia, son of Keyghobad, who committed a sin and Shemmer captivated him and Rostan, son of Dastan, son of Garshasp freed the king from captivity (Aburehyan Birouni, 2010, P. 147).

The author of History of Sistan describes how Sistan was founded by Garshasp:

However, the foundation of Sistan was by Garshasp, son of Asrath, son of Shahr, son of Kurang, son of Bidasb, son of Toor, son of Jamshid Malek, son of Yunjahan, son of Inhekid, son of Ushhang, son of Faravak, son of Siamak, son of Mishi, son of Kiumars; and, Kiumars was Adam (History of Sistan, 1994, P. 1).

Ebn Balkhi in his Sharh Moluk Faras says: The first class of the kings of Faras is called Pishdadian (Ebn Balkhi, 2005, P. 9).

According to Ebn Balkhi, Garshasp was the 11th king in Moluk Faras of Pishdadian class:

- 1- Giumars Golshah ruled as a king for forty years.
- 2- Hushanj-Pishdad, forty years
- 3- Tahmures, son of Abunjahan, thirty years
- 4- Jamshid, son of Tahmures, seven hundred and sixteen years
- 5- Bivarasf, son of Arvandasaf, one thousand years
- 6- Afereydoun, son of Asghian, five hundred years
- 7- Manouchehr, son of Mishkqoryar, one hundred and twenty years
- 8- Shahr Yaraman, son of Asghian, sixty years
- 9- Afrasiab, twelve years
- 10- Zaabzu, son of Tahmasb, thirty years
- 11- Garshasp, son of Voshtasb, twenty years. He is the last king in Pishdadian dynasty (Ibid, P.13).

There are controversial ideas about Garshasp's origin. Some say that Garshasp was the son of Zuben Tahmasb (Ferdowsi in his Shahnameh claims Garshasp to be son of Zutahmasb) and some say that he was nephew of Zu. According to the second story, Garshasp son of Voshtasb, son of Tahmasb and was a king during Zu's time. Some say that Zu opened kingdom in his own desire and some say he chose him for his courtship and Garshasp's mother is the grand grandchild of Ebn Yamin, son of Jacob and ancestor of the prophet of Islam (Ebn Balkhi, 2005, P. 14).

Regarding the race of Garshasp, the only harmony that is seen in Garshasnameh, Avesta and Bondahehn is about the name of Garshasp's father. In Garshasnameh, his father's name is Athrat, in Bondahehn (33-22/35) it is Asrat and in Avesta (Yasht 10/9), Vandidad 1/20), it is Thritha. In Avesta, Bondahehn and Garshasnameh, Garshasp's father has two sons, one of them is Garshasp and the other one, in Avesa, is Urvax, in Bondahehn, it is Xsurva and in Garshasnameh, it is Gourang. According to Avesta, Usurva is the legislator and Garshasp is a hero. Usurva is killed by Hitaspa, the golden crown and Garshasp takes revenge for his murdered brother (Yasht 41/19208/15). This story is not found in Garshasnameh and other Persian texts. Nothing is written in Avesta about the ancestors of Athrat; however, Bondahehn gives an account of his ancestors as follows: Athrat, son of Saam, som of ¹

Tura, son of ¹ Spaenyāsp, son of ¹ Durosasp, son of Touzh, son of Fereydoun (Iran Nama, Jalal Khaleghi Motlagh, first year, 1983, No. 3, P. 406).

Tabari writes about Garshasp's ancestors as follows: Garshasp is the son of Athrat, son of Sahn, son of Nariman, son of Torg, son of Sheydasb, son of Uroshsb, son of Tooj, son of Fereydoun, and this book of ancestors is closer to the ancestors book of Bondahehn (Ibid, P. 406).

In Ferdowsi's Shahnameh (721/6), Garshasp is related to Jam; that is, in this book too, the Garshasp's ancestor goes back to Jamshid rather than Fereydoun (Ibid, P. 407). Therefore, Shahnameh and Garshasnameh believe that Garshasp is ascended from Jamshid and Tabari and Bondahehn believe that Garshap is from Jamshid (Ibid, P. 406).

Avesta gives the origin of Garshasp and claims that his ancestors could be traced back to twenty one. Pahlavid stories gives a description of codes, traditions and religious beliefs or subjects about creation of heaven and stories about mythological characters such as Jamshid, Garshasp, Mashyeh and Mashyaneh (Zhaleh Amouzegar, 2009, P. 8).

First generation: Sutkar or šudkar has twenty two "Fargard" or chapters! Most subjects and contents of this book are about virtue, piety and religious faith. In fourth chapter of ninth book of Dinkerd, a summary of this part could be studied. Among the interesting and detailed issues of this part, there are some texts about the life story of "Garshasp", "Keykhosrow" and "Key Kavous" and there is a probability that the "Pahlavid" passage of Zandevoman Yasan was the seventh Fargard (generation) of first part (Avesta, 2005, P. 224).

Among the titles of Garshasp in Avesta, one is Gasu; meaning, long-haired and the other is Gadvar; that is, carrier of club. I did not notice the subject of having long hair in reading about Garshasp or one of his grandsons in the Persian myths. However, in Armenian texts, in the writings of Gregore Magistros, the title of straight haired and shaking hair which are given to Rostam must have been taken from Garshasp's long hair title¹¹ in turn, his club carrying title is famous. In Garshasnameh, after killing the dragon, Garshasp makes a club for the memory of that fight, as dragon-like (10/269) (Iran Nama, Jalal Khaleghi Motlagh, first year, 1983, volume 3, P. 408).

In Yasna, except one time, nothing is written about Garshasp and that is, cooking food on the back of the slept dragon (Yasna, Part 9). It must be said that essentially, there is no name or talk about that famous

¹¹ See the journal of Faculty of Literature and Human Science, Tabriz University, 1974, part 73

hero. In Yasht 5, his battle with Gandaruwa, the golden hill diva and this has been repeated in fifth, fifteenth and ninth Yashts (Daneshnameh, 2002, P. 1606).

According to Yasht 19, Gandaruwa has been introduced as, “he had risen with open jaws to destroy the physical world and righteousness...” and in 15th Yasht, the same is noted and killing Hitasp the golden crown has been described:

In Guae, Garshasp the brave worshipped him [Vaye, the god of air], in the waterfall, the colors were created by Mazda, on the golden throne, on the gold cushion, on the golden carpet, visted close to Barsam with his generous palm and begged him [Vayu] to give him (Garshasp) the victory, “bestow me the victory, O’ Indrarvay [Vaye], to come on top of my hand, as I wish to kill Histasp for the blood of my brother, Xusurva that he shed, and I wish to drag the beast in my chariot. It was then the Asti Gafya, the hord, this is with Aevo-Gafya the great, this is how it goes with Gandaruwa that dwells in water.” The crafty Indrava helped him to gain victory and Garshasp became victorious (Daneshnameh, 2002, P. 1607).

In that place where Zoroaster hailed Hume and asked, “For the third time, who of the people in physical world pressed you O’ pure Hume to make the sacred drink and what benefit and good was given to him to compensate that good deed.” The death remover Hume answered, “The third one among this earthly life was Thrita (Garshasp’s father) from the family of Saam, the one who was the most charitable one in his family and from the people of this physical world, he was the man who pressed me to make sacred drink and for that profit and good deed and because of his charity, he had two sons, Uraxuia and Kerespa (Garshasp), the first was a judge and legislator (Takenesh- teacher, judge) [Datvaraz] who brought giving pledge and supervised the laws of Urmazd, the leader of Var and heavenly tests and the other was a brave, long-haired and club bearer hero (Hume, Yasht, Yasna, Part 9) [Avesta 2005, P. 455]. One of the most important tasks of Garshasp in Avesta is killing the horned dragon (Yasna 11/9) as described in Pahlavid texts such as Dinkerd (14/9), Minoui Kherad [heavenly wisdom] (50/26) and Garshasnameh (part 63/52, 454-457). (Iran Nama, Jalal Khaleghi Motlagh, first year 1983, P. 408).

He (Garshasp) killed the horned dragon who devoured horses and men, had a yellow color venom that would throw one spear farther and would jump to the face, then unknowing, Garshasp was cooking food in a pot in mid-day. The dragon felt hot and became restless and moved. Then the boiling pot was turned on side and the contents poured. Garshasp

Nariman was afraid and pulled back (Hume, Yasht-Yasna, part 9) (Avesta 2005, P. 456).

There have been many of the beasts, bandits and wrong doers who were captivated by Garshasp. One of them was a gigantic bird named Kamak that spread its wings on the air and covered the land. Its wings used to cover the land so vast that the rain could not reach the land. In one instant, Garshasp was forced to flee from the horned dragon: (John Hynels, 2007, P. 61)

That devoured horse, devoured man and was yellow and poisonous,
The venom on his back would rush out as long as a spear.

The hero Garshasp was cooking meat in a pot on the back of the dragon in lunch time.

The beast felt hot and sweated.

It jumped forward in a haste

Spraying boiling water in every directions

Garshasp flew in fear¹² (John Hynelz 2007, P. 62)

After performing the rituals in the coasts of Pishina lake, Garshasp prays to defeat the powerful lie-worshiper Gandaruwa, the golden hill in the battlefield that would be in the coast of Farakhkart sea and to find victory over him (Aaban Yasht, 5th Yasht, Deed 10) (Avesta, 2005, P. 355).

In the seventh deed in Raam Yasht- the 15th Yasht, the brave Garshasp prays to Izad (god)- Goda Izad- on a branch of Zanga river and begs him to give him (Garshasp) strength to take revenge for the blood of his brother Uraxia from Hitasp and destroy several other of his enemies. This wish is accepted by the Izad and Garshasp earns the victory in the battle (Ibid, P. 422).

Garshasp had nine sons, killed the nine sons of Patani, the sons of Nivik and Dashtiani, and Varashvadanin and Piteon, the friend of Javadan (Yasht 19, clause 41). He destroyed the powerful, deceitful, lame and intelligent “Arzoshaman”. He killed “Shenavizak” whose feast was of rock and he was the same one who wanted to make chariot from the sky and make a wheel from earth, and to tie Urmazd and Ahriman (Satan) on his chariot (Yasht 19, clauses 43-44) (Christiansen 2008, P. 146).

In Zamyad Yasht- 19th Yasht, when for the third time, a glory that was owned by Jamshid unties itself from Jamshid of Jam in form of a bird and song. Garshasp Nariman took that glory and became the bravest among the bravest, except from Zoroaster. The glory gave him such force and masculine strength that: “He killed the horned dragon as it used to devour horses and men, it was the yellow poisonous dragon that spat venom on horses and men and devoured them. The poisonous dragon whose venom

¹² Yasna 9, clause 11, Greschvich, literature, P. 63

would be spread on air as long as a spear. Garshasp cooked stew on an iron pot on the dragon's back. The beast burned below the hot pot and moved suddenly so the boiling water poured around. Garshasp Nariman became fearful and pulled back. He killed Gandaruwa who was a golden heel diva that moved on land with wide open jaws to destroy the world with strength...Garshasp Nariman killed the beast and destroyed his life energy (Deed 6, Avesta, 2005, P. 445).

In Surtrask¹³ describes Garshasp's heroic acts and championship practice with more details. According to that part, the hero succeeded to soften Vatyā, the storm diva that used to make turbulences on the land.¹⁴ He (Garshasp) insulted fire because he lashed it in front of Urmazd and for that reason, fire prevented the soul of Garshasp to enter into the heaven and at the same time, Gosurvan (the soul of oxen, the deity in Drvaspa) was kind to him and was trying to keep him away from the purgatory (Christiansen, 2008, P. 147).

In Avesta, the body of Garshasp is protected by Farvahars (angels) and when Zihak breaks his chains and kills people, Garshasp is awakened and destroys Zihak.

"We praise the powerful pure Farvahars as 99999 of them are put to guard "Farakhkart" sea and in that manner, they guard the seven-color star, the body of Garshasp and the fetus of Zoroaster (Farvardin Yasht, 13th Yasht, Deed 17-20) (Avesta 2005, P. 406).

In one of the lost parts of Avesta, named Sutgransk, the 15th Fargard (part) the acts of Garshasp are described. Only one clause of this part has been repeated in Dinkard (14/9). (Iran Nama, Jalal Khaleghi Motlagh, first year, 1983, Vol. 3, P. 412).

The historians of initial centuries of Islam described the stories of Garshasp in the same way as they were described in the religious texts of ancient Iran; however, in connecting those doings with the prophets, the unanimous author of History of Sistan describes how Sistan was built by Garshasp:

And Sistan was built when Garshasp gathered the wise men of the world and tell them the news of "I will build a city in this life as Zihak will destroy world, kills the free men of the world and creates a dark magic that would ruin the world and the people in the world will be in distress; however, he will have no power and domination over the city I have built. But, what I wish is to see good and look

from seven, four and twelve parts and calculate and start in a day which is not dark and has no evil in it. It must maintain for long as much as it is possible. Although, world and whatever in it will pass and at the end, it becomes trivial." (History of Sistan, 1994, P. 1).

They waited and contemplated for a long time till they saw and then said, "Now, build." First, he made the foundation of the city and then, they ordered to stay in the city for four thousand solar years till Mostafa (Mohammad) rises and the religion of Islam appears, and the people of Fars (Ajam-unwise) are called to the religion of righteousness. The first group who listen to him is the people of Sistan...(Ibid, P. 1).

Garshasp was happy and gave them presents and built the city and finished it. The story of Garshasp is long and the book covers it all; however, we content ourselves to this amount here to save the book from redundancy." (Ibid P. 2)

However, of his greatness and honor one was that, during Zihak, when Garshasp was only fourteen, he killed a dragon that was as big as several mountains by the order of Zihak and after that, he left to help Mehraj of India with few Zavoli (Zabol) and Iranian people, as Zihak commanded and took over Behev with thousands and thousands elephant riders and killed him and the Indians. He made the land safe and left to Sarandib and captivated Nasrin there and killed. He turned around Mohit sea and saw all those islands and strange things. He left to Maghreb from there and did many great acts (Ibid, P. 2).

Until again, Afereydoun appeared and chained his (Garshasp's) cousin, Zihak and sent someone and summoned Garshasp. And, Garshasp went with hi grandson, Narim, son of Kurang, son of Garshasp. They went to Afereydoun and Afereydoun welcomed them and placed him on crown and led Nariman on the golden chair before the thrown (Ibid, P. 2)

And, he sent Garshasp to China to capture the king of China who had not submitted to Fereydoun. Garshap captured him and sent him to the court with thousand elephant load of gold and jewelry with Nariman. He, Garshasp, was in China. He sent a letter to Afereydoun saying, "I captured this man and sent him to you and I stayed here so he return. However, you have to give him (the king) presents and send him back, as he is a nobleman and no one could keep this land except him." Afereydoun did as Garshasp had said and from there, Garshasp went back to Afereydoun and from there, he headed to Sistan. He ruled Sistan for nine hundred years and during his reign, Zihak had no power in Sistan while Zabol, Kabul and Khorasan that were under domination of Zihak in that time were given to

¹³ Dinkart, book 9, chapter 15, book 9, chapter 14, Pashutan publication)

¹⁴ This is the very Vatyā diva that is mentioned in Vandidad (Fargard 10, clause 14) and is the contradiction to Vata god.

Garshasp and Afereydoun gave more regions to Garshasp to rule (History of Sistan, 1994, P. 2).

Ebn Balkhi in his Farsnama says, "Garshasp, son of Voshtasb ruled for twenty years (Ebn Balkhi, 2005, P. 13).

Garshasp's mother was the daughter of Yamin, son of Jacob the prophet. When Zu the son of Tahmasb left the throne, Garshasp was crowned and did good deeds and it was the last years of Pishadian kings and no pieces are left to be recognized. The kingdom of Kianian vanished then (Ibid, P. 39).

Many of Iranian poets tried to write stories of Garshasp in poetry and Assadi Toosi had highest share in this effort.

Garshasp is the great mythological hero of Avesta in Persian literature. There is no mention of Rostam in any places of Avesta; there is no news of his fight with Esfandiar and in the religious Zoroastrian texts of Sassanid time, Garshasp is still the great hero (From Myth to History, 2011, P. 227).

Although Garshasp and Nariman in Garshasnameh summon people to worship only one God, they condemn attacking the idol temples of enemies (25-26/256) and Nariman executes one of the Iranian heroes, Qobad because of attacking the idol temples of the enemy despite he (Qobad) is one of the relatives of Fereydoun (1/382). Assadi writes those points when the memories of Mohammad's destruction in the Indian temples in name of religion but in truth for the greed of gaining wealth was still remembered by people (Iran Nama, Jalal Khaleghi Motlagh, first year, 1983, Vol. 3, P. 119).

It is not a tradition of Iranian to kill the messenger.

Garshasp says to the messenger of Faghour:
If it was a tradition to kill the messenger

Your head would be now lying on dust (Garshasnameh, 87/369). However, in Garshasnameh, Beheva and Africi torture the messenger and translator of Garshasp (42-45/35, 294/78)

Garshasp's deeds in Garshasnameh (8/226)

The club of Garshasp is the head of dragon (Garshasnameh (10/269)

Fereydoun gives Mahan, Ghahestan and Esfahan to the borders of Ghazvin and Rey to Garshasp (117-118/427).

The city of Zaranj in Sistan is built by Garshasp (Garshasnameh 7/463).

In his 700 years of old, Garshasp battles physically with the king of Tanjeh (Garshasnameh 85/442).

Garshasp dies at the age of 733 (Garshasnameh 2/460).

When he dies, birds in sky and animals in mountains cry. The sun eclipses and a harsh rain falls (Garshasnameh 18-19/468).

Following stanza describes how hard Garshasp hits the head of his enemy in a battle:
He hit the head of enemy with both hands so hard
That the top of his head was spread on the ground (56/257).

If Garshasp hits mountain with his club, a road is opened in the mountain so vast that a caravan could pass through it:

The place he hit on the mountain with the heavy club

Becomes a scar that makes a road for a caravan to pass (55/392)

And if he cries loud in the valley, it splits so large that a troop could pass:

And his yell splits the valley so hard

That a troop passes through it (26/277).

And in more:

If he smashes a rock by his club in India

The earth shakes in Rome by his force

In following stanzas Goshtasp that bluffs on his strength, the time stops in Garshasp's speed and his yell gives the death the assumption that the trumpet of judgment day is being blown and the poor souls rise from their graves. In china, when they see a meadow they think it is the light of Garshasp's sword:

If I speed my movement,

The leg of the time becomes leg

If I yell on the ground

The dead would jump out of grave in his seek of judgment day

The China sees a fire in the sky

She sees it as the glare of my sword (36/440)

(Irranama, Jalal Khaleghi Motlagh, first year, 1983, Vol. 3, P. 520)

In following stanzas, Garshasp's stallion is first compared to four moving pillars and the belt of Garshasp hanging from it is like a dragon hanged from threshold of a castle and then the stallion is compared to a moving mountain that another mountain rides it. It is a mountain the beast of it is shield, its plant is spear, its eagle is arrow and its valley is the battlefield warriors:

Between the two rows of battle warriors with bows and arrows

He rode off on a stallion as big as an elephant
Riding as if a drunken elephant

Troop killer, like a steel castle

A castle on four big pillars

A dragon hanged there upside down

The fast beast was like a mountain

And a yelling mountain riding it

Its beasts were but Khesht¹⁵ and his prey was warriors

The plants were spears and his eagle was arrow

The force of his foot mountain had spots

The land would give birth of a well wherever he pressed his foot (23/298) (Irannama, Jalal Khaleghi Motlagh, first year, 1983, Vol. 3, p. 521)

Resembling Garshasp with bows on hand riding a horse to a lion sitting on a mountain and keeping a dragon in his hand:

He looks like a lion keeping a dragon sitting on a mountain

When he is riding the drunken elephant shaking his belt (9/286)

In following stanza, the face of Garshasp with black hair around it is described as:

His two cheeks are like two suns with flowers

As stayed around the sun like a dark night (947/221)

(Irannama, Jalal Khaleghi Motlagh, first year, 1983, No. 3, P. 527)

In this part, the stories are mostly first hand and new and the magnificent things Garshasp sees in the Indian islands are older and more mythical and in turn, in the second part of the book many of the deeds of Garshasp in Rome, Tooran and western territories are more tale like than the first part. For example, the dialogue of Garshasp and priest is a copy of the dialogue of Garshasp and Brahman in India. The strange scenes of Garshasp in Ghirvan and other lands are just copies of the magnificent scenes he saw in India. His dragon killing in the opening of story when he is only fourteen is in fact the origin of most dragon killing tales in the Iranian tales and myths (Ibid, P. 398).

In Garshasnameh, after killing the dragon, Garshasp makes a club out of the dragon's skull for the memory of this victory and makes a flag in black color with dragon shape with golden milk muscle and a fish on top (35-36/63). This flag of black dragon figure becomes the family flag of Garshasp and in Shahnameh too, Rostam is always seen with the same black flag with dragon figure and a golden lion on it (566/214/2) and the very flag is Faramarz's flag too (345/29/4). When Iranians accepted Alexander in the ring of Iranian kings, in order to prove that he deserved the title, they transferred some of the qualities and deeds of Garshasp, Iranian heroes and kings to him, such as Alexander's dragon killing, his ascendance to sky and seeing the strange happenings

¹⁵ A battle weapon, see, Irannama, 45, footnote 34), wrapping like a snake....a Khesht in hand like a snake spinning (2/446)

and visiting dog-shaped men. All those stories found their ways into Alexander's life story and then, they returned to the Iranian literature through translations from Pahlavid texts (Ibid, P. 412).

This harmony from the beginning of story of Garshasp to the end between Garshasnameh and report of History of Sistan could be found in all topics. This clears two subjects. First, Assadi did not invent any of the stories and worked from written sources. Second, all the stories told about Garshasp, including his journey to India, Rome, Tooran, Ghirvan, Tanja and many other countries had been collected in one source and Assadi did not need to use several sources (Ibid, P. 400).

On the other hand, History of Sistan does not take its report from Assadi's Garshasnameh, rather from a prose text that was the basis of Assadi's work too. This clears that apart from the harmony and organization between Garshasnameh and Report of History of Sistan, there are still four controversies too, first, Bahram instead of Mehraj, nine hundred years instead of seven hundred thirty three years, grandson instead of nephew and absence of killing Nasrin of Sarandib in Garshasnameh (Ibid, P. 400).

The genuineness of Garshasnameh stories could be assessed by comparing some of them with Avesta and Pahlavid literature too. Followings are some of the coordination and not coordination (Irannama, Jalali Khaleghi Motlagh, first year, 1983, volume 3, P. 406).

In Garshasnameh, Garshasp serves Zihak while in Avesta (Yasht 61/13), Bahman Yasht (62-58/3) and Bondaheshn (33/33) Garshasp is one of the immortals of Zoroastrian religion that is awakened at the end of world, when Zihak frees himself from chains and Garshasp destroys him with his club (Ibid, P. 412).

However, in Shahnameh, some of the heroic acts of Garshasp are missing and Rostam has taken his place. In Shahnameh, Garshasp is mentioned only when he is crowned after Zu Tahmasb:

Zu had a son who was his favorite

The father had named him Garshasp

He ascended to the thrown

And was crowned with Kiani crown

As he ascended on thrown and received his father's place

He ruled world with elegance and glory

It passed to the time

When the tree of disaster brought fruits of revenge (1/58 on) (Ferdowsi 2003, P. 59)

He ruled for nine years and had to stand against Afrasiab's troop all the time. With the death of Garshasp, the reign of Arian Pishdadian comes to end and another family in Arian race, named Kianian, rule the world.

In other stories and in Shahnameh, the position and character of Garshasp is not very clear. In some stories, he is ascended from Jamshid. His character in Shahnameh and other stories does not have the significances of religious texts. In Shahnameh too, when Garshasp is mentioned, it is about his helping Manouchehr in fight with Salm and Toor to revenge the murder of Iraj. In addition, there is another Garshasp who is the son and heir of Zu, Tahmasb's son (Zhaleh Amouzgar, 2009, . 63). When Zu dies, Garshasp takes his place and dies after nine years of ruling (Ibid, P. 66).

According to Ferdowsi, Garshasp was the son and heir of Zu. All the battles of his five years of rule were achievements of Zaal and Rostam. The interesting point is that, Garshasp, who is a powerful hero in Yashts and religious stories with many heroic and adventurous acts is somehow ignored in national stories as could be seen in Arabic and Farsi histories (Christiansen, 2008, P. 187).

Final words:

When discussing the religious tales and quotes on Kianian, one should also speak of Keresaps (Garshasp). It is true that the hero has no blood relationship with Kianian family, his existence became the source of chains of stories that in national stories have close ties with the history of Kianian (Christiansen, 2008, P. 145).

Certainly, Garshasp of Avesta was one of the heroes with many stories of ancient time of his heroic acts in killing dragon and heroes and later, the description of his battle arts and skills found ways in religious texts and found spiritual themes. The story of a man who cooks his food on the back of a gigantic beast and appears in sea stories and the tales of Sinbad in his sea adventures¹⁶ (Christiansen, 2009, P. 147).

Stories of Garshasp are good examples of a narrow line that could separate myth from tales. Although presently, most of those stories appear as tales than myths, nonetheless, the relationship of Garshasp and the end of world implies that those tales were more religious importance than now. Garshasp, like many other ancient characters in national cultures is mostly mentioned for his brevity than deeds (John Hynles, 2007, P. 63).

Although Garshasp is respected for his brevity and is requested to remove the hostility of bandits, in Zoroastrian tradition, there has always been a doubt on his character. True, he was a brave hero, he did not respect fire, as the center of the religion's entity and paid less attention to religion. In death, he asked to be accepted in paradise but despite naming all his heroic deeds one by one, the creator did

not accept his request. Ultimately, after begging for many times, while Garshasp was crying and the angles; too, in tears, begged for him, it was only the request of Zoroaster and the symbol of animal world (i.e., Goshurvan or Goshurun- the spirit of oxen) that gives Garshasp permission to rest in paradise (Ibid, P. 63).

Four men that were famous for pressing Hume receive worthy and noble children: Jungehan has Jamshid, Abtin (Atghian) has Fereydoun, Serboat (Tritha) has Garshasp and Pourshasab takes Zoroaster as a heavenly present (Zhaleh Amouzgar, 2009, P. 33).

Iranian Hume is completely similar to Soma; however, today it is believed to be ephedrine. It is assumed that the plant ordinarily generates force and heals and when it receives prayers and is blessed, its powers become several times more. It is said that each of the four men who pressed Hume for the first time received the gift of having a noble child. Vivanghvant became Jamshid's father, Yima, has Jamshid, Athwya (Athghian, Ghasa Abtin) and Thraetaona has Fereydoun for his son and Thriza (Athrat) has Kersapsa (Garshasp) and Pourushaspa has Zoroaster (John Hynlez, 2007, P. 51).

It was for the bravery that Garshasp could find Divine glory who had escaped Jam. At the end of world, Garshasp saves people from a dragon; for, Zihak (Dahaka) frees himself from his captivity in the mountain and attacks the creator in his beastly rage, committing terrible sins and devours one third of men and animals, god revives the brave Garshasp (according to Pahlavid stories, he awakens Garshasp from his sleep¹⁷ and Garshasp kills Zihak with his famous club and saves mankind (Ibid, P. 62).

Still a long time should pass till Ushidar Mah, the second savior with his increasing force (creation of good) and gradual discharge of evil and the end of dark forces. Evil will appear once again in figure of Zihak; the very beast who was put in chain in a cave in Damavand mountain. He will escape the chain and will commit great sins. He will devour one third of mankind and animals. He will damage the good elements; that is, fire, water and plants; however, Garshasp, another ancient hero will rise and ultimately, world will be saved from that evil being (Ibid, P. 105).

According to the stories and passages of Pahlavid books, Keykhosrow disappears but is not dead. He is hiding in a secret place. His duty in particular is to awaken Garshasp the hero in era of Soshians; guide him in choosing Zoroastrian religion and ask him to destroy Zihak who is put in chains by Fereydoun to the end of world though he (Zihak) will

¹⁶ See Hauvin, bibliogr.VII, P. 90

¹⁷ See page83

free himself from chain in Ushidar Mah millennium (Zhaleh Amouzegar, 2009, P. 62).

The spirit of Fereydoun speaks of his inability to destroy Zihak and the task is assigned to Garshasp. Keykhosrow awakens Garshasp and he throws an arrow that destroys Zihak (Ibid, P. 86).

Garshasp kills the golden heel Gandaruwa, breaks into his large mansion and kills the golden-crown Hitasp who was the murder of Garshasp's brother, Uraxia. Calming down the wind, controlling the gigantic bird with spread wings and destroying huge bandits are among his heroic acts (Ibid, P. 62).

Garshasp is tricked by Pari Khanasinti in Kabul and joins him and because of disrespect to the fire, as mentioned before, becomes a sinner and despite being immortal, when Nouhin Toorani throws an arrow to him in a valley in Zabol, Garshasp falls in a deep sleep and remains unconscious to the end of the world. The angles guard the body of Garshasp until in the millennium of Ushidar mah, when Zihak unchains himself and starts damaging the creatures of the world, Amshaspandan and other gods will go to Garshasp's place and will awaken him to kill Zihak with his club (Zhaleh Amouzegar, 2009, P. 62).

Jamshid becomes sinful, Farah (glory) escapes him. This Divine glory flies away three times like a bird (Ibid, P. 54).

When Hume is separated in three times, in each course, Mehr, Fereydoun and Garshasp find it. This division could show the three roles of Jamshid; that is, the role of domination of the other world, that is given to Mehr, the kingdom Divine glory (glory), that is given to Fereydoun and the Divine glory (glory) of heroic act that is given to Garshasp. In another implication, this story narrates the diagram of the triple structures of a society that was founded by Jam and ruled over it (Ibid, P. 55).

Urmazd shows the restless and wandering soul of Garshasp to Zoroaster and because of the heroic acts of Garshasp, Zoroaster stands up before the god of fire and the god did not accept the mediation of Zoroaster and from that time, the spirit of Kereshaspdar (dependents) finds rest and peace. (Hamestayan) is the purgatory and the soul of those whose sin and good deeds are the same is kept there.¹⁸ In the passage of "Pahlavid story" which is seen with "Danstan Dinig" this part of Sutgransk is mentioned as a dialogue between Urmazd and spirit of Garshasp. In that dialogue, Garshasp talks about his great deeds and his battles with Servovara, Gandaruwa and other evil doers (Christensen, 2008, P. 148).

Like Yeumim and Chaos, Garshasp is a hero that loses eternal prosperity due to committing sins. Now, we should know what is his sin against fire?

Our only information is that he lashed fire (turned it off?). This act could be seen as a consequence of a battle he had with Servovara dragon; because when Servovara jumps up and hit the boiling water, the fire was killed; however, this assumption seems relatively unlikely and perhaps, the sin was the insult to fire that disagrees with the instructions of Mazdisna religious codes. Garshasp did that when he was under influence of Khansatiti the wizard. In the concerned part in Bondaheshn, it is briefly said that Garshasp insulted the religious codes of Mazdisna. Nevertheless, a great task had been planned for Garshasp for the end of the world. The situation of Garshasp is like Yuen and one story has been repeated for both and later, it was tried to create a relationship between the two (Christiansen, 2008, P. 150).

It seems that the basic source of all was Chehrdad Nask and the differences between the sources undoubtedly depend on the various explanations and interpretations given by the interpreters (Christiansen, 2008, P. 153).

Studying Iranian mythology that have remained in Avesta, Pahlavid, Farsi and other texts makes us believe that the heroic tradition is an ancient issue and is related to the pre-historic culture of our people. Analyzing the heroic characters in Avesta and Shahnameh shows that many characteristics of those heroes, including Garshasp and Rostam were the same characteristics of one of the ancient gods in Indo-Iranian civilization. The ancient god of Indo-Iranian culture is named Indra (From Myth to history, 2011, P. 27).

Our mythological heroes such as Garshasp, Rostam, Esfandiar and kings like Fereydoun are inspired from the model of ancient heroic Indo-Iranian god, named Indra that reflects the cattle-breeding and hunting society. In this pattern, the ethical aspects are either absent or are very trivial and this pattern could be seen in all Indo-Iranian heroes of mythology age (Ibid, P. 38).

It is very difficult to determine and trace back the origin of several stories that exist about the families of Sistan rulers. The first subject of the author is that, those stories are weak remains of the ancient story of Garshasp. As the tale-like history was developed and completed after Yashts development, Keresâspa or Garshasp could not find a definite place in history; for, in that time, the place of Manoushchehr and later Avzavu and then Nozar in historical plot of the kings had been already determined. For that reason, it was difficult to find a suitable place for Keresâspa and developers of stories worked in different forms, for instance, sometimes, he

¹⁸ See Yashts by Lommel, P. 145 on

is introduced as the Vezir¹⁹ or advisor of Avzavu (Christiansen, 2008, P. 187). Perhaps the ominous destiny of Jamshid, Garshasp, Zaal, Rostam and Esfandiar, each one of them were vanished in misery was because they did not fit the Mehr pattern and due to lack of Mehr mystic and ethical qualifications, as people assumed, were doomed to be destroyed (From Myth to History, 2011, P. 39).

Nevertheless, Bondaheshn still praises Garshasp. All heroic acts of Garshasp are described in that Zoroastrian text (Ibid, P. 227).

In my assumption, Garshasp has more a religious (worshipper) characteristic than a mythological one. In my view, in Avesta, in the book of religion and subsequently in Bondaheshn, Garshasp is a very powerful and strong hero and plays great roles in stories and myths; on the other hand, he does not play an important role in Shahnameh (Ibid, P. 443).

In judgment day, the first dead man who is raised from grave is Garshasp because if it was not the blessed acts of Goshtasp, the creation of Hormozd would not survive.

In Hushidar Mah millennium, Zihak devours the creatures and the gods awaken the unconscious Garshasp and he kills Zihak. Since Garshasp Saam ignored the religion of Mazdisnan, he was made unconscious by an arrow that was thrown to him and is now in sleep (Ibid, P. 233).

Garshasp is sacred because he has Avesta origin. Since the Avesta religion and the Iranian myths were both born in the east Iran and the existing epic notes in Avesta reflect the initial age of development of Iranian epics. The epic beliefs of Zoroastrians are crystallized and sacred in Avesta news and later, when the religious center of Zoroastrians moves from Balksh in east Iran to Pars in south Iran, the Zoroaster lose their communication with next changes of epic stories in east Iran and the Pahlavid-Zoroastrian writings mainly repeat the old epic subjects frequently as they were regarded Avesta texts and thus, sacred. In those Pahlavid texts, similar to Avesta texts, there is no sign of Rostam's bravery acts (Ibid, P. 228).

If Garshasnameh is read carefully and deeply, it could be seen that the first part of the book; that is, Garshasp's adventures in India make the oldest tales of Jalalok (Irannama, Jalal Khaleghi Motlagh, 1983, second book, P. 398).

¹⁹ Accordig to a story quoted by Tabari, see, P. 532 on

In Garshasnameh, in describing Garshasp and putting him superior than Rostam, it is said:

You will hear many words of Rostam

You will assume there was no man as great as he

If you remember the battle of Garshasp

You truly remember the battle of Rostam

(6/19 on) (Ibid, P. 413).

Conclusion:

The religious myths and stories of ancient Iranian are about a character whose heroic acts and bravery guarded earth from dragons, bandits and gigantic birds. However, this character did not earn much position in national stories so far that in creating Shahnameh, Ferdowsi shows no attention to that hero and this urges Assadi Toosi to write Garshasnameh in poems.

The religious texts respect Garshasp and even Anahid accepts his prayers and sacrifice and makes him victorious.

Some historians believe Garshasp is the same Indo-Iranian Indra and assume that heroes and epic characters in national stories belong to the same period; all dwelled in east.. They rule there, their battles and bravery acts take place in east and they die there too.

Therefore; all national stories become eastern and remain in Avesta and as time passes, they repeat again and the description of their bravery is given to other heroes and is repeated again and beyond those braveries and fighting the dragons and beasts...as originated from Avesta and religious texts, no new subject is developed.

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The Relation between Managers Skills and Multiple Intelligences in Tehran High Schools

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Abstract: This paper aims at investigating the relation between managers' multiple intelligences and their skills and explaining the relation between Gardner multiple intelligences (verbal, visual, mathematical, musical, bodily, interpersonal and intrapersonal intelligences) and the managers' technical, human and conceptual skills. The present paper is a descriptive correlational research. The statistical universe comprises all managers and teachers of public high schools in Tehran. Among 19 districts of Tehran, districts 2, 11 and 16 were selected randomly and among these districts, 60 managers (32 female and 28 male) and 300 teachers (160 female and 140 male) were selected via stratified – relative random sampling as per Morgan table. Data pertaining to multiple intelligences and managers skills were respectively collected through Gardner multiple intelligence questionnaire and interview-administrated questionnaire. The coefficients of Cronbach's alpha for multiple intelligences questionnaire and skills questionnaire are 0.89 and 0.93, respectively. The results of research analyzed via Pearson correlation test and T-test reveal that there is a significant relation between all multiple intelligences dimensions, except for verbal intelligence and intrapersonal intelligence, and the managers' technical skills. There is a significant relation between all multiple intelligences dimensions, except for bodily-kinesthetic intelligence, and the managers' human skills. There is a significant relation among all multiple intelligences dimensions, except for bodily-kinesthetic intelligence and spatial-visual intelligence, and the managers' conceptual skills. Also there is no significant relation among the managers' gender and their human and conceptual skills, and there is only a significant relation between technical skills and gender, that is, technical skills of female managers are higher than male managers. No significant relation was seen between managers multiple intelligences dimensions and gender.

[Zeinab Sadeghi, Bijan Abdollahi. **The Relation between Managers Skills and Multiple Intelligences in Tehran High Schools.** *Life Sci J* 2012;9(4):4962-4967] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 743

Keywords: multiple intelligences, Gardner, managers' skills

1. Introduction

Education as one of the most sophisticated systems plays a substantial role in the society affairs and its continuity and survival. Indeed, scientific and cultural development of any society is dependent upon the education. Here, educational managers play an important role as a part of educational system. Educational system will no doubt enjoy high effectiveness, efficiency and validity if educational managers possess sufficient knowledge and skills (Mirkamali, 2006). Comprehensive development of educational organizations has made twofold the necessity of employing skillful and capable managers to enjoy professional knowledge and experiences. These managers influence the whole society orientation by affecting other professions education directly (Behrangi, 2010). Since managers require a range of skills to be efficient, various theories have been provided as regards skills, and each one has raised some traits as the essential skills required by managers. Skill is, in fact, regarded as the person continuous capability to do a task quickly and accurately. Managerial skills comprise the ones by which a person makes the movement of a complex components feasible so as to reach a balanced

movement of all components towards the determined objectives (Tutunchian, 2003). Scholars such as Katz (1974), Robbins (2000) and Griffin (1987) have respectively referred to technical – conceptual – human skills, political and special skills, and diagnostic and analytical skills. For years, the skills raised by Katz (1974) who classified a manager required skills in three scopes of technical skills, human skills and conceptual skills, have been considered by authors and experts in management, particularly general management literature. George and Jones (2009) have defined human – technical – conceptual skills as below:

- a. Technical skills comprise the scope of particular knowledge or profession.
- b. Human skills comprise capability of understanding change and control of individual and group behaviors.
- c. Conceptual skills comprise the capability of analyzing situation and identifying cause and effect of matters and events. These skills are frequently achievable through formal education, experience and thinking (George and Jones, 2009). In the contemporary era, learning skills, emotional intelligence, etc. are studying and

developing (Alagheband, 2009). Although managers' skills have been categorized in various ways, three skills provided by Alagheband (2008) namely technical skills, conceptual and human relations, according to Katz, embrace all extant classifications. Besides skill, managers require another important factor which helps them to undertake an effective and efficient management, that is, intelligence. Theoretically speaking, there is a great deal of reasons that intelligence is related to leadership. As per a comprehensive study, Hunter & Schmidt (1998) reported that intelligence is one of the best predictors in professional performance, the relation between intelligence and performance is very strong for complicated professions, and consequently intelligent leaders are more effective. The French psychologist and developer of the first intelligence test, Alfred Binet (1857-1911), defined intelligence as the person capability in judgment, conception and argument. Also Hamidzadeh (2007) regards it as the representation of humans' specific potentials and claims that human brilliance, wisdom, conception and analysis are measured based on intelligence. Wisdom is brought forth by intelligence, and to the extent that wisdom is grown, the level of reason, knowledge and intellect are improved. Although a unique and integrated intelligence cannot be found in individuals, a wide range of them that are both independent and distinctive can be observed. Then Harvard Gardner provided a new definition for intelligence and pointed to at least seven main intelligences. This theory opened a new window for education authorities. He believes that intelligence is not a measurable quantity; he added eighth and ninth intelligence in 1999. According to Gardner, all individuals possess all types of intelligences with different ratios, and in the learning process all types of intelligences work as the complimentary element of one another. Multiple intelligences consist of: verbal intelligence, logical-mathematical intelligence, visual-spatial intelligence, bodily-kinesthetic intelligence, musical intelligence, interpersonal intelligence, intrapersonal intelligence, naturalistic intelligence, existential intelligence (Gardner, 2003; Gardner, 1983). Regarding multiple intelligences in managers, Sadeghi (2008) research demonstrated that there is a relation between leadership style of high schools managers and their multiple intelligences, and effective and efficient managers possess high intelligence. Also Wilson (2010) in a paper as

regards the relation of multiple intelligences and leadership, pointed out that multiple intelligence applies salient concepts for efficiency, selection, education and progress of leaders; intelligence and potential contribute to the effective leadership, and effective leaders enjoy multiple types of intelligence. He noted that adjusting managers' skills and playing the right role are among challenges addressed by theory of multiple intelligences. So with regard to the role of multiple intelligences and skills in management and their impact on the performance of educational managers, this paper seeks to determine whether there is a relation between multiple intelligences of educational managers and applying management skills by them.

2. Materials and Methods

2.1 Research Questions

- 1) Is there any relation between each dimension of multiple intelligences and technical skills of managers in Tehran high schools?
- 2) Is there any relation between each dimension of multiple intelligences and human skills of managers in Tehran high schools?
- 3) Is there any relation between each dimension of multiple intelligences and conceptual skills of managers in Tehran high schools?
- 4) Is there any significant difference among managers multiple intelligences in terms of managers' gender?

2.2 Research Method

This paper is a descriptive correlational research.

2.3 Statistical Universe and Samples

Statistical universe of this paper comprises all managers and teachers of public high schools in Tehran. Samples were selected through random stratified multi-stage cluster method; that is, first 19 districts of Tehran were divided into three areas of north, center and south, then from each area, one district was selected by using simple random sampling (districts 2, 11, and 16). With regard to Morgan table, samples consist of 59 managers and 291 teachers. Finally for making the ratio of managers to teacher equal to 1 to 5, 60 managers (32 female and 28 male) were selected via a stratified – relative random sampling, and 300 teachers (160 female and 140 male) were selected through using simple random sampling.

2.4 Data Collection Method and Instrument

Two questionnaires have been applied for data collection. One of them is interview-administrated questionnaire for managers three skills which consists of 50 questions regarding managers technical, human and conceptual skills; this

questionnaire has been rated based on Likert rating and distributed among teachers. Its questions relate to human skills (19 questions), conceptual skills (17 questions) and technical skills (14 questions). The other is Gardner multiple intelligences standard questionnaire (1983) which includes 106 questions classified in 7 parts: musical intelligence (14 questions), logical- mathematical intelligence (17 questions), verbal intelligence (20 questions), interpersonal intelligence (18 questions), intrapersonal (9 questions) and visual- spatial intelligence (15 questions). This questionnaire has been rated based on Likert rating and distributed among managers. To determine validity, content validity and face validity have been applied, such that, the questionnaires have been submitted to 10 relevant experts and have been applied after undertaking necessary modifications and obtaining final confirmation. Cronbach's alpha coefficient has been used to determine the questionnaires reliability. This coefficient was reported 0.89 for multiple intelligences scale and 0.93 for managers' skills scale,

indicating proper reliability of the measurement instruments. Data obtained from questionnaires completed via SPSS 14 software, were analyzed through using Pearson correlation coefficient statistical test and T-test.

3. Research Findings

3.1 First Question

Is there any relation between each dimension of multiple intelligences and technical skills of managers?

with respect to the results provided in Table 1, one can claim that the highest correlation coefficients between multiple intelligences and managers technical skills belong to visual- spatial intelligence (R= 0.80) and bodily- kinesthetic intelligence (R=0.74), which are significant at the alpha level of 0.05. Regarding logical- mathematical, musical and interpersonal intelligences, the relation is weak; and there is no significant relation among verbal intelligence and intrapersonal intelligence and managers technical skills.

Table 1- The Relation between each dimension of multiple intelligences and technical skills of managers

Technical skills and multiple intelligences	Significance Level	Correlation coefficient
Verbal intelligence	0.27	0.11
Logical- mathematical intelligence	0.001	0.32
Spatial- visual intelligence	0.00	0.80
Musical intelligence	0.01	0.23
Bodily- kinesthetic intelligence	0.00	0.74
Intrapersonal intelligence	0.121	0.15
Interpersonal intelligence	0.008	0.26

3.2 Second Question

Is there any relation between each dimension of multiple intelligences and human skills of managers?

As per results presented in Table 2, one can state that the highest correlation coefficients between multiple intelligences and managers human skills belong to verbal intelligence (R= 0.92), musical

intelligence (R=0.70), and intrapersonal intelligence (R= 0.87) which are significant at the alpha level of 0.05. Regarding logical- mathematical, visual- spatial and interpersonal intelligences, the relation is weak; and there is no significant relation among bodily-kinesthetic intelligence and interpersonal intelligence and managers human skills.

Table 2- The Relation between each dimension of multiple intelligences and human skills of managers

Technical skills and multiple intelligences	Significance Level	Correlation Coefficient
Verbal intelligence	0.92	0.00
Logical- mathematical intelligence	0.27	0.005
Spatial- visual intelligence	0.25	0.01
Musical intelligence	0.70	0.00
Bodily- kinesthetic intelligence	0.83	-0.02
Intrapersonal intelligence	0.00	0.87
Interpersonal intelligence	0.05	0.19

3.3 Third Question

Is there any relation between each dimension of multiple intelligences and conceptual skills of managers?

The results presented in Table 3 reveal that the highest correlation coefficients between multiple intelligences and managers conceptual skills belong to logical- mathematical intelligence ($R= 0.68$) and interpersonal intelligence ($R=0.66$), which are significant at the alpha level of 0.05. Regarding

verbal, musical and intrapersonal intelligences, the relation is weak; and there is no significant relation among visual- spatial intelligence and bodily-kinesthetic intelligence and managers conceptual skills.

Table 3- The Relation between each dimension of multiple intelligences and conceptual skills of managers

Technical skills and multiple intelligences	Significance Level	Correlation Coefficient
Verbal intelligence	0.002	0.30
Logical- mathematical intelligence	0.00	0.68
Spatial- visual intelligence	0.08	0.17
Musical intelligence	0.03	0.21
Bodily- kinesthetic intelligence	0.06	0.18
Intrapersonal intelligence	0.00	0.20
Interpersonal intelligence	0.00	0.66

3.4. Forth Question

Is there any significant difference among managers' three skills in terms of gender?

The results of T-test presented in Table 4 reflect that there is no significant difference between human skills and conceptual skills in terms of gender.

Whereas regarding technical skills at the alpha level of 0.05, there is a significant difference between female and male managers. That is, female managers enjoy higher technical skills compared with male managers.

Table 4- Managers' three skills in terms of gender

Variable	Male managers		Female managers		T	Significance level (p)
	Mean	Standard deviation	Mean	Standard deviation		
Technical skill	2.41	0.74	2.63	0.67	1.982	0.05*
Human skill	2.35	0.87	2.51	0.68	1.253	0.21
Conceptual skill	2.39	0.76	2.58	0.65	1.732	0.08

3.5. Fifth Question

Is there any significant difference among managers' multiple intelligences in terms of gender?

As per Table 5, there is no significant difference among managers' multiple intelligences in

terms of gender. In other words, with regard to the alpha level of 0.05, t ranges from 0.08 to 1.87 and it is smaller than crucial t, thus there is no significant difference.

Table 5- Managers' multiple intelligences in terms of gender

Variable	Male managers		Female managers		T	Significance level (p)
	Mean	Standard deviation	Mean	Standard deviation		
Verbal intelligence	2.5	0.61	2.68	0.61	1.91	0.06
Logical- mathematical intelligence	2.61	0.71	2.71	0.75	0.86	0.4
Spatial- visual intelligence	2.59	0.84	2.8	0.72	1.74	0.08
Musical intelligence	2.65	0.56	2.78	0.65	1.35	0.17
Bodily- kinesthetic intelligence	2.66	0.62	25.86	0.7	1.87	0.06
Intrapersonal intelligence	2.62	0.61	2.61	0.69	0.08	0.9
Interpersonal intelligence	2.93	0.77	3	0.89	0.52	0.6

4. Discussion and Conclusions

In inferential statistics section, the results attained from Pearson correlation test revealed that there is a significant relation among all dimensions of

multiple intelligences, except for verbal intelligence and intrapersonal intelligence, and technical skills of managers. One of the skills that guarantee position of school managers is technical skill. Technical skills

are resulted from education and experience. Visual-spatial and bodily-kinesthetic intelligences with the highest correlation coefficients have a strong significant relation with technical skills. That is, managers with extensive visual-spatial and bodily-kinesthetic intelligences are more capable in timely preparing and implementing weakly lesson programs, dividing classes, employing teachers for different lessons, guiding and monitoring teachers' trainings.

Pearson correlation test results revealed that there is a significant relation between all dimensions of multiple intelligences, except for bodily-kinesthetic intelligence, and human skills of managers. Verbal intelligence, intrapersonal intelligence and musical intelligence have a strong relation with human skills. One of the skills a school manager must achieve is the skill of working with humans. For an educational manager to be regarded as an effective member of educational environment and create cooperation and understanding among members under his leadership, he must enjoy human skills sufficiently. Managers who have higher verbal, musical and intrapersonal intelligences are more capable in building effective human relations among teachers. According to Lovi (2007), the highest rank of skills for managers are first building relations, second possessing strong relational skills and third realizing evaluated objectives. It must be underscored that although school management is an operational rather than an executive task, the environment of the school manager activity is a human environment more than anything else in which interaction and human relations are determinant more than any other factor. It suggests managers need to develop and modify managerial skills training programs particularly human skills which must be considered by related authorities.

Pearson correlation test results depicted that there is a significant relation between all dimensions of multiple intelligences, except for bodily-kinesthetic and spatial-visual intelligences, and conceptual skills of managers. There is a significant relation among logical-mathematical and interpersonal intelligences and conceptual skills with the highest correlation coefficient. Managers cannot undertake their tasks properly unless they have a thorough perception of environmental, economic, technological, political and moral factors which will influence the performance. Through conceptual skill, school managers take decisions relating to educational components with minimum mistake, understand details of management better, and build a proper and reasonable combination of educational factors. Managers who have logical-mathematical and interpersonal intelligences in a more extensive level are more capable in taking rational decisions,

doing affairs with discipline and evaluating efficiency of programs. Multiple intelligence is a matter of great magnitude in the third millennium. So with regard to the relation between multiple intelligence and managers skills, it is recommended to focus on the relation between multiple intelligence and leadership in selecting and training educational managers.

T-test results revealed that there is no significant difference among managers' human and conceptual skills and their gender, and there is only a significant difference between technical skill and gender; that is, female managers' technical skill is higher than male managers. These findings are consistent with Abbassi (2006) and Majd (2001) research and inconsistent with Javaherizadeh and Charmian (2009) and Babi and Yuhanan (2005) studies.

T-test results reflected that there is no significant difference between managers' multiple intelligence dimensions and their gender. Cheng (2002) states that development of multiple intelligences is the main requisite for growing a new generation of citizens for future society in technological, economic, social, political, cultural and learning prospects.

In the end, to develop Gardner multiple intelligences, it is suggested to take proper educational and informational measures including management books and journals, meetings, and on-the-job trainings; because by developing these intelligences, managers' skills can be increased and they are made further efficient. Also with regard to the impact of multiple intelligences on managers' skills, senior managers of education ministry, when employing managers, can pay a particular attention to their intelligences and provide the stage of better and more appropriate planning.

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10/24/2012

Analyzing Effects Reduce of fertilizer subsidy on beet producers' Welfare Fars Province

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Abstract: The purpose of this study the effects of fertilizer subsidy removal on the welfare of producers of beet in Fars Province are. The research data and information required by statistical yearbook and databases and also completed questionnaires from 65 beet farmer in Marvdasht obtained by Eviews software Excel and were analyzed. The results of this study show that removal of fertilizer subsidies should be gradual because it removed at once as fertilizer subsidies lead to sudden increase production costs and small farmers and novices who do not usually have the financial resources, are strongly affected may lead to even remove them is in production.

[Seyed Nematollah Mousavi, Maryam Mazloumi. **Analyzing Effects Reduce of fertilizer subsidy on beet producers' Welfare Fars Province.** *Life Sci J* 2012;9(4):4968-4973] (ISSN:1097-8135).
<http://www.lifesciencesite.com>. 744

Keywords: subsidies, fertilizer, beet, Fars

Introduction

Subsidy to agricultural inputs with the aim of reducing cost of production and food security for the population in developing countries always been common. Among the various inputs, Fertilizer in Iran like many countries with highest prevalence was subsidized. So that in 1385, more than 9 / 6 trillion Rials as subsidy allocated to Fertilizer that about 76 percent of the total cost includes the Fertilizer (Supportive Services, 2007). For long periods with the aim of providing subsidy Fertilizer of interest were mentioned, but with the expansion of its distribution problems emerged Fertilizer subsidy was questioned. These problems can include high financial burden for government, creating false comparative advantage in some economic activities, waste of scarce investment resources, reducing environmental degradation and competition named. However, the distribution of subsidized Fertilizer conflict between positive and negative consequences, and there are different theories. (FarajZade and Najafi 2010). Being a fertilizer subsidy ability of the major reasons for this pattern of fertilizer, he said. Sources of supply bottlenecks in domestic production of fertilizers and global oil prices in the past two years, price increases universal inputs and increasing the rent of the global marine transport was the same for the subsidy to such dramatic increased and this, the government subsidy was faced with the problem, so The year 2004 of about 1150 billion Rials subsidy required and not provided in 2005 approved the sum of about two thousand billion Rials with what was requested, was the distance (Supportive Services, 2006).

Without the use of fertilizers, agriculture will not be possible with high efficiency. The use of fertilizer can lower both negative environmental

effects to be associated with: the first is that this effect can be reduced or acreage due to low yield per hectare due to the non-application of fertilizers increased the cost per unit area is followed, makes no mentioned product is grown. Second, a wide area with high potential, to produce more and increase productivity, the need to use chemical inputs and therefore one has the most effective ways to motivate more use of fertilizers subsidy to these inputs is (Amoli and et al, 2007). Fars province is one of the poles agricultural countries with good investment and can be programmed as one of the main centers of production and export of agricultural products to act. Beet cultivation in the province in 85-86 18178 ha and production levels in the crop year equal to 528,275.62 tons per hectare is 29061.26 kg. 86-87 in the amount of reason to the 1585 acres under cultivation and production declined against the 47,823.16 tons and Farming in beet production rates are 87-88 under cultivation was 6,141 hectares, equal to 165,161 tons against which the performance of 26,894.81 kg is ha. (Jahad keshavarzi).

Theoretical literature:

Ante and Aitah (1983) using cross sectional data (1977-1976) about 153 farms located in East Egyptian samples and using a cost function to estimate the elasticity of demand Trans log factors of production and test technology structure in rice farming began. The results showed that demand for production factors (eg, fertilizer) to prices of production factors on the black market is sensitive. It also became clear that farmers completely rational act and as we deem necessary, more or less than the quota based on the black market price of fertilizer your intended use must. Ready and Deshpande (1992) to study the combined positive and negative

effects of fertilizer subsidy removal began in India. The findings of this study showed that areas with high growth in the subsidy could be gradually reduced to fertilizer, but in areas with low growth rate of subsidy distribution among the low, subsidized rate increase is necessary. However, these studies implicitly that the distribution of subsidies and government support of Fertilizer emphasized, but some other studies, in total agreement to create the desired outcomes mentioned in the application process fertilizer, market reform and market liberalization suggest Fertilizer have. Kohansal (1993) in their study of the effects of fertilizer subsidy removal in Fars province was investigated. The results showed that input price liberalization policies in agriculture should be done step by step until farmers have enough time to adapt to new conditions and thus have incurred losses to the agricultural sector is reduced. Wagle (1994) attempted to estimate the total demand for fertilizers functions and private investment in agriculture to India. In this study, short-term price elasticity demand and long-term fertilizer 39/0- 97/0- obtained showing that demand for fertilizers in India in the study period price changes, is very sensitive. Low price elasticity demand to expand areas under cultivation and the blue areas covered seeds and species with high yield were attributed (Persian). Eliyasiyan and Hosseini (1996) to study the effects of subsidy removal on the application of agricultural inputs including fertilizers, pesticides, seeds, machinery, water and related consequences on the income of farmers increased exchange rate and therefore the prices paid for inputs have. The results showed that the profitability index of one hectare irrigated wheat crop in 72-71 years after economic liberalization, the equivalent of twice the 71-70 years before the release was. Nikokar (2002) with the effect of removal of subsidies on beet product suggests that removal of fertilizer subsidies should be gradual so the sudden removal because of sudden increase production costs and small-scale farmers who do not usually have the financial reserves, will suffer severely and may even cause the removal of the turntable be produced. Piriaei and Akbari Moghaddam (2005) in a study to investigate the welfare effects of reducing agricultural subsidies in Iran began subsection. Their findings showed that the reduction of subsidies led to subsection welfare of rural and urban households are.

Karimzadegan (2006) with the effects of fertilizer subsidy on consumption of non-optimal in wheat production stated that non-optimal use of fertilizers in wheat production is completely evident. Comparison of production and profits in the current mode with optimal indicate that a return to optimum

levels, farmers will earn greater profits and average production will increase.

Research Methodology

Input demand function can be of benefit or cost function, Farmer (agriculture) be extracted, so the input demand function of input prices, product prices and other factors leading to the transfer request input demand function is, is. If the function of extracting a profit on the input demand function is used, tools used for analysis include: the demand inputs of fertilizers and pesticides and the production function operation selected Fars province. Of course, only possible in micro level welfare analysis of selected products among manufacturers is provided. Farm level, using demand function is estimated profit function and then estimates the production of these products, in order to help clarify the inputs of fertilizers and pesticides to produce its effect on revenues, costs and benefits considered Manufacturers this review is in order to achieve production input demand functions, the model provided by Sidhu and Baanante was used (Mousavi and et al 2009). Profit function, we consider the following:

$$\pi = A \prod_{i=1}^m P_i^{\alpha_i} \prod_{k=1}^n Z_k^{\beta_k}$$

Where:

π : Profit (total revenue minus total cost of production inputs) to help the product price is normal.

P_i : A variable X_i input prices normalized to help Price

α_i : Profit function than the price elasticity of input variable i have.

Z_k : values my input K.

β_k : Income elasticity function to the k value my input.

If the profit function we logarithms, we get:

(2) I have a variable input and contribution to profit in this way we define:

$$(3) \quad \ln \pi = \ln A + \sum_{i=1}^m \alpha_i \ln P_i + \sum_{k=1}^n \beta_k \ln Z_k$$

$$s_i = \frac{P_i X_i}{\pi}$$

Considering that the total s_i is equal to one, to obtain input function is sufficient demand for us to demand transparency.

$$(4) \quad s_i = \frac{-P_i X_i}{\pi} = \frac{\partial \ln \pi}{\partial \ln P_i} = \alpha_i$$

Estimating equations with two and four input demand function for the variable i to be obtained as follows:

$$(5) \quad X_i = \frac{\pi}{P_i} \left[\frac{-\partial \ln \pi}{\partial \ln P_i} \right]$$

Profit function now considers the following:

$$(6) \quad \pi = AP_F^{\alpha_1} P_L^{\alpha_2} P_P^{\alpha_3} P_M^{\alpha_4} P_W^{\alpha_5} P_S^{\alpha_6} P_E^{\alpha_7} AC^{\alpha_8}$$

In this function:

π Profit, P_F fertilizer prices, P_L labor prices, P_P price pesticide, P_M machinery prices, P_W water prices, P_S seed prices, P_E product selling prices and AC cultivation (hectares) Host input demand functions extracted.

First, the profit function, take logarithms:

$$\ln \pi = \ln A + \alpha_1 \ln P_F + \alpha_2 \ln P_L + \alpha_3 \ln P_P + \alpha_4 \ln P_M + \alpha_5 \ln P_W + \alpha_6 \ln P_S + \alpha_7 \ln P_E + \alpha_8 \ln AC$$

According to the relation 3, the relationship for each of the four inputs is calculated:

$$(7) \quad S_i = \frac{-P_i X_i}{\pi} = \frac{\partial \ln \pi}{\partial \ln P_i} = \alpha_i$$

Equations with parameters estimated demand function (equation 7) for inputs (fertilizer) can be obtained as follows:

$$(8) \quad X_F = \frac{\pi}{P_F} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

Calculate the demand elasticity of various inputs:

If the logarithms function, 8 we obtained the following relationship:

$$(9) \quad \ln X_F = \ln \pi - \ln P_F + \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

Top of the relationship between price elasticity of demand for its fertilizer is obtained as follows:

$$(10) \quad \omega_{FF} = \frac{\partial \ln X_F}{\partial \ln P_F} = \frac{\partial \ln \pi}{\partial \ln P_F} - 1 + \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

Likewise, cross gain traction for the same inputs that here only refers to fertilizer and cross elasticity of the above relation is obtained as follows:

$$(11) \quad \omega_{FP} = \frac{\partial \ln X_F}{\partial \ln P_P} = \frac{\partial \ln \pi}{\partial \ln P_P} + \frac{\partial \ln}{\partial \ln P_P} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

$$(12) \quad \omega_{FM} = \frac{\partial \ln X_F}{\partial \ln P_M} = \frac{\partial \ln \pi}{\partial \ln P_M} + \frac{\partial \ln}{\partial \ln P_M} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

$$(13) \quad \omega_{FL} = \frac{\partial \ln X_F}{\partial \ln P_L} = \frac{\partial \ln \pi}{\partial \ln P_L} + \frac{\partial \ln}{\partial \ln P_L} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

$$(14) \quad \omega_{FW} = \frac{\partial \ln X_F}{\partial \ln P_W} = \frac{\partial \ln \pi}{\partial \ln P_W} + \frac{\partial \ln}{\partial \ln P_W} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

$$(15) \quad \omega_{FS} = \frac{\partial \ln X_F}{\partial \ln P_S} = \frac{\partial \ln \pi}{\partial \ln P_S} + \frac{\partial \ln}{\partial \ln P_S} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

$$(16) \quad \omega_{FE} = \frac{\partial \ln X_F}{\partial \ln P_E} = \frac{\partial \ln \pi}{\partial \ln P_E} + \frac{\partial \ln}{\partial \ln P_E} \left[\frac{-\partial \ln \pi}{\partial \ln P_F} \right]$$

And applying tension to obtain the same price for beet: beet production function:

In order to affect productive change in input prices also production function Cobb - Douglas was used. The production function relationship between the product and the expression of specific inputs and the effects of production factors like labor, irrigation and technology on a good product to show that (Mousavi and et al 2009). Production function of Cobb - Douglas in the pattern of this study is as follows:

$$(17) \quad q = AF^{\alpha_1} L^{\alpha_2} P^{\alpha_3} M^{\alpha_4} W^{\alpha_5} S^{\alpha_6}$$

In which the production value of q, A coefficient of fixed amounts to each production elasticity of inputs,

F Fertilizer, L labor, P Sam, M Machinery, W and S water price is the price of seed. In this study, data requirements through interviewing the person and the Yearbook statistics Agriculture Ministry of Agriculture, databases, FAO, Statistical Center of Iran, Central Bank of Iran and Services for support and completion of the questionnaire sample 65-man farmers beet work in crop 87-1388 has been obtained For analysis of EViews and Excel software was used for a hectare of beet product in the table below (Table 1).

Table1. The average amount consumed in a Fertilizer hectare for beet product

Year	Chemical fertilizer									
	phosphate		N		Potash		other		Total	
	amount	Value (kg)	amount	Value (kg)	amount	Value (kg)	amount	Value(kg)	amount	Value(kg)
79-80	206.49	51	388.96	40	18.1	37	19.69	86	633.24	45
80-81	6.272	48	382.24	39	12.65	45	12.2	86	678.98	43
81-82	223.4	55	391.28	50	18.95	50	62.78	267	696.41	71
82-83	269.03	75	391.09	77	21.5	53	9.09	307	717.71	79
83-84	267.97	87	446.04	80	13.93	60	9.98	763	737.92	91
84-85	258.28	69	383.93	65	15.98	54	17.88	378	676.06	75
85-86	220.59	97	603.56	100	105.63	65	41.44	286	971.22	103
86-87	182.6	66	314.09	53	0	0	28.91	91	525.61	60

*Jahad keshavarzi 89

Table2. The average amount spent in institutions for the product of beet acres

Year	seed		animal manure		hoofs					
	Amount (kg)	Value (kg)	Amount (ton)	Value (ton)	herbicides		insecticides		fungicides	
					Amount(kg)	Value(kg)	Amount(kg)	Value(kg)	Amount(kg)	Value (kg)
79-80	16.39	941	0.009	2000	3.962	2483	3.847	2183	0.462	2477
80-81	15.53	2076	0.001	4000	3.076	2242	2.181	3648	0.214	3627
81-82	13.13	1747	0	0	4.273	2239	1.829	1923	0.024	1113
82-83	7.78	5031	0.6	3127	3.91	3103	2.827	3462	0.079	2972
83-84	5.88	22521	0.521	3460	3.088	4113	4.238	3765	0.292	4748
84-85	6.54	13283	0.23	5167	4.07	4966	1.67	50.47	0.32	7625
85-86	4.28	35594	3.682	10561	2.77	5315	2.973	6893	0.104	9023
86-87	21.01	2111	6.37	1250	0.539	5133	0	0	2.44	6134

*Jahad keshavarzi

Table 3. The average price beet

Year	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
Price(kg/r)	25.5	37	52	62	78	97	125	157	175	225	252	303	355	390	420	460	460	620

*Jahad keshavarzi

Conclusion

Table (4) operating profit function for beet product is presented. As this table is also marked signs of all coefficients obtained based on the expected. Toxin variable cost, labor, water and seeds of a significant negative effect of product price on the significant positive benefits have beets and only variables price of fertilizer, machinery and plant level of profits have not had a significant effect. In other

According to the information and data obtained are as noticeable to the average amount spent on fertilizer words, the difference between operating profits of only due to all the variables are significant. Mark Price, all negative inputs are obtained. This means that input prices lead to reduced profitability will beet. Also emphasized was the significance level with 10 percent of the variance is not dissonance. Presented is able to clear 68 percent of the changes described in the operating profit to explain. As

stipulated in the variable coefficient has no statistical significance fertilizer therefore the demand sensitivity to price changes will increase costs and will be produced.

Profit function can be seen that the only function of the price of chemical pesticides, the price of labor, water price, and price and sale price beet seed is obtained. As Table (5) is among the inputs used in the production function specified only significant effect of seed production and of course the negative is shown. Positive effect on production of other variables has shown. According to the statistical significance can be said inputs of seed production in the third zone have been used thus increasing the consumption of production inputs is reduced.

Table 4. Beet earnings estimate.

Variable	coefficient	statistics T
Width of source	25.2	2.3
Fertilizer prices	-0.03	-0.21
hoof Price	-0.12	-1.01
Labor cost	-0.17	-1.1
machinery Prices	-0.5	-1.3
Water prices	-0.28	-2.01
Seed prices	-0.66	-1.5
crop Price	2.23	4.01
Cultivation	-0.001	-0.002
statistics	R^2	0.68
	F	4.39

*Research findings

In general, research results indicate that beet production in Fars province, one of the most important agricultural areas is considered and any fluctuation in the production of beet farmer households on welfare affects. Therefore, the results showed in Fars province beet fertilizer subsidy removal due to lack of fertilizer demand sensitivity to price changes that increase profitability and reduce production costs amount to about 22.5 and 16.1 percent respectively are . This means that policies for the optimal price strategy to make adequate intake of this input is not and should complement policies and compensation policies with the input prices (input subsidies) is applied. Finally, the findings summarized recommendations are presented.

1 - Was observed that the reaction against the rise in the utilization of fertilizers is considered very low prices of fertilizers so quickly increase production

costs and will need to reduce subsidies should be gradual basis. 2- removal of fertilizer subsidies should be gradual because it removed at once as fertilizer subsidies lead to sudden increase production costs and small farmers and novices who do not usually have the financial resources, are strongly affected may lead to even remove them is in production.

Table5. Results of beet production estimate.

*Research findings

Variable	coefficient	statistics T
Width of source	0.79	3.49
Fertilizer	-2.9	-0.0004
hoof s	0.035	0.253
Labor	0.031	0.007
machinery	0.325	0.03
Water	-0.02	0.011
Seed	3.05	2.37
Statistics	R^2	0.99
	F	2.39

Table 6. Effect of reduced fertilizer subsidies on production costs and operating profits of beet

Reduction of fertilizer subsidy (percent)	15	30	50	removal
Share of fertilizer production costs	11.4	14.3	19.8	25.6
Costs per ha (million Rials)	8.1	8.4	8.9	9.4
increased cost (percent)	7.2	12.4	18.5	22.5
Net income per ha (million Rials)	6.4	6.1	5.9	5.6
Reduced profit (percent)	-2.7	-6.4	-14.6	-16.1

*Research findings

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10/24/2012

Wise return in John Keats' poetry and Le Clézio's writings (comparison of the elements between a romantic poet by John Keats and the Contemporary Novel Mondo by Le Clézio)

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Abstract: This paper seeks to compare the elements in a romantic poem by John Keats and a Contemporary Novel (Mondo by Le Clézio) and finding the answer of a question raised by the contemporary thinker Ihab Hassan. Correspondence and coordination between these two literary works (while they are different) is very impressive. It looks more impressive when at first glance these correspondences are hidden between the Mondo that even after comparing it cannot be considered a literary plagiarism. By the divergence and withdrawal of modernity in the last century, over time, some schools came out of the modernity heart and the most important of which is called post-modernity. This paper by correspondence between these two works of art from two different centuries tries to shed a light on the subject prove that it can be possible that some postmodern artists can be return to the past and wisely accomplish the untold in the previous school of literature and art. In this paper, this move is called (wise return).

[Behzad Bahrami Nasab, HENRIK EDOYAN. **Wise return in John Keats' poetry and Le Clézio's writings (comparison of the elements between a romantic poet by John Keats and the Contemporary Novel Mondo by Le Clézio).** *Life Sci J* 2012;9(4):4974-4980] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 745

Keywords: Mondo novel by Jean-Marie Gustave Le Clézio, ode to the Greek vase, John Keats, contemporary novel, romantic poem, modernity, post-modernity, existentialism (reality of existence), short stories

1. Introduction

We live in the century which witnessed profound changes in all fields of art and literature. New poetry, new music, new painting and new story have been emerged and opened new horizons for art lovers.

All the new poems try to combat the Romantic introversion and Realistic extroversion, new poetry is a poetic creation of truth.

In romanticism school, poetry is aversion to the truth, but the kind of truth which has already been there crafted and experiences the feelings. In the realism school poetry is a rhetorical device that is used in all cases. But in modern literature poetry does not explain made and known objects and does not describe life experiences or landscapes or stories and thoughts.

Through novel the author tries to show his personal problems and difficulties by allegory and find a way to solve them. Allegory is just an expression of a belief or emotions of the writer.

Life experience is the basis of the literature in the twentieth century, and often readers try to find author's memories through the novel, whether the novel is written by Andre Gide or Maxim Gorky. These authors believed that the purpose of realism is describing the personal experience not the author's observations.

After World War I, the novel shows the author's world-wide view. In this period it was stated that from the first step, the novel should move us, and by its early words it should spread a wide but vague

world for the reader, and suddenly put the reader among incidents, and to understand the events the reader should penetrate the story, and like the novelist the reader should rebuild the novel, and according to Andre Gide the novel needs the reader to be completed.

World War II put a stop on any modern seeking for few years, and after the war there was a kind of confusion and to eliminate this confusion, new attempts began in the novel world, most important of which was modern novels process. Although now a days the term new novel is famous as an established school and also has some theorists, but in fact it is a name that journalists called to some scattered activities.

The common goal of these authors was denying some present novel forms in the world. They wanted to replace the conventional novel to a novel that is not in the cliché form and is inspired from specific facts. Although two of the leaders of the new novel Natalie Sarraute and Alain Robbe Grillet tried to find theoretical aspects in their opinions, but their result was different. These differences in ideas and works of novel writers lead us to believe that new novel nor is a school, not a single movement. But most authors believe that novel should not be based on "intrigue" or heroes and death of heroes and death of the psychological and philosophical classifications should be stated in the novel.

According to many art lovers, one of the figures who could fill this literary gap of the contemporary novel in French literature is the French

author Jean-Marie Gustave Le Clézio, the best seller novelist of France and the winner of literary Nobel Prize in 2008.

In the years 1965 to 1975, two major issues were the interest of writers of this period: the language and substance, they said that only a thought exists that comes to expression. Le Clézio in this period left out the language to establish real communication with the substance.

But this article particularly dealt with multi-dimensional look to Le Clézio in terms of new realistic novel and Romanticism which describes the Nature and specifically comparison of Le Clézio's *Mondo* and the famous poem by John Keats that is full of romanticism descriptive terms, and in other words the wise return in the poetry of John Keats and writings of Le Clézio. The main purpose of this comparison is the comparison between the romantic poetry of John Keats and the contemporary novel - *Mondo* by Le Clézio and arguing about the belief a contemporary thinker - Ihab Hassan – who believed that there is a significant correspondence and coordination between these two literary works, while they are separate works.

Biography of Jean-Marie Gustave Le Clézio

Jean-Marie Gustave Le Clézio was born on the thirteenth of April 1940, in the island of Niece. He had a French mother and an English father who was a Medical doctor in Nigeria.

Le Clézio completed his master's thesis about loneliness in the works of Henri Michaux and then completed his PhD thesis on "Lautréamont". His first novel was published with a great success at the age of twenty-three and won the "Theo Frost Renaudot" price. (RENAUDOT, 1926)

At the beginning of seventies Le Clézio found the release of language through Indians in Panama. Le Clézio believed that the author's role is writing internal and external experiences through automatic recording. In fact he plays the role of a seismograph to find something that will dictate human behavior.

One of the errors seen in the biography of Le Clézio is that often he is believed to be a British descendant in the island of Mauritius, an island located in the Indian Ocean and once in the colonies of Great Britain. But the fact is that his parents came from a generations in Bertany region in northwestern France and settled in Morris since the eighteenth century.

In 2008 the Swedish Academy announced that Jean-Marie Gustave Le Clézio, the famous French writer, is the winner of Nobel Prize for Literature. The prominent characteristic of the writer, according to the Nobel Foundation, is his poetic

adventure and sensual delight and his specific attention to environment, especially the desert.

The Swedish Academy called Le Clézio a writer with European roots, but a global citizen. He is a writer that everyone can understand him. Nobel jury member Horace Angdal called Le Clézio in the classic sense a European writer. "Le Clézio is a global citizen and is a wanderer. He belongs to different cultures and spent a long time of his life in non-European countries. This fact has influenced his writing. Based on this fact he cannot be considered as a typical European writer". (Horace Angdal, 2008)

His great travel experience reflects the influence of French culture and values in the world. Nobel Foundation, described Le Clézio, who also has Mauritanian Naturalization, as a browser of humanity in the rise and fall of the dominant civilizations.

Le Clézio states that his purpose and the purpose of authors is the desire to write, the social environment and issues and problems of the society. "Why do we write? I think each of us have our special answer to this simple question. The desire to write, the social environment, situations, and failures can also be the reason. If we write, we do not mean to practice something. It means that we are faced with a difficult reality, but we choose another way to react, another way to communicate, a specific location and time to respond." (Le Clézio, 2008)

In His word he talks about people with no language and talks about earliest humans who used sounds and myths for communication. "Do we have to live again today at a time that writers cannot dare to think that they are able to change the world, although they believe that their stories and novels can present a better sample of what life has to be, why do we write? Do we write to invent culture and go back to the early period of communication?" (Le Clézio, 2008) he severely believes in the role of cinema, popular music, and jazz in life.

"Jean-Marie Gustave Le Clézio" believes that there are two reasons to prove that literature is essential; the first reason is that literature comes out of the language heart. He says that in French "novel" offers those prose texts that after the Middle Ages were chosen by the people for speaking in a new style of language. Romance language means that the language is used for creating beauty, expression of thoughts and imagination. About the literary words including the function of poetry and rhymes believe in simple writing:

"A writer should write very simply because he works as a witness. In most cases, the author is not more than a simple spectator." (Le Clézio, 2008)

About the racist theories in a century ago Le Clézio believes that they considered language as an element to express the fundamental differences

between cultures, and he believes that these theories were very influential.

He believes that the source of globalization is Europe, and start of colonization in the renaissance: "People forget the fact that this phenomenon occurred with the onset of the Renaissance in Europe and start of colonization. Globalization itself is not a bad thing, and communication is the sharing scientific and medical advances. May be general information helps understanding concepts, who knows, if the Internet had existed at the Hitler time, perhaps he could not succeed in his plan" (Le Clézio, 2008).

Although at the beginning it was believed that his style was similar to authors of "new novel" which preferred "pure writing" to the fate of people in the story (Penalties novels, 1963), contrary to "new novel" Le Clézio paid attention to the fate of the characters in his stories. Although initially he liked the difficult style of writers such as Georges Perec, later he changed his style and wrote stories with simple words.

In African and deserts novels such as the novel "Great Ambassadors" by Henry James and "bluster and outrage" by William Faulkner and "Ulysses" by James Joyce, from the first row the reader enters in the middle of the story without an introduction. The strength of this novel is in its resistance against the reader, this means that the reader to understand the novel shall penetrate in it step by step. In other words, like the novelist he should re-build the novel. André Gide in the book "coin makers" refers to this concept:

"I do not want the author to quote the events explicitly. But he should look every incident several times from the view of people involved or affected by the events and then express them. I would like a minor change of events in the eyes of each witness. Readers' will arises from his effort to understand the truth. The novel needs readers' cooperation to be completed and explained." (Andre Gide, 1388)

One of the most important similarities of writers such as André Gide and Maxim Gorky with Le Clézio is that the readers try to find author's personal memories in their novels. Perhaps the uncertainty in the literature that emerged after World War II, led to new effort in the world of novel, and Le Clézio also affected. Now the existentialism impact in literature especially in the new novel and its writers are mentioned.

Existentialism school occurred shortly before World War II in France and after the war reached its utmost power. They believe that "existence" is above "nature" and humans are left in a useless and absurd world with no rule and end. Thus nothing guides the creation. Existentialists' works

influenced profoundly in the contemporary literature of Europe. As for Le Clézio, among characters of his stories such as Mondo or Lolaby, there is the trend to absolute freedom and avoid from bonds of social rules and confusion in Nature and Society:

"Quand il n'y avait pas de danger, il se promenait toute la Journée dans la vill, en regardant ce qui se passait. Il aimait bien se promener sans but, tourner au coin d'une rue, puis d'une autre, prendre un raccourci, s'arreter un peu dans un jardin, repartir. "

"Whenever he did not feel safe (Mondo), he wandered in the city all day long and watched the events around. He liked to walk aimlessly, walk around a street and then another street and choose a short way, stand beside a garden and again start walking." (Mondo, 1982)

Another thing that is noteworthy about Le Clézio but rarely has been mentioned is his desire to write short stories. One of the most famous short stories in French literature is Le Clézio's Mondo which also have been translated into Persian. It must be understood that Le Clézio is one of the few French authors who has written short stories, and highlighted this genre in French literature which is mostly the tradition of literature in Anglo-Saxon (many English and American authors), Italian (Luigi Pirandello, Alberto Moravia, etc.) and Latin America (Juan Rulfo, Jorge Mario Vargas Llosa, etc.). In fact, before Le Clézio, French literature has not introduced a great writer in this genre to the world of literature, but a few authors such as Guy de Maupassant and Alphonse Daudet.

In the study of Le Clézio's stories we see some common elements that will be mentioned here. The first element is child. Child is important in his works. Le Clézio believes that there is innocence in children that adults have lost by the force of time and it is the duty of the writer to remind it again. The next element is the mountain. Mountain has a direct relationship with light. In the "Mondo" where Mondo is absorbed to the light and selects the "Golden Light House" at the top of the hill, is in fact a place of worship which received his homelessness. Another important factor in the story of Le Clézio is "poverty". Lala or Leila, the desert hero is a poor.

Mondo is also poor. But contrary to what has been associated with poverty, their poverty has not led them to withdrawal and isolation, but shows their freedom.

Mondo in French means the world and is comprised of two parts "Mon" and "do" which in Buddhist ritual mean the question and answer. Mondo story is also the questions of a child who is not waiting for any response.

The author tells about a society in which humanitarian values has been destroyed and promises

a community will not distinguish between freedom and debauchery. The characteristics of the mentioned society can be cleaned and shiny floor of tall buildings, a turning chicken roast that turns roasted chicken, lifts and ... which Mondo sees them.

Le Clézio in the reconstruction of consumer-oriented society supported the past object, and because of this return to the past he is called postmodernist. The symbolic work of the author retells the second language of the story which is contrary to the childish language of Mondo and unveils the fear and insecurity that has been imposed in the last century.

Le Clézio believes that before man thinks of heaven, thinks of hell. He is an expert sociologist and depicted his own philosophy of contemporary urbanization. He is an author who the revelation of human nature, avoid from civilization and the consumer society are the main motif in his world of thought and ideas.

Wise return in the poetry of John Keats and Le Clézio's writing

Ode on a Grecian Urn

Thou still unravish'd bride of quietness,
 Thou foster-child of silence and slow time,
 Sylvan historian, who canst thus express
 A flowery tale more sweetly than our rhyme:
 What leaf-fring'd legend haunt about thy shape
 Of deities or mortals, or of both,
 In Tempe or the dales of Arcady?
 What men or gods are these? What maidens loth?
 What mad pursuit? What struggle to escape?
 What pipes and timbrels? What wild ecstasy?
 Heard melodies are sweet, but those unheard
 Are sweeter: therefore, ye soft pipes, play on;
 Not to the sensual ear, but, more endear'd,
 Pipe to the spirit ditties of no tone:
 Fair youth, beneath the trees, thou canst not leave
 Thy song, nor ever can those trees be bare;
 Bold lover, never, never canst thou kiss,
 Though winning near the goal - yet, do not grieve;
 She cannot fade, though thou hast not thy bliss,
 For ever wilt thou love, and she be fair!
 Ah, happy, happy boughs! that cannot shed
 Your leaves, nor ever bid the spring adieu;
 And, happy melodist, unwearied,
 For ever piping songs for ever new;
 More happy love! more happy, happy love!
 For ever warm and still to be enjoy'd,
 For ever panting, and for ever young;
 All breathing human passion far above,
 That leaves a heart high-sorrowful and cloy'd,
 A burning forehead, and a parching tongue.
 Who are these coming to the sacrifice?
 To what green altar, O mysterious priest,
 Lead'st thou that heifer lowing at the skies,

And all her silken flanks with garlands drest?
 What little town by river or sea shore,
 Or mountain-built with peaceful citadel,
 Is emptied of this folk, this pious morn?
 And, little town, thy streets for evermore
 Will silent be; and not a soul to tell
 Why thou art desolate, can e'er return.
 O Attic shape! Fair attitude! with brede
 Of marble men and maidens overwrought,
 With forest branches and the trodden weed;
 Thou, silent form, dost tease us out of thought
 As doth eternity: Cold Pastoral!
 When old age shall this generation waste,
 Thou shalt remain, in midst of other woe
 Than ours, a friend to man, to whom thou say'st,
 "Beauty is truth, truth beauty," - that is all

Ihab Hassan (1925) in "post-modernism: a critical bibliography" writes: "Behind each history, continuously or intermittently, abstract or imaginary, lurked a conflict between personal identity and death. Is history often the hidden biography of historians? Is it the recorded imagination of our own mortality? Thou silent form, bring us out from our thoughts; / as the eternity, and cold priests' preaching / does so.... When will the modern age ends? And what will come after?" (Ihab Hassan, 1975) {This section of text is a translation of a poem by Keats, which happens to be used by Ihab Hassan. The present translation is a little different with a translation of a poem by the author (for Greek vases).}

The characteristic of modernity help us to answer the question of Ihab Hassan: "Enlightenment program was disillusionment from the world, the dissolution of myths and establishment of wisdom instead of the dreams" (Adorno T.W. & M. Horkheimer, 1995). The artist is the creator, and enlightenment was - (is) - making the world difficult to him, and each day makes creator-like competitors for him, thus having in mind the meaninglessness of the modern world, and was more alienated in a world extremely narrow and repetitious.

As a theory, although it can be assumed that the conflict between the modern and the postmodern provided a challenge and revelation for the artists in post-Enlightenment era, but this "coming out of modernity" of the postmodern cannot satisfy some today artists. This artist finds contemporary literary and artistic theories inefficient to create a work which satisfies the needs of today people to meaning and truth. The individual oriented and poetic trends of some of these artists show their efforts for "wise return" where there are serious effects of the combination. On these combined wise returns, there are some truth oriented views of the Romantic artists, such as "Jean-Marie Gustave Le Clézio". It is noted here that the purpose of this paper from romantic "Le

Clézio” is only about the Le Clézio who created “Mondo”.

Since Romanticism has many meanings and feedbacks, to facilitate the present discussion, we present our view of this artistic and philosophical school in the form of a poem from a poet who itself is a summary of Romanticism and criticism on it.

John Keats is a nineteenth century English poet who is considered as one of the last great Romantic elites. In his poems he is seeking for a definition of poetry and poets: a poet who is in connection with the power of his imagination and ability to tell the timeless truth. Keats's does not consider the heritage of previous poets only as the former data, but tries to make clear the definition of the poetic imagination and what a poet should be. Thus he implements the past poetic theories and creates poems very close to the tradition of Romantic poetry. The characteristics of these poems are faith to the everlasting timeless truth in nature that the poet can discover them through his ingenuity and express them in his poem. Keats believed that poetry and art is a vehicle for truth and immortality, and basically art is able to create them, but this belief gradually fades; until in a few poems that he wrote before his early death, he used a more descriptive, more cautious, more skeptical and more realistic language, specifications which later became more prominent and bold in modern art. "Sadoldin, 2011" (Sadoldin Adel, 2011)

Among the poems of Keats's romantic poetry "an ode to the Greek Vases" has been selected for this paper for two reasons: First, Ihab Hassan used a piece of this poem for the opening of his question, and second, we believe that discussion about this poem and finding similarities between it and Mondo by Le Clézio can somehow clear a kind of “wise return”.

“Mondo” by Le Clézio is a story of a boy in a semi-fictional modern world. Mondo who no one could tell where he came from, once comes to a city in which we - as readers and consumers of novel – cannot have an explicit idea of its time and location. The fact that it is a French novel and the author due to his biography is considered “global”, the fact that Mondo is wearing tennis shoes, and these kinds of keys and signifiers do not lead us to any specific or even limited language and location. Sometimes you are tempted to call Mondo a magical realism story, but it is not for a thousand and one reasons. Basically we do not discuss in this paper that whether Le Clézio consciously had this idea in mind. This paper is a study because: there are ideal similarities between a novel in the twentieth century with a Romantic poem in the nineteenth century and the resultant and outcome of these commonalities can

provide an answer to the question raised by Ihab Hassan.

In the poetry of Keats, the poet's imagination sees the silent heroes on the pot “Immortals” - whether positive or negative. There is a beautiful young lover who is sitting near under an eternal and evergreen tree, and feels that his lover will stay beautiful and in love “Immortality”, and the lover “Immortality” apt to kiss her. There are examples of such nested in the poem and can be achieved. But there are two visions in “Mondo”:

First: Mondo - the hero –the city is narrated from his point of view - is the representative of a fancy and meaningful look that gives meaning and “immortality” to the life of lifeless humans around him, the surrounding environment and consequently to the city and basically to the story, whether this immortality is sectional, such as the sectional immortality we feel from Mondo fellowship with each of the novel's minor characters, or the eternal immortality such as the novel itself. It means that in the Keats's poetry the fantastical look of Keats at a pot, has immortalized the pot and the poetry of Keats, and Le Clézio by Mondo, has immortalized the Mondo and city and his novels. One of the reasons that indicate Mondo is a representative for meaningful imagination to the world around is that throughout the novel Le Clézio accompanied him with the concept of light, and reflected him like a monologist in theater who has the topical light.

Second: through the novel (Mondo) we know characters who - suddenly - Mondo deals with them, talks, interacts, and says goodbye. Their immortality is just like that, Just like a moment on the Keats's Greek vases; beautiful youth, tree and... are immortalized. The point is that all the heroes fixed in Mondo are “non-modern Mondo”. It means that throughout the novel, those characters find kind of immortality who somehow are sick of modernity and have left modernity, and unlike these individuals, other people are not more than shadows that should be imagined in the city. Here there is no difference between the Rosa who sells fruit and only meets Mondo half of the row, and Ti Sheen who is very familiar with him. Both are immortalized and somehow their degree of immortality can be measured by their distance from modernity. Even objects in Mondo are immortalized through their distance from modernity.

In the Keats's poem, leaves refer to the leaves painted on vase, and this is the general style of Greek pottery. Covering the Greek vase by leaves imagined a kind of life from the perspective of the manufacturer. But when the City Mondo is covered by leave, it represents another fact: death. Because leaves on the Greek vase are green and attached to

the stem, but deciduous leaves in Mondo city represent fall and are deadly (even though it comes after summer). On the other hand the leaves on Greek vases are generally the laurel tree leaves, which are the only kind of leaf that Le Clézio refers and they exist in the golden light house, T Shen's house - the most eternal human in Mondo.

And the last point about leaves: Where does the paper of the modern world come from? We all know that it comes from stems and leaves of trees, and also in most languages there is a verbal similarity between leaf and paper, and by the result of these two factors - especially the first modern factor - in the Mondo city there are small rivers on both sides of the road, full of dry leaves and pieces of paper. Therefore we have to admit that this sequence between leaf and paper has undermined the deathly modernity.

The Greek vase and its ancient history made it immortal in the poet's imagination and on the other hand its fixed designs from the vision of romantic poet provided a kind of immortality for them.

In Mondo instead of the vase there is city, and instead of ashes of the dead there are people who appear to be live, but the spirit of modernity has declined them.

Conclusion and discussion

Writers of the late twentieth century tried to deny some of the common themes in the novel, etc. The aim of all these new writers and theorists was to replace a novel that is not in the cliché of other schools is inspired from particular facts. The novel should not be based on "intrigue" or heroes and death of heroes and death of the psychological and philosophical classifications should be stated in the novel. The novel must be very precise draft of the world outside: the specific world of "pure objects".

But each of the authors of the new style (new novel) has its own indicators, for example, Robbe Grillet always wants to remain at the level of objects. Nathalie Sarraute, while avoids creating types, narrates the roaring and vibrant life of people with their tacky characteristics.

Ihab Hassan finds contemporary literary and artistic theories inefficient to create a work which satisfies the needs of today people to meaning and truth. Keats is one of the artists with individual oriented and poetic trends and tries for "wise return" in his poems; especially the poem "ode to Greek vase", integrated wise return and truth oriented approaches of romantic artist.

"Le Clézio" talks about the fall and decline of the last century, about the current world that suffers economy crisis. There is a rhythmic track of hunger and poverty in his stories, especially his new stories. He is a realistic writer who demands reality in

this sick world. The world suffers crisis in the late twentieth and twenty-first centuries, it is a world with non-resilient development and dictatorship, a world of hatred and degradation and falling, it is a proud world that does not see evident catastrophes. In his works Le Clézio cries loud against false pride and lie, a scream in a world that is like a small opera, the world that we live in, and we do not learn anything from it. He is a writer with a great nostalgia and sadness in the world, and this is the base "Le Clézio" works, and his writing has high efficiency and excellent for everyone. He pictures a human beyond this world and this materialistic civilization, humans with celestial figures, thoughtful and gentle characters that pass the Planet Earth and pass. Persuasion and comfort in his word sometimes become angry and effect as boiling hot springs.

This author was inspired by Native American culture and has found desert and island and denuded and pristine lands tastes, and his story characters always wandering non-stop in such territories, and look for adventures and seek for treasures such as emotion, truth, and may be love.

Passionate characters of old stories and legends such as Adam Polo, Lala, Mao, Nour, Mondo or Juan who opened a borderless world in Le Clézio's works are his real friends to win the Nobel Prize award.

To express his love, he embraces the world and rejects the despicable soul and closed views and fashions of modern life and opinions of the current society makers. "Le Clézio" is an author with open arms on the extreme. Each of the events in his novels inspires something to our mind and discovers other inner events of distant lands.

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09/04/2012

A quantitative study of the effect of proton beam intensity on helium, nitrogen and krypton gas target systems

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Abstract: We have studied the effect of beam intensity on physical properties of gas target. The high-energy proton beam (12 μ A) which was produced in cyclotron of nuclear medicine research group at the Agricultural, Medical and Industrial Research School (AMIRS) entered a conical stainless steel target chamber through a titanium double window. CFD has been used for numerical study of thermal field inside the gas target for three different cases of helium, nitrogen and krypton. The results of both numerical and experimental investigations reveal that target pressure and temperature increase with increasing the beam intensity. Target pressure increasing rate, raises with increasing of gas molecular weight (Kr>N₂>He).

[H. Hassani Bidaroni, D. Sardari, M. Mirzaee, F. Moattar. **A quantitative study of the effect of proton beam intensity on helium, nitrogen and krypton gas target systems.** *Life Sci J* 2012;9(4):4981-4985] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 746

Keywords: Gambit code; Radioisotope production; gas expansion; proton beam

1. Introduction

Radionuclides are used in nuclear medicine therapy (Chatal and Cornelis, 1999). The principal applications of radionuclides are positron emission tomography (PET), single photon emission computed

tomography (SPECT) imaging, radiotherapy and tracing. A summary of typical radionuclides used for internal radiotherapy and their applications are illustrated in Table 1 (IAEA Tech. report No. 465).

Table 1. Radionuclides and their applications in internal radiotherapy

Radionuclide	Type of emitter	Half life	Application
¹¹ C	Positron emitter	20.3 min	PET imaging
¹³ N	Positron emitter	10 min	PET imaging, Cardiac blood flow agent
¹²³ I	159-KeV gamma emitter	13.1 h	SPECT imaging
¹⁸⁶ Rh	1-MeV beta emitter and 140-KeV gamma emitter	90 h	Radiotoxic therapy

In the 1930's, Lawrence et al., constructed the first cyclotron for examining nuclear reactions and production of radionuclides. Modern radionuclide production apparatus consists of a cyclotron in the energy range 10–30 MeV and a current of up to 350 μ A (Bechtold, 1992). The high-energy beam produced in the cyclotron enters the target chamber filled with target gas. The most important experimental investigations on the cyclotron production of radionuclides are summarised in Table 2.

The physical properties (temperature and pressure) and geometrical configuration of the target are important parameters that influence the properties and quantity of the produced radionuclides

(Vandecasteele et al., 1981; Acerbi et al., 1981; Gindler et al., 1976; Helus et al., 1980 and Wojciechowski et al., 1988).

A few numerical studies have investigated the physical properties of target gas properties. For example, Lenz et al., (2011) used computational fluid dynamics (CFD) modelling for simulation of a 200kPa nitrogen target gas. For a better understanding of hydrodynamic motion and physical structure of argon and xenon gases in a GSI_RFQ beam target system, Schneider and Maruhn (1989) performed a numerical simulation of hydrodynamic flow in a cylindrical target gas.

The aim of this study is to evaluate the influence of irradiation intensity on gaseous target

pressure and temperature in order to determine the operating constraints for beam intensity and target gas pressure required to prevent the destruction of titanium double windows. CFD modelling was used

for numerical modelling of the target gas pressure for a stationary target system.

Table2. Cyclotron produced radionuclides

Authors	Radionuclide	Beam energy
T. J. Ruth et al., 1985	$^{11}\text{CO}_2$ and ^{18}F	500 MeV
V. Tolmachev et al., 2000	$^{114\text{m}}\text{In}$	12.6 MeV
C. Manuel et al., 1982	^{128}Cs	67 MeV
J. Zweit et al., 1987.	^{66}Ga	31 MeV
E. Joachim et al., 2000	^{124}I	14 MeV
Yevgeny A. et al., 1997	^{153}Gd , ^{188}W , ^{63}Ni , ^{51}Cr and ^{89}Sr	14 MeV
Khandaker M. U. et al., 2010	$^{100\text{g}+\text{m}}$, $^{101\text{m}}$, $^{105\text{g}+\text{m}}\text{Rh}$	40 MeV
H. Thisgaard and M. Jensen, 2009	^{119}Sb	low energy

Experimental

The experimental apparatus used in this study is shown in Figures 1 and 2. A stainless steel target chamber with a conical shape (length: 251 mm, front diameter: 17 mm and rear diameter: 38 mm) was designed for the production of radionuclides from helium, nitrogen and krypton gases. A high-energy proton beam (12 μA) produced in the cyclotron at Agricultural, Medical and Industrial Research School (AMIRS) entered the target chamber through double titanium windows of thickness 20 μm . The gap between the titanium windows was cooled using an air stream. After the completion of energy transfer to the gas molecules, the high-energy protons came to a stop at the end of the target chamber. During the irradiation process, the external body of the target was cooled using circulating water at 295 K. The irradiation process was performed in the AMIRS 30-MeV cyclotron using a focused 26.5-MeV proton beam. An ammeter was used to monitor the beam current.

The experimental investigation was performed as follows:

1. A vacuum (10^{-5} mbar) was created inside the chamber.
2. The chamber was filled with the target gas up to an adjusted initial pressure.
3. The target chamber was cooled using circulating water.
4. The target gas was irradiated with a proton beam for 1–2 h.
5. After completion of the irradiation process, the target gas was recovered via a cryogenic vessel.
6. The target pressure and temperature were recorded.
7. The target wall was steam washed.

8. The condensed water contains radionuclides was collected and transferred to a receiving vessel in a hot cell.
9. As described above, three different target gases (helium, nitrogen and krypton) were used for the production of radionuclides. Therefore, in each step of the experiment, the target chamber was filled with one of these gases. A PT barometric pressure indicator was installed at the centre of the target. Two thermometers were installed at the ends of target and the temperature was reported as the average reading of two thermometers. The uncertainties in temperature and pressure measurements were 0.05 $^{\circ}\text{C}$ and 100 kPa, respectively.

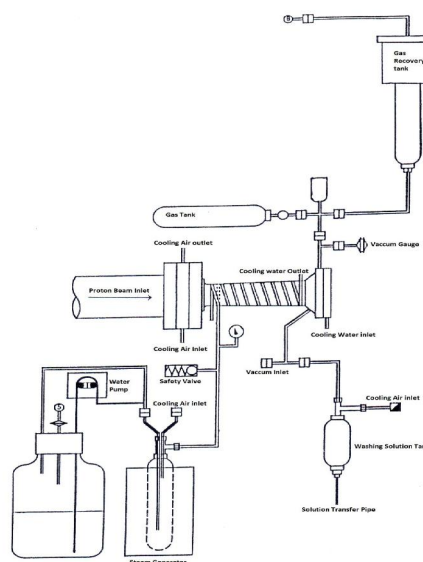


Fig 1. Experimental system

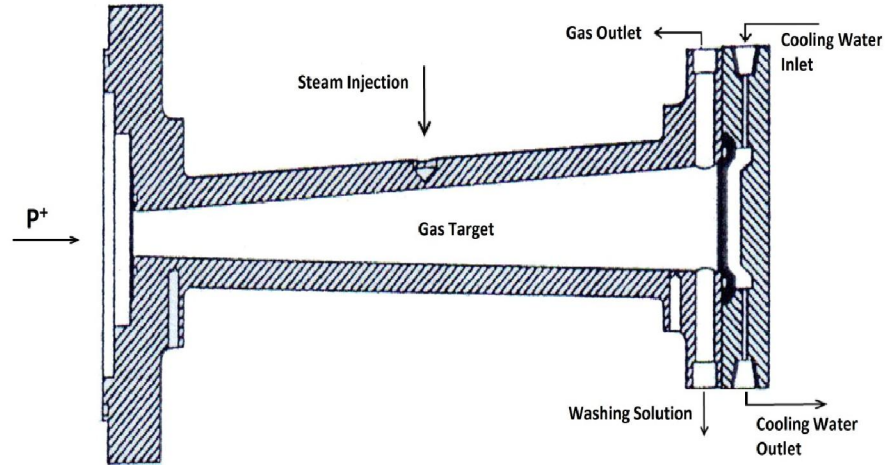


Fig 2. Schematic design of the target gas

CFD modelling

The CFD approach uses a numerical technique for solving the governing equations for a given geometrical and boundary conditions. In this study, the temperature distribution and flow pattern of the target gas inside the target chamber have been simulated using a commercial fluent code version 6.3.

The thermal field of the target gas can be determined by solving the volume-averaged fluid equations for the target gas and cooling fluid sides. The governing equations for the gas and coolant sides include the continuity equation, momentum equation and energy equation as shown below:

1. Continuity equations:

$$\text{coolant side; } \frac{\partial}{\partial x_i} (\rho_w u_i) = 0 \quad (1)$$

$$\text{gas side; } \frac{\partial}{\partial x_i} (\rho_g u_i) = 0 \quad (2)$$

2. Momentum equations:

$$\text{coolant side; } \frac{D}{Dt} (\rho_w u_i) = \frac{-\partial P}{\partial x_i} + \frac{\partial}{\partial x_j} (\mu_w \frac{\partial u_i}{\partial x_j}) \quad (3)$$

$$\text{gas side; } \frac{D}{Dt} (\rho_g u_i) = \frac{-\partial P}{\partial x_i} + \frac{\partial}{\partial x_j} (\mu_g \frac{\partial u_i}{\partial x_j}) \quad (4)$$

3. Energy equations:

$$\text{coolant side; } \frac{D}{Dt} (\rho_w C_p T) = \frac{\partial}{\partial x_j} (k_w \frac{\partial T}{\partial x_j}) \quad (5)$$

$$\text{gas side; } \frac{D}{Dt} (\rho_g C_p T) = \frac{\partial}{\partial x_j} (k_g \frac{\partial T}{\partial x_j}) + Q'' \quad (6)$$

Where u_i is the fluid velocity ($i = 1, 2$ and 3), ρ is the density, P is the pressure, T is the temperature, k is the thermal conductivity, C_p is the heat capacity and Q'' is the heat flow. The subscripts g and w refer to gas and cooling fluid (water), respectively.

Q'' is estimated as follows:

$$Q'' = \frac{Q'}{V_{\text{Frustum}}} \quad (7)$$

$$V_{\text{Frustum}} = \frac{1}{12} \pi [D_2^2(x+1) - D_1^2(x)] \quad (8)$$

$$x = \frac{LD_2}{D_2 - D_1} \quad (9)$$

Where V_{Frustum} is the volume of the target chamber; D_1 , D_2 and L are the front diameter, back diameter and length of cone, respectively. In this equation, Q' is the energy transferred to the target. The coolant is assumed to be an incompressible fluid. The properties of the gas target are estimated using three different correlations as follows:

1. The ideal gas equation of state:

$$PV = nRT \quad (10)$$

2. The van der Waals equation of state:

$$P = \frac{RT}{V-b} - \frac{a}{V^2} \quad (11)$$

$$a = \frac{27 R^2 T_{\text{critical}}^2}{64 P_{\text{critical}}}, \quad b = \frac{RT_{\text{critical}}}{8 P_{\text{critical}}} \quad (12)$$

3. The Redlich-Kwong equation of state:

$$P = \frac{RT}{V-b} - \frac{a}{V(V+b)\sqrt{T}} \quad (13)$$

$$a = 0.4278 \frac{R^2 T_{\text{critical}}^2}{P_{\text{critical}}}, \quad b = 0.08664 \frac{RT_{\text{critical}}}{P_{\text{critical}}}$$

Where P is the pressure in atm, V is the volume in m^3 , T is the temperature in $^{\circ}K$, R is the universal gas constant ($J/mol \cdot K$), n is the number of gas moles, b is a constant for correcting volume, a is a constant for correcting the attractive potential of molecules and T_{critical} and P_{critical} are the critical pressure and temperature, respectively.

Geometry and boundary conditions

The geometrical configuration of the problem under consideration for CFD simulation is

shown in Figure 3. Commercial Gambit version 2.3.16 was used for preparing the mesh of the target geometry. Several non-uniform grid sizes were used to solve the governing equations for examining grid independence and unstructured grid elements relevant to Figure 4, were found to be suitable for the numerical simulation of the problem.

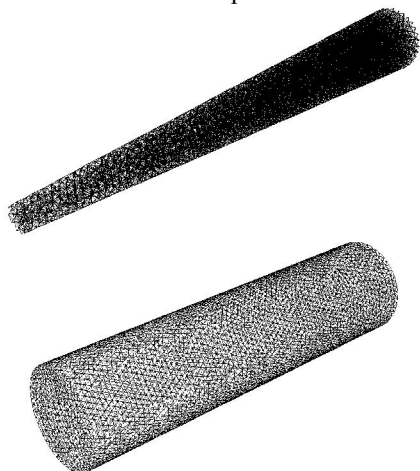


Fig 3. Geometrical configuration of the target gas

A velocity inlet boundary condition (constant velocity and temperature) was used at the target inlet, whereas an outlet flow boundary condition (fully developed flow field) was assumed at the target outlet. No slip conditions or coupled thermal boundary conditions were used at the frustum wall.

The governing equations have been solved iteratively using semi-implicit method (SIMPLE method).

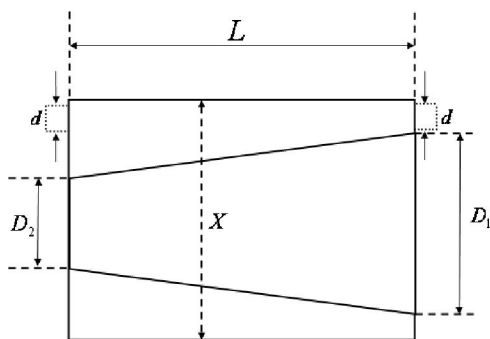


Fig 4. Number of nodes in each direction

Results and discussion

Figures 5–9 show the influence of proton beam intensity on the target pressure and temperature of helium, nitrogen and krypton gases. As can be observed, the target pressure increases with increasing beam intensity. There is good agreement

between the experimental and CFD results. After beam degradation inside the target and energy transfer to the gas molecules, the target gas temperature increases. Increasing beam intensity causes an increase in beam energy and a resulting increase in target gas temperature and pressure.

The rate of increasing target temperature increases with increasing molecular weight of the target gas (krypton = 83.8, nitrogen = 28 and helium = 4). The maximum increase in the pressure of the krypton target gas is approximately 27% at a beam intensity of 12 μA .

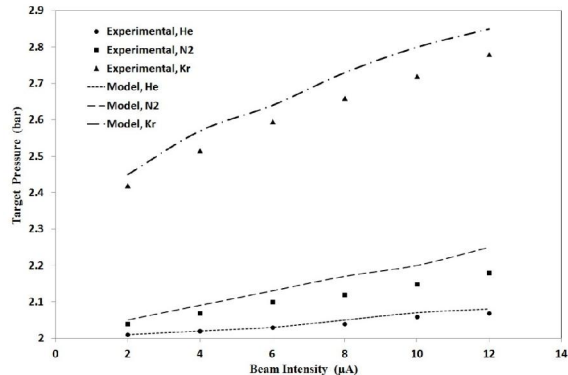


Fig 5. The effect of beam intensity on target gas pressure at $P_0=2$ bar

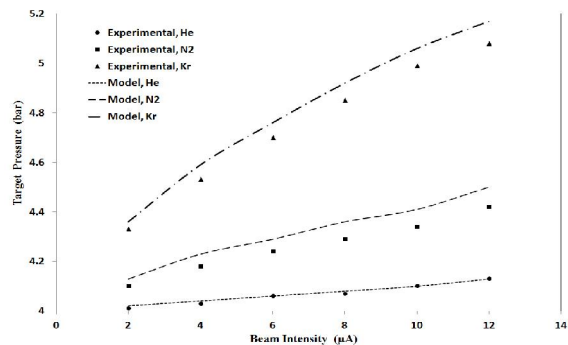


Fig 6. The effect of beam intensity on target gas pressure at $P_0=4$ bar

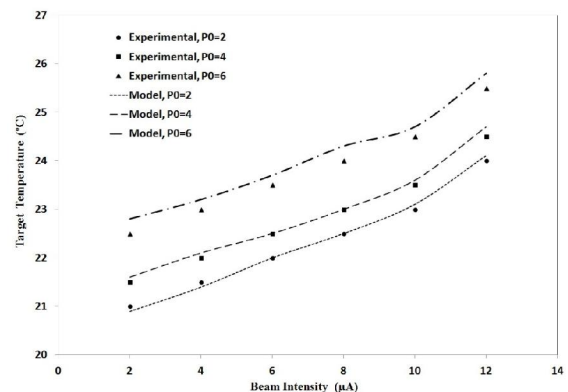


Fig 7. The effect of beam intensity on the helium target gas temperature

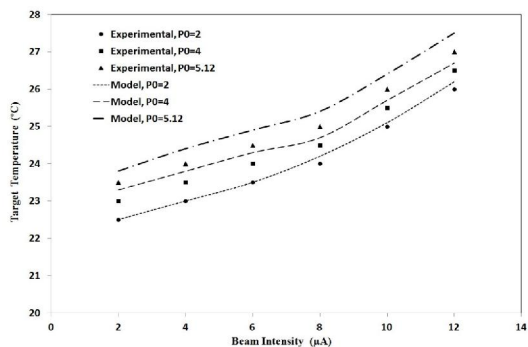


Fig 8. the effect of beam intensity on the nitrogen target gas temperature

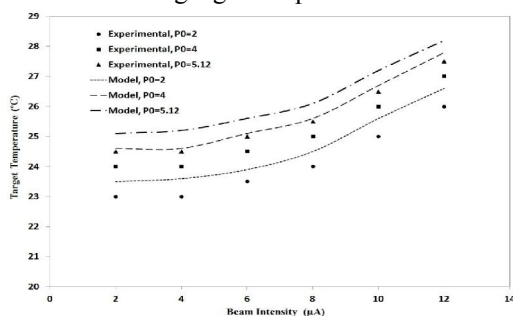


Fig 9. the effect of beam intensity on the krypton target gas temperature

Conclusions:

We study the effect of irradiation intensity on target pressure and temperature. As mentioned above the target pressure increases with the increase in proton beam intensity up to 27% for krypton gas. Titanium double window is affected strongly by the pressure of target gas. Thus operating conditions of target gas should be controlled to prevent physical damages to the titanium windows.

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11/4/2012

Experimental investigation of the interaction between a vertical flexible seawall and random sea wavesRamin Vafaei¹, Alireza Naseri², Omid Giyasi Tabrizi^{3*}

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Abstract: Seawalls are sheltering structures used for protecting the coastal regions against wave induced forces. Because of random nature of the wave behavior, application of physical models for the study of wave-structure interaction can be quite efficient. In the present research, physical models of thin flexible walls were constructed and tested in a wave flume subject to generated random waves. The water surface variations and the strains at the base of the wall were recorded using sensors; and the relationship between the strain and the wave height was obtained using the zero up-crossing method. The results indicate that the strain-wave height relationship is linear. Since the behavior of the wall is within the elastic region, the relationship between the strain and the flexural moment at the base of the wall follows the Hook's Law; and accordingly the relationship between the wave height and flexural moment at the base of the wall was obtained.

[Ramin Vafaei, Alireza Naseri, Omid Giyasi Tabrizi. **Experimental investigation of the interaction between a vertical flexible seawall and random sea waves.** *Life Sci J* 2012;9(4):4986-4993] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 747

Key Word: Seawall, Random waves, Strain, Wave height, Flexural moment.

1. Introduction

Because of vast coastal lines and country's population in coastal areas and damage caused by storm waves, check resistant structures against stormy waves have become one of the basic needs in our country.

The seawalls are one of the important structures which have basic role in protection coasts. The seawalls in addition to bear on the random waves induced forces, due to environmental condition must be endure induced forces such as earthquakes, ocean currents, wind and impact buoys, also. One of the most important tools for study the interactions is the physical models that recently have been used by researchers and engineers widely. The theoretical basis of these models established in the fifteenth century by Leonardo Davinchy then presented by Isaac Newton in the 17th century comprehensively. A comprehensive laboratory study only is not limit to data correct collection consistent with the problem physical conditions rather must use the information collected eventually. Accordingly, this data have utmost importance. Today, the appropriate tools are available to researchers in this field. Numerical methods and signal processing as a powerful technique for data processing are widely used. Despite the findings of researches on the interaction between seawall and sea random waves, a lot of studies have not been on relationship between the wave and exerted forces on wall. In this study, the strain on the wall when encountered with sea random wave, strain and flexural moment measured and

relation between them has been determined using an in vitro model (Cheghini, 1998).

2. The works done in this area

Senfelo in 1928 is one of the first researchers that is presented a way to determinate the pressure resulting of non-breaking wave induced forces. The advantage of his approach is its easy use. Using this method can be estimated the pressure distribution by a straight line roughly (Quoted in 1) .Rundgrin in 1958, with a laboratory work indicated that Senfelo method show non-breaking wave induced forces more than real values (Rundgren, 1958). Minikin theory has been presented based on empirical observations on the large-scale wall which affected regular break waves in 1963. In fact Minikin work was the first laboratory works to examine the scale impact on his studies comprehensively (Minikin, 1963). Most important studies have been conducted about wave induced forces on seawall and vertical foreshore are Gouda works in 1974 which are used by many engineers in design and have been used in many articles and books as reference (Yung Fang et al., 2007). Vigaya Karisma and et.al are studied the regular wave induced wall dynamic response analysis on energy absorbing structure based on scale of 1 to 20 in 2004 as an experimental research (Vijayakrishna et al., 2004). Hugh in 2004 has investigated wave induced flexural moment which created in coastal structure (Hughes, 2004). Nilamani and et.al checked roughness effects on seawall which are considered as both come before and after block on wall in the laboratory also, they had been

investigated the waves upward and downward currents and their effect on wave induced forces. Advantage their work is use from random waves and steep wall with different slopes (Hughes, 2004). Como and et.al studied in 2010, the Froude number similarity between model and prototype on seawall against breaking waves. Their results showed that the amount induced pressure on seawalls which is obtained from dimensional analysis to prototype is more than true value that likely occur in nature. This is because entering the air phase when exerted wave which can be considered as a factor to reduce the force while this effect is negligible in the laboratory. He considered force value and breaking waves induced moment on the wall then measured the pressure using wave generator 100-meter flume at different height of the wall. Barometers value in his experiment was number 8 at wall height; also wall width which was equal with the flume width was 3 m (Cumo et al., 2010).

3. Interaction between waves and seawalls

In figures 1 and 2, thick and thin walls and their failure mechanisms are shown. In thick walls hydrostatic and hydrodynamic forces induced stimulus moment which causes collapse wall are around base of the wall and as a persistent moment must be more than induced moment around wall base to prevent collapse the wall. Also wall weigh and contact the surfaces with floor must generate frictional force more than the force required to produce waves to prevent slipping.

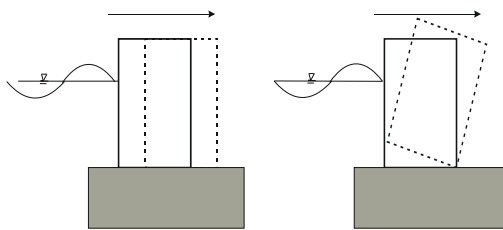


Figure 1: slip and collapse in thick walls

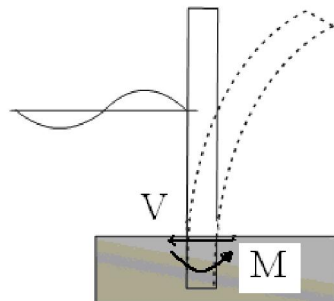


Figure 2: internal forces in the thin wall

In thin walls, stability mechanism is between the floor and the walls which can be meeting by considering a sufficient length to penetrate the walls in the floor. Wall base flexure moment (M) which cause flexure stresses and wall base shear (V) led to create base shear stresses. The study is used physical model of the thin walls. Note that the walls are built along the coast therefore, wall length is much larger than section dimensions. Thus the wall behavior against wave force would be a flat strain (Vafaipour Sorkhabi et al., 2011). So it can be review with regard to the wall length and section dimensions and height based on the Froude number similarity. In this regard, determine flexural moment and shear forces would be more important than rest of the parameters to investigate wall structural behavior. Note that wave induced forces effect near the water surface so; base flexural moment will be more decisive by increase wall height. In physical models, can be used barometric and strain metric methods to determine the moment and shear. In barometric method, pressure values at regular points of the wall height are determined using a set of sensors or sensitive Pyrometer to pressure then are obtained by equations 1 and 2 based on the surface bellow pressure chart, moment and shear (Strain, 2009).

$$V_t = \sum_{k=1}^{k=n} P_{kt} \cdot \Delta z$$

$$M_t = \sum_{k=1}^{k=n} P_{kt} \cdot \Delta z \cdot z_k$$

P_{kt} value is the pressure measured by the k nd barometer on the wall in t pitch, Δz distance between barometers; z_k distance M nd barometer from bottom of the channel, V_t the base shear value and M_t is flexural moment value at wall base. During radiation, moment wave and shear will be having history like each other (Cumo et al., 2010). In strain gauge method, flexural strain and base shear are meeting using strain gauge sensors directly. Strain gauges install at wall base to measure bending on wall, then the strains are read in accordance with figure 3 also flexural moment obtain by (3) to (6) equations (SPM, 1984).

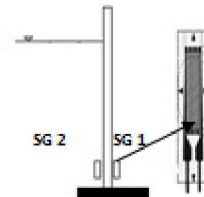


Figure 3: How flexural strain gauge is placement on the wall

$$|\varepsilon_{1t}| \# |\varepsilon_{2t}|$$

$$\bar{\varepsilon}_t = \frac{|\varepsilon_{1t}| + |\varepsilon_{2t}|}{2}$$

$$\sigma_t = E \cdot \bar{\varepsilon}_t$$

$$M_t = \sigma_t \cdot W$$

In above equations ε_{1t} and ε_{2t} are measured strains in t pitch ,E elasticity module , σ_t flexural stress and W section base at the location of install strain gauges. We should consider that above relations are valid in linear range of the stress-strain.

Thus the wall sections should be chosen so that the stress does not exceed this limit. Shear strain gauges are installed in accordance with Figure 4 and base shear value are obtained from the 7 to 9 relations.

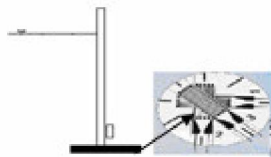


Figure 4: How shear strain gauge are placement on the wall

$$\gamma_{\max t} = \sqrt{2[(\varepsilon_{1t} - \varepsilon_{3t})^2 + (\varepsilon_{2t} - \varepsilon_{3t})^2]}$$

$$\tau_{\max t} = \frac{E}{2(1 + \nu)} \gamma_{\max t}$$

$$V_t = \frac{\tau_{\max t} \cdot I \cdot T}{Q}$$

In the above equations, ε_{1t} and ε_{2t} and ε_{3t} are the strains readings from strain gauges 1, 2 and 3, γ_{\max} shear strain, ν Poisson's ratio, τ_{\max} section shear stress , I section inertia moment and Q is section half static torque relation to inter fiber (Cumo et al., 2010).

4. Random Waves

In general, waves are classified into two categories; regular and random waves. Random waves can be defined by a combination of regular waves. Sea waves in stormy condition are kind of random waves and water level is non-regulated. In the laboratory and the field findings, waves have random nonlinear wave mode. In this mode, all of the waves must be considered as a wave by wave. In this case the wave hydrodynamic properties are

considered by zero up-crossing or zero downward crossing method. Upward zero crossings method is a more conventional method and in this study has been used of it.

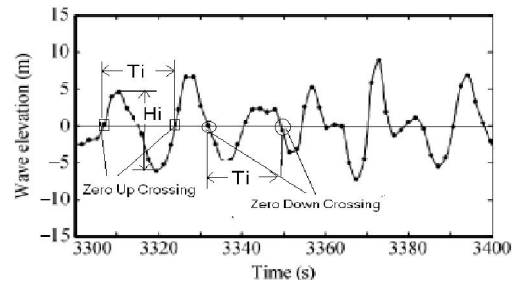


Figure 5: Non-linear random waves (field and laboratory waves)

4.1. Analysis the wave spectra

Random waves can be studied using spectral analysis of waves was recorded. Therefore the waves in sea conditions can be stated by spectral density comprehensively (SPM, 1984). Accordingly various spectrums like as Bretschneider spectrum in 1959, P-M in 1964, TMA in 1985 and Jonswap spectrum in 1974 are defined based on the recorded data. Sorensen has defined Jonswap spectrum as one of the most spectrums with widely application for the coastal structures design (Sorensen, 1993). New researches have been done about construct an appropriate spectrum with climate condition of Iran. But can be used from the spectrums in case lack of the spectrum. In this research was used from Jonswap spectrum. Equation 10 shows energy density during use Jonswap spectrum and figure 6 shows the Jonswap spectrum.

$$S(f) = \frac{\alpha g^2}{(2\pi)^4 f^5} e^{-1.25(f_p/f)^4} \gamma a$$

In this spectrum, γ coefficient is values between 1/6 to 6 but number 3/3 is recommended. γ coefficient is density ratio to in maximum frequency on the spectrum Johnson to P-M spectrum [8] in equation 10.

$$a = e^{-\left[\frac{(f-f_p)}{(2\sigma f_p^2)}\right]^2}, \alpha = 0.076 \left(\frac{gF}{W^2}\right)^{-0.22}$$

$$f_p = \frac{3.5g}{W} \left(\frac{gF}{W^2}\right)^{-0.33}$$

In the above equations, F is wave location length, W wind speed, f frequency and fp is wave

peak frequency (Regulation of design and offshore structures ports of Iran, 2006).

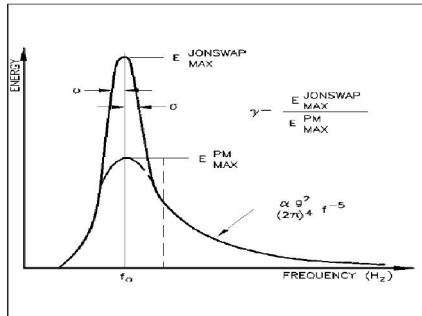


Figure 6: Jonswap wave spectrum

5. Physical model and tests

In order to conduct research experiments, the wave flume was designed and built at marine structure laboratory of Tabriz University. Profile used for the test is as follows (Figure 7):

- Flume length: 12/5 m
- Flume width: 1/15m
- Flume floor height above ground level 75: cm
- Flume inters portion height: 1/05 m
- Water deep (d): 60 cm
- Generated wave type: hinged
- Type of wall: Metal, impenetrable, without overflow wave, tangy on the floor, open in sides
- Wave used: random wave under Johnson spectrum.
- Sampling frequency of water surface: about 10 Hz
- Sampling frequency of wall strain: about 50 Hz



Figure 7: Overview of the hydraulic laboratory wave flume of Tabriz University

6. Produce and use of wave

Input data according to Jonswap wave spectrum enter into generator wave system software by an input file waves then the pedals began to move

based on the given data and wave generation process is summarized in three steps (Figures 8, 9).

- Wave initial production based on DSA numerical model and getting the obtained wave from data takes off from sensor 1 (MOD0).
- Correct spectra obtained from step 1 due to the theoretical spectrum (MOD1).
- Repeat step 2 to reduce difference between the spectra obtained and theoretical spectra (MOD2, 3...).

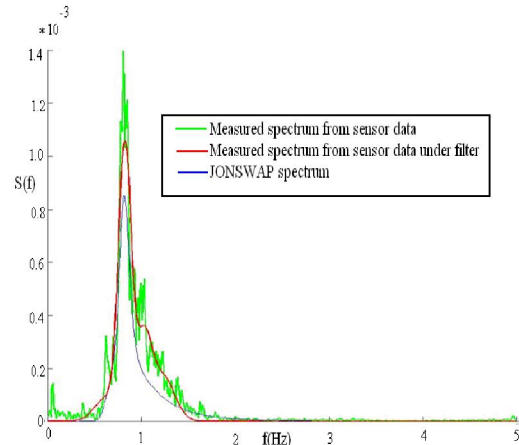


Figure 8: The initial spectrum (measured, filtered and theoretical)

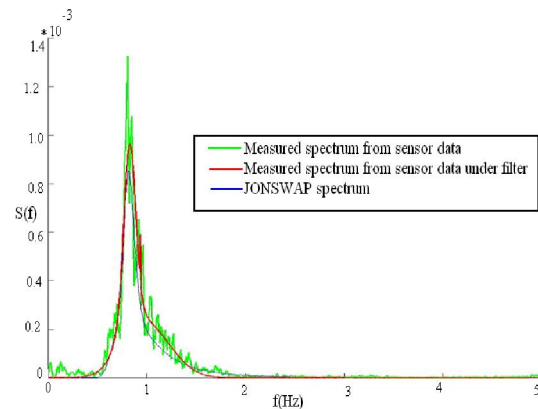


Figure 9: Corrected spectra (measured, filtered and theoretical)

7. Strain used

Strains applied are kind of TML Metal Pam E-101R which used to measure the flexural moment as half-bridge. Sampling range of the strain gauge is from zero to 100 Hz. Because of wall vibration is faster than sea level variations so must be careful in selecting the sampling frequency of the wall response to prevent of come with Aliasing problem undesirable. In the present study, strain sampling frequency is 50 Hz. How the half-bridge is connected and connect details strain gauges are shown in figure 10.

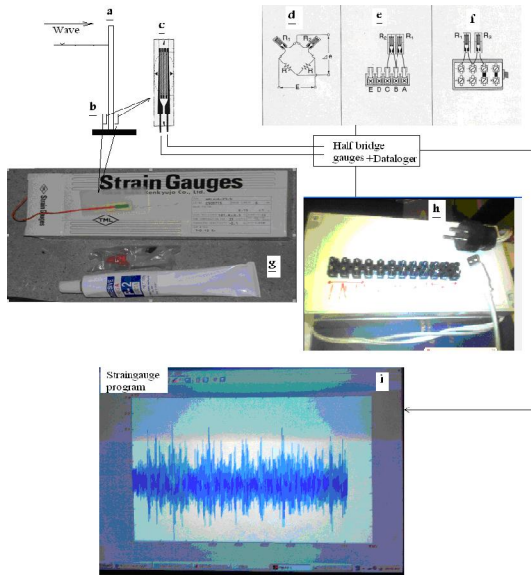


Figure 10: Take off strain on the wall (a: wall, b: place a strain gauge mounted on the wall, c: strain gauge schematic figure, d: half-bridge circuit, e: Strain gauges connected to a data single-way data logger, f: connect the strain gauge to two-way data logger, g: strain gauge real picture with a special glue, h: data logger, i: data taken off image of the strain gauges).

8. Tests conducted

Experiments conducted are presented in table 1. Changes of the effective height, H_s from 3/9 to 9/2 cm and peak frequency from 0/8 to 1/24 Hz are presented in table 1.

Table 1: Characteristics of generated randomly wave with Johnson spectrum based on effective height and peak frequency.

Experiments number	H_s	f_p
1	5	0/8
2	5/2	1/24
3	5	1
4	5/6	1/23
5	7/3	1/22
6	3/9	1/23
7	5/4	1
8	5/4	1/2
9	4/3	1/23
10	7/7	1/21
11	6	1/23
12	7/5	1/23
13	9/2	1/23
14	5/6	1/24
15	7/5	1/21

The taking off data are used to determine wave on the determinant sensors of water level while number of them is 5 and they used for each of 15 defined waves in table 1. For example, in Table 8, the tests are in water level for the wave number 8 with height of 5/4 cm and the peak frequency is 1/2 Hz. In order to exact determine the water level in each experiment a study is conducted on the surface water and obtained data stored in a separate file. The resulting file will have the time series.

Table 2: Studies performed to determine the wave by determinant sensors of water level

	WP1 sensor	WP2	WP3	WP4	WP5
Name of water level	W1	W2	W3	W4	W5
Name of water static level	W001	W002	W003	W004	W005

Take off strain is done with water level at same time. In order to determine the net strain for wave, take off work is done in wall static mode. So taking off strain in table 3 is done accordance to taking off work in table 2 on the wave number 8. Given that only one strain gauge mounted on the wall so there will be only one file of strain time series.

Table 3: Take off is done to determine strain based on the strain gauge mounted on the wall

	SG1
Strain file name	E1
Name of strain file for wall static mode	E001

9. Analysis results

Statistical analysis are done wave by wave to obtain many parameters such as wave height, wave length and wave statistical properties. As well as to study the interaction between the wall and waves, wave by wave analysis will be necessary to strain. Also, in design is necessary determine more influence on the strain per each wave passing while it occurs with compares impact peak of each wave on the strain volatility. To investigate the relationship between time histories of the strain (E) and water level (W), the data has isolated by wave by wave method (according to cross upward zero method) and for each wave, maximum positive amplitude (above water zero level) and the maximum negative amplitude (below water zero level) are obtained separately. In this case, the wave height can be obtained from the following equation:

$$H_k = \max(|(a_{\max}^+)_{k+1}| + |(a_{\max}^-)_{k}|)$$

In strain analysis the strain value in k nd wave is obtained from the following equation:

$$\epsilon_k = \max(|(\epsilon_{\max}^+)_{k}|, |(\epsilon_{\max}^-)_{k}|)$$

In above equation $(\epsilon_{\max}^+)_{k}$ is maximum flexural strain on the wall in direction of the wave influence and $(\epsilon_{\max}^-)_{k}$ is maximum flexural strain on the wall in opposition direction of the wave influence . So the strain such as H_k height will be ϵ_k . Therefore, a program under name wavebywavevafaei.m is written in MATLAB software that can be detect waves by upward zero crossing and the downward zero crossing separately then investigate them wave by wave and obtain for each of them maximum positive range (above water zero level) and maximum negative amplitude (below water zero level), maximum wave height, wave length and period. To isolate each wave, at the beginning of work, final data from before wave connect to the first data and equation of a line passing through this point cut off in the static water surface which represents the point as starting point and the end point of the wave to the end of the first data of the next wave and the line passing through this point in the surface water has been cut off which represents the point as final point. Figure 11 show properties of a wave that have maximum height and obtained from analysis wave by wave of time history of water level .The wave is obtained per the No. 65 wave and the total number of waves are 228.

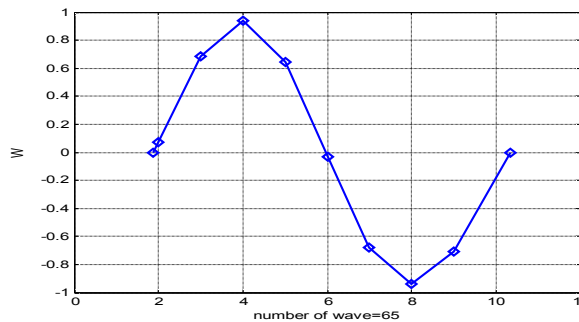


Figure 11: No. 65 wave is obtained of analysis wave to wave of time history of water level.

The maximum wave is obtained in figure 11 is achieved of normalized time history of water level. The positive amplitude of this wave is $(a_{\max})_{\text{norm}} = 0.9404$ and its negative amplitude is $(a_{\min})_{\text{norm}} = -0.9601$, as well as wave height is $(H_{\max})_{\text{norm}} = 1/8809$. To obtain actual values must be multiplied these numbers to reverse the number were normalize. In this case, $a_{\max} = 6/300$ cm, $a_{\min} = -5/600$ cm, $H_{\max} = |6/300| + |-5/600| = 11/9$ and maximum wavelength will be $L_{\max} = 84/698$ cm. Due to the water depth ratio to wave length is

$\frac{d}{L} = 0.710 > 0.5$ water depth value will be correct. For all waves, on the time history can be achieved these parameters. Figure 12 show wave height diagram based on wave number.

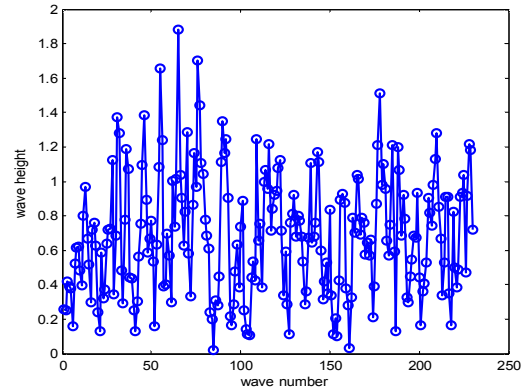


Figure 12: Diagram of wave's height for a water level.

If the waves height are arranged in order from large to small, middle wave height $H_{\text{ave}} = 4/49$ cm , wave height of one third largest waves , $H_{1/3} = 5/79$ CM ,root mean square wave height, $H_{\text{rms}} = 5/15$ cm will be obtained. When produce of this wave value of effect height of wave is considered $5/89$ cm. Due to obtained results the error of 9% seems to be acceptable. In the analysis of wave by wave the maximum strain was in dynamic state $\epsilon_{\text{dyn}} = 2/2017 * 10^{-4}$ and in this case flexural moment value in dynamic mode will be :

$$M_{\text{dyn}} = E \epsilon_{\text{dyn}} . W = 2 * 10^6 * 2.2017 * 10^{-4} * 21.33 = 9386 \text{ kg.cm} = 94 \text{ kg.m}$$

It should be noted that the moment has been obtained in 10 cm level from floor and install place of the strain gauge and because of the wall is placement on two bases, it show half wall dynamic moment. Per wave height, a strain like it obtains. Therefore can be predicate the strain based on wave height. Figure 13 diagram shows the strain values at the corresponding height. These graphs provided appropriate linear behavior. R2 values in these graphs are 0/8434 and very few points placed out of bands range 95%. As can be seen in Figure 13, the relationship between wave height and strain 11 is established. This equation is written in dimensionless form:

$$\frac{\epsilon_i}{\epsilon_{max}} = 0.8241 \frac{H_i}{H_{max}} + 0.09677$$

In this equation H_i is wave height, H_{max} maximum wave height in time history, ϵ_i is a strain like as H_i , and ϵ_{max} is considered maximum strain in the history. In the wall $H_{max} = 11/813$ cm, $\epsilon_{max} = 2/2017 * 10^{-4}$ that it is strain in dynamic state resulting of wave rate but static content is not included. Due to the relation $M_{dyn} = E \epsilon_{dyn} . W$, relationship between wall base moment in dynamic state and wave height would be as equation 12: $M = 625.48H + 867.63$

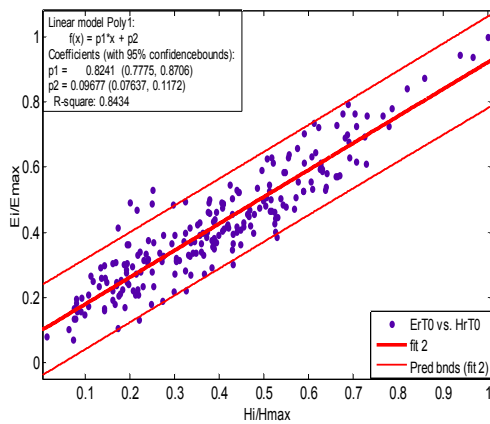


Figure 13: base wall strain chart against wave height

In Figure 14 water level spectrum and in figure 15 the random wave induced strain range in the wall is shown. As can be seen in both spectra peak frequencies are close together and frequency energy of strain range is more than 17 percent of the water level energy.

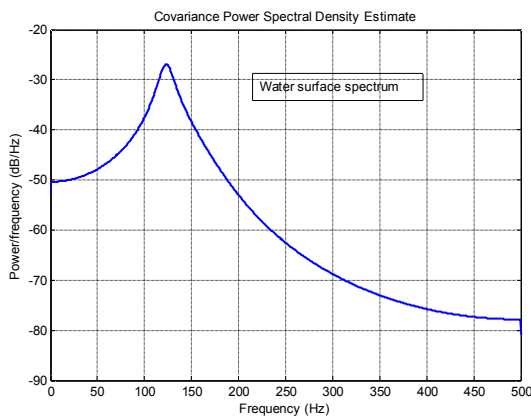


Figure 14: The water level spectrum

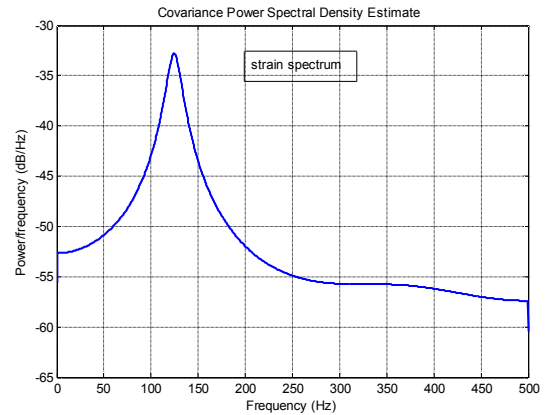


Figure 15: Strain range

According to the same spectrums figure and frequency range governing them can be concluded that relationship between changes in strain with water level is fairly linear. This case is visible in analysis of the time series, also (Figure 13).

10. Conclusions

- The strain behavior and fairly linear wave height with determinant coefficient is about 85 percent.
- assume generating wave in deep water for hinged wave generator pedal are confirmed based on the results obtained from wave by wave approaches on the zero up crossing method ($\frac{d}{L} = 0.710 > 0.5$).
- In reform process of produced wave in flume after steps 2 or 3 can be usually get an appropriate answer. But at higher step despite improve compliance in spectrum peak may be produce more deviations in the high-frequency part of the spectrum.
- Frequency peak of water level spectrum is roughly equivalent with strain range.
- Linear relationship between strain and water level can be observed by time-series analysis and comparison of the spectrums.

Acknowledgements

Because of financial support of research affair of Tabriz University for this study is appreciated.

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11/4/2012

A Hybrid Fuzzy Wavelet Neural Network Combined with Shuffled Frog Leaping Algorithm for Identification of Dynamic Plant

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Abstract: This paper present a Fuzzy Wavelet Neural Network (FWNN) design based on Shuffled Frog Leaping (SFL) Algorithm to improve the function approximation accuracy and general capability of the FWNN. In presented FWNN, the fuzzy rules that contain wavelets are constructed. Each fuzzy rule corresponds to a sub-wavelet neural network (sub-WNN) consisting of wavelets with a specified dilation value. Orthogonal least square (OLS) algorithm is used to determine the number of fuzzy rules and to purify the wavelets for each rule and SFL algorithm is suggested for learning of FWNN parameters. The structure is tested for the identification of the dynamic plant. Simulation results demonstrate effectiveness and ability of proposed approach.

[Reza Sharifian Dastjerdi, Ramtin Sadeghi, Farshad Kabiri, Payam Ghaebi Panah. **A Hybrid Fuzzy Wavelet Neural Network Combined with Shuffled Frog Leaping Algorithm for Identification of Dynamic Plant.** *Life Sci J* 2012;9(4):4994-4998] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 748

Keywords: Shuffled Frog Leaping Algorithm, fuzzy wavelet neural network, identification.

1. Introduction

In recent years, there has been a growing interest in algorithms inspired from the observation of natural phenomenon, such as fuzzy logic, neural network, and heuristic techniques in many scientific and engineering research areas by the researchers around the world [1].

Fuzzy technology is an effective tool for dealing with complex, nonlinear processes characterizing with ill-defined and uncertainty factors. Fuzzy rules are based on expert knowledge. The constructing of knowledge base for some complicated processes is difficult. Thus, there are some methods for constructing of fuzzy rules [2]. On the other hand, some characteristics of neural networks such as learning ability, generalization, and nonlinear mapping are used to deal with signal processing, control system, decision making, and so on. However, the main problem of neural networks is that they require a large number of neurons to deal with the complex problems. Moreover, they also result in slow convergence and convergence to a local minimum. In order to overcome these disadvantages, wavelet technology is integrated into neural networks [3, 4].

Recently, based on the combination of feed-forward neural networks and wavelet decompositions, wavelet neural network (WNN) has received a lot of attention and has become a popular tool for function learning [3]. The main characteristic of WNN is that some kinds of wavelet function are used as the nonlinear transformation in the hidden layer of neural network, so time–frequency property

of wavelet is incorporated into the learning ability of neural networks.

However, the main problem of WNN with fixed wavelet bases is the selection of wavelet frames because the dilation and translation parameters of wavelet basis are fixed and only the weights are adjustable. The appropriate wavelet transform will result in the accuracy of approximation. Therefore, there are several different methods proposed to solve the problems [5-7].

The complexity and uncertainty of the system can be also reduced and handled by the concepts of fuzzy logic. The local details of non stationary signals can be analyzed by wavelet transforms. The approximation accuracy of the plant can be improved by the self-learning capabilities of neural networks. Therefore, there are many papers that discuss the synthesis of a fuzzy wavelet neural inference system for signal processing, control problems, identification and pattern recognition [3, 8-12].

In this paper, a FWNN combined with SFL algorithm have been proposed to identification of dynamic plant from input-output observations, inspired by the theory of multi resolution analysis (MRA) of wavelet transforms and fuzzy concepts. FWNN consist of a set of fuzzy rules that each rule corresponding to a sub-WNN consists of single scaling wavelets. The difficulties of selecting wavelets are reduced and orthogonal least-square (OLS) algorithm is used to determine the number of fuzzy rules and to purify the wavelets for each rule. Furthermore, in order to improve the function approximation accuracy and general capability of the

FWNN system, a self-tuning process that uses the SFL approach is proposed to adjust the parameters of translation, weights, and membership functions.

By minimizing a quadratic measure of the error derived from the output of the system, the design problem can be characterized by the proposed SFL formulation. The solution is directly obtained without any need for complicated computations. Moreover, the efficient method is expected to have good performance without requiring any derivatives or other auxiliary knowledge.

The paper is organized as follows: to make a proper background, the basic concept of the SFL algorithm is briefly explained in Section II. In Section III, the concepts of FWNN and optimization problem are explained. The results of the proposed FWNN-SFL in a simulation example are given in Section IV and conclusion is drawn in Section V.

2. overview of SFL

The SFL algorithm is a memetic meta-heuristic method that mimics the memetic evolution of group of frogs when seeking for the location that has the maximum amount of available food. The SFL is derived from a virtual population of frogs in which individual frogs represent a set of possible solution. Each frog is distributed to a different subset of the whole population referred to as memeplex. The different memeplexes are considered as different culture of frogs that are located at different places in the solution space (i.e. global search). Each culture of frogs performs simultaneously an independent deep local search using a particle swarm optimization like method. Within each memeplex, the individual frogs hold ideas, that can be influenced by the ideas of other frogs within their memeplex, and evolve through a process of change of information among frogs from different memeplexes.

To ensure global exploration, after a defined number of memeplex evolution steps (i.e. local search iterations), information is passed between memeplexes in a shuffling process. Shuffling improves frog ideas quality after being infected by the frogs from different memeplexes, ensure that the cultural evolution towards any particular interest is free from bias. In addition, to improved information, random virtual frogs are generated and substituted in the population if the local search cannot find better solutions, After this, local search and shuffling processes (global relocation) continue until defined convergence criteria are satisfied. The flowchart of the SFL is illustrated in Fig. 1.

The SFL begins with an initial population of "N" frogs $P = \{X_1, X_2, \dots, X_N\}$ created randomly within the feasible space Ω . For S-dimensional problems (S variables), the position of the "ith" frog

is represented as $X_i = (x_{i1}, x_{i2}, \dots, x_{iD})$. A fitness function is defined to evaluate the frog's position.

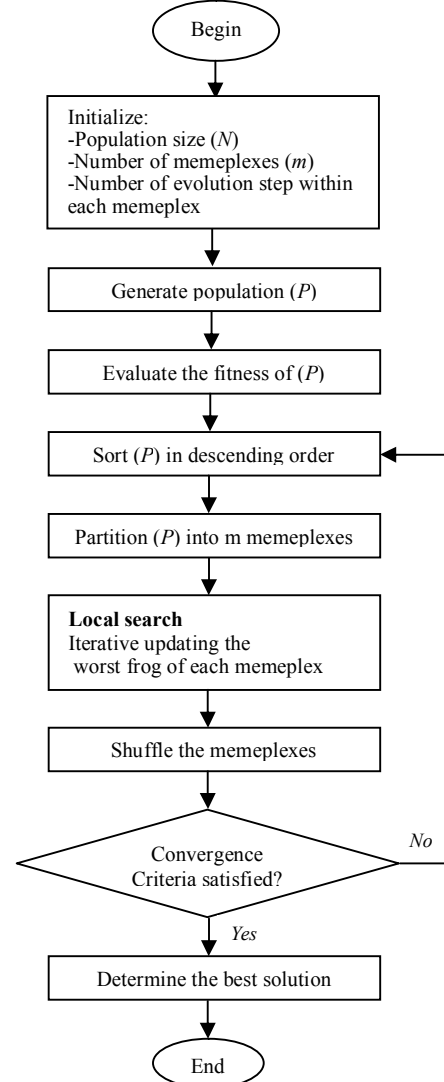


Figure 1. General principle of the SFLA.

Afterward the performance of each frog is computed based on its position. The frogs are sorted in a descending order according to their fitness. Then, the entire population is divided into m memeplexes, each of which consisting of n frogs (i.e. $N = n \times m$). In this process, the first frog goes to the first memeplex, the second frog goes to the second memeplex, frog m goes to the m th memeplex, and frog $m + 1$ back to the first memeplex, and so on.

Within each memeplex, the position of frog i th (D_i) is adjusted according to the different between the frog with the worst fitness (X_w) and the frog with the best fitness (X_b) as shown in (1), where $\text{rand}()$ is a random number in the rang $[0, 1]$. During memeplex evolution, the worst frog X_w leaps toward

the best frog X_b . According to the original frog leaping rule, the position of the worst frog is updated as follow:

$$\text{Position change } (D_i) = \text{rand}() \times (X_b - X_w) \quad (1)$$

$$X_w(\text{new}) = X_w + D, (\|D\| < D_{\max}) \quad (2)$$

where D_{\max} is the maximum allowed change of frog's position in one jump. If this repositioning process produces a frog with better fitness, it replaces the worst frog, otherwise, the calculation in (1) and (2) are repeated with respect to the global best frog (X_g), (i.e. X_g replaces X_b). If no improvement becomes possible in this case, then a new frog is randomly generated to replace the worst frog. The evolution process is continued for a specific number of iterations ([13, 14]).

3. FWNN and problem formulation

3.1. Fuzzy wavelet neural networks overview

A typical fuzzy wavelet neural network for approximating function y can be described by a set of fuzzy rules such as follow [3]:

R_i : If x_1 is A_1^i and x_2 is A_2^i and ... and x_q is A_q^i , then

$$\hat{y}_i = \sum_{k=1}^{T_i} w_{M_i, t^k} \Psi_{M_i, t^k}^{(k)}(\underline{x}), M_i \in z, t^k \in R^q, w_{M_i}^k \in R^q, x \in R^q \quad (3)$$

where R_i is the i th rule, c is the number of fuzzy rules. x_j and \hat{y}_i are j th input variable of \underline{x} and output of the local model for rule R_i , respectively. Also M_i is dilation parameter and T_i is the total number of wavelets for the i th rule. $t^k = [t_1^k, t_2^k, \dots, t_q^k]$, where t_j^k denotes the translation value of corresponding wavelet k . Finally, A_j^i is the fuzzy set characterized by the following Gaussian-type membership function.

$$A_j^i(x_j) = e^{-\left(\frac{x_j - p_{j1}^i}{p_{j2}^i}\right)^2} p_{j3}^{i/2} \quad (4)$$

$p_{j1}^i, p_{j2}^i \in R$ and $p_{j3}^i = 2$, where p_{j1}^i represents the center of membership function, p_{j2}^i and p_{j3}^i determine the width and the shape of membership function, respectively. Wavelets $\Psi_{M_i, t^k}^{(k)}(\underline{x})$ are expressed

by the tensor product of 1-D wavelet functions:

$$\Psi_{M_i, t^k}^{(k)}(\underline{x}) = 2^{\frac{M_i}{2}} \Psi^{(k)}(2^{M_i} \underline{x} - t^k) = \prod_{j=1}^q 2^{\frac{M_i}{2}} \Psi^{(k)}(2^{M_i} x_j - t_j^k) \quad (5)$$

By applying fuzzy inference mechanism and let \hat{y}_i be the output of each sub-WNN, the output of FWN for function $y(\underline{x})$ is as follow:

$$\hat{y}_{FWN}(\underline{x}) = \sum_{i=1}^c \hat{\mu}_i(\underline{x}) \hat{y}_i \quad (6)$$

where $\hat{\mu}_i(\underline{x}) = \mu_i(\underline{x}) / \sum_{i=1}^c \mu_i(\underline{x})$, $\hat{\mu}_i(\underline{x}) = \prod_{j=1}^q A_j^i(x_j)$ and

for current input \underline{x} and each function, satisfies $0 \leq \hat{\mu}_i \leq 1$ and $\sum_{i=1}^c \hat{\mu}_i = 1$. Also $\hat{\mu}_i(\underline{x})$ determines the contribution degree of the output of the wavelet based model with resolution level M_i . In this paper the applied structure of FWNN is the same as the structure used in [12]. Also orthogonal least-square (OLS) algorithm is used to select important wavelets and to determine the number of fuzzy rules. Details of this OLS algorithm can be found in [15].

3.2. Tuning parameters of FWNN

Assume that there are H input-output pairs, $(x(l), y(l))$, $l = 1, \dots, H$. Our task is to design the fuzzy basis function expansion such that the error between $\hat{y}_{FWN_k}(x(l))$ and $y(l)$ is minimized. Therefore SFL is applied for tuning parameters of FWNN by optimizing the following objective or cost function.

$$E = \sum_{l=1}^H |\hat{y}_{FWN_k}(x(l)) - y(l)|^2 \quad (7)$$

and, the N th frog is represented as

$$F_N = [p_{j1}^{iN}, p_{j2}^{iN}, p_{j3}^{iN}, w_{M_i}^N] \quad (8)$$

which are all free design parameters that to be updated by SFL algorithm in our FWNN model. Summarized the whole proposed approach is illustrated in Fig. 2.

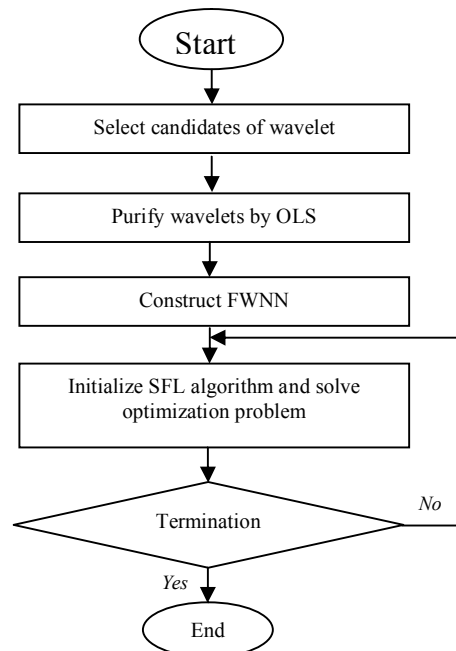


Figure 2. The algorithm of constructing FWNN

4. Design example

The identification problem involves finding the relation between the input and the output of the

system. In order to evaluate the effectiveness and efficiency of the proposed approach, we repeat a simulation example from [15], where a FWNN-SFL employed to identify a nonlinear component in a control system. The plant under consideration is governed by the following difference equation:

$$y(k+1) = 0.3y(k) + 0.6y(k-1) + f(u(k)) \tag{9}$$

Where $y(k)$ and $u(k)$ are the output and input, respectively, at time step k . The unknown function $f(\cdot)$ has the form

$$f(u) = 0.6\sin(\pi u) + 0.3\sin(3\pi u) + 0.1\sin(5\pi u) \tag{10}$$

In order to identify the plant, a series-parallel model governed by the difference equation as follow:

$$\hat{y}(k+1) = 0.3\hat{y}(k) + 0.6\hat{y}(k-1) + F(u(k)) \tag{11}$$

Was used, where $F(\cdot)$ is the function implemented by FWNN-SFL and its parameters are updated at each time step. In the learning process, the input to the plant and the model is considered as a sinusoid $u(k) = \sin(2k\pi/250)$ in interval $k=1$ until $k=250$ and $u(k)$ is changed to $0.5\sin(2k\pi/250) + 0.5\sin(2k\pi/25)$ at $k=250$ until $k=500$.

Three fuzzy rules with 4 selected wavelets are represented by OLS algorithm for constructing FWNN. The first step to implement the SFL is generating the initial population where N is considered to be 300. Each population is a solution to the problem which determines the parameters of FWNN, i.e. F_N vector. In this paper, the number of iteration is set to be 1000.

The output and control signal are shown in Fig. 3. As shown in Fig. 3, the output of the model follows the output of the plant almost immediately, even after the adaptation was stopped at $k=250$ and $u(k)$ was change to $0.5\sin(2k\pi/250) + 0.5\sin(2k\pi/25)$.

To compare the obtained result by SFL, a simple Genetic Algorithm (GA) is applied. The number of chromosomes in the population is set to be 200. Also, the number of iterations is considered to be 1000, which is the stopping criteria used in SFL. The approximation of piecewise function obtained by suggested method is presented in Fig. 4.

For the designed parameters, the average best-so-far of each run are recorded and averaged over 10 independent runs. To have a better clarity, the convergence characteristics in finding the best values of update parameters are given in Fig.5. Where shows SFLA performs better than GA at early iterations.

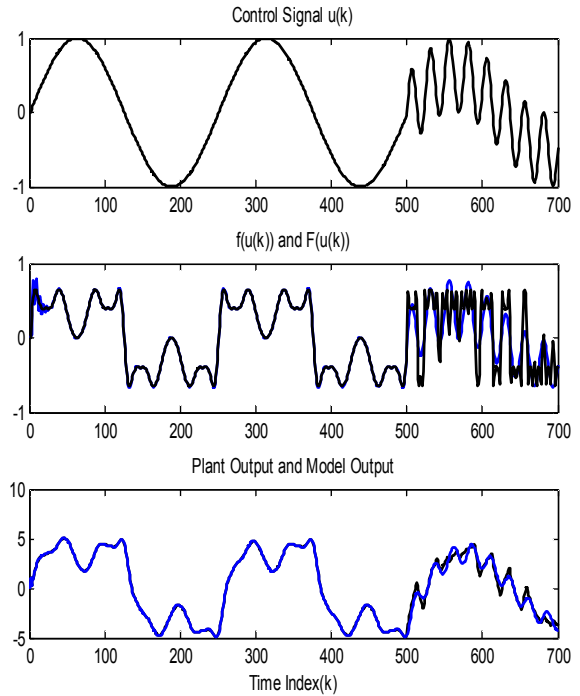


Figure 3. Results of identification, where solid line denotes the output of the plant, dashed line denotes the FWNN-SFL output.

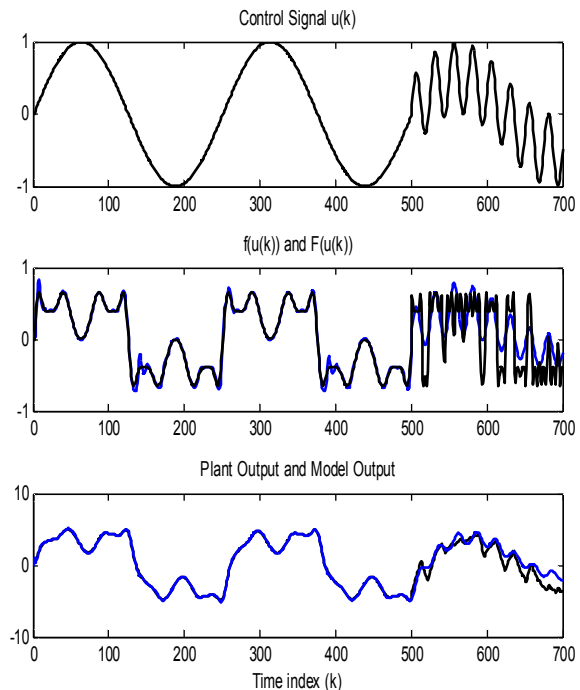


Figure 4. Results of identification, where solid line denotes the output of the plant, dashed line denotes the FWNN-GA output.

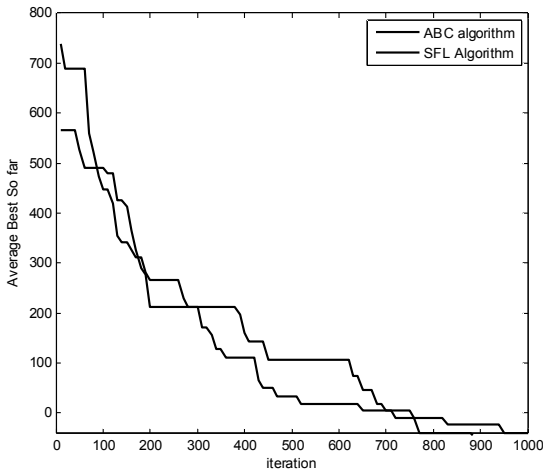


Figure 5. Convergence characteristics of SFLA and GA.

5. Conclusion

In this paper, a new memetic meta-heuristic method called Shuffled Frog Leaping Algorithm (SFLA), combined with FWNN for function learning is proposed. Proposed approach integrates the advantages of fuzzy concepts with the WNNs and evolutionary algorithms. In the presented FWNN, OLS algorithm is used for determining the number of fuzzy rules and to purify the wavelets for each rule and a real version of SFL algorithm is used for tuning parameters of FWNN. The simulation results are presented show the efficiency and effectiveness of the proposed approach. Also, the GA is adopted from literature and applied for comparison. The obtained results demonstrate that SFL has faster convergence and better performance than GA.

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11/4/2012

Spatial Analysis and Geographical Configuration of Second Homes: A Case study of Rural Districts of Ramsar County

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Abstract: Today, different factors underlie the development of second homes, as a major geographical phenomenon and a new model of movement. These factors include the ever-increasing population and urbanization, technological developments, change in attitudes and lifestyle, rural-urban migrations, people's attachment to their birthplace and reverse migrations, the rise of villagers' capitals, economic reconstruction, rural destitution, and development of transportation and communication. This study has been initially concerned with exploring the number of second homes across the world. The configuration and spatial model of second homes have then been studied. The study area covers rural regions of Ramsar County in Mazandaran province (4 rural districts including 256 villages and settlements). Geographically speaking, this area encompasses four major regions: coastal, plain, foothill, and highland. The findings suggest that there are 7674 second homes (56.30% of total residential units) spread over the area's rural regions. Distance from the city and rural road decide second home configuration and residential density. Also, there can be observed two types of houses: modern and traditional. There is a temporary population of almost 30660 in Ramsar County, constituting 43.8% of the total population of 70000. Field studies and library research shape the present study. Yet, the study is based on field studies. GIS, Excel and Spss software have been employed to extract maps and tables.

[Khadijeh galyan moghaddam, Teimour Amar. **Spatial Analysis and Geographical Configuration of Second Homes: A Case study of Rural Districts of Ramsar County.** *Life Sci J* 2012;9(4):4999-5008] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 749

Keywords: spatial analysis, Ramsar, Iran, second home, geographical configuration

1. Introduction

“Second home” proves to be a crucial geographical phenomenon (Opačić & Mikačić, 2009: 163). This phenomenon can be more or less observed in all countries. Configuration and development of second homes in developing countries have been often spontaneous, unplanned and bereft of any regulation (Rezvani, 2008: 31). This has given rise to the degradation of natural resources and agricultural farms, the rise of property values, scarcity of housing for local people, and spatial heterogeneity and aesthetically undesirable landscape. In the face of the dynamic nature of second home, this term has also been referred to as “up-country residence”, “holiday home”, “cottage”, “summer home”, “weekend home”, “camp”, “tent” and so forth. For instance, the international term “cottage” and second home is used in Canada and China respectively (Wang, 2006:20). Second home is also a preferred term in Iran. Today, second home expansion, as a new model of housing and mobility (Pitkaˆnen, K. & M. ˆlaˆinen, V, 2008:1), indicates urbanization level in different countries, which covers a vast array of factors, including, senility and urban population density, the rise of capital in urban regions, abandonment of rural housing, reconstruction, economic transition from industry to service, change in working conditions and

working flexibility, transport and communication development and cuts in transport fares (Müller, 2007: 198). Studies suggest a direct relationship between the rate of second home occupancy and income. It can be, therefore, expected that more second homes are relatively more occupied by tourists in countries enjoying higher welfare standards. The same argument holds true for Iran where tourist attractions, landscapes and temperate climate in its rural regions have recently engendered a dramatic growth in tourism in these regions (Rezvani, 2011:39). Further, there have been different motives for constructing second homes in rural regions, including, agriculture demolition, recognition and development of tourism, growth of rural-urban and urban-rural (reverse) migration and rural abandonment (Galyan moghadam, 2009: 192).

Deciding on the number of second homes and proposing a working definition of the term, researchers are currently facing a couple of problems, namely the ever-growing number of second homes, lack of official statistic, failure to tell the primary and second homes apart, and poor statistical measurement. Yet, most of the definitions provided for second home seek to differentiate between permanent and non-permanent housing. Investigations reveal that second homes have a

supplementary function in the field of tourism, retirement period, investment, and housing, suggesting the typical nature of second homes (Wang, 2006:41). In this regard, the Institute for Social Innovation has defined second homes as “those homes occupied less than 91 days in each year” (Rezvani, 2003:60).

Today, in many parts of the world (this includes Iran), second homes have been distributed in both modern and traditional form which have, in some sense, different functions. Despite the different functions this phenomenon fulfill, the configuration of second homes associates with regions with high eco-tourism potential (Sharifnia, et al., 2010), indicating the disproportionate configuration of this phenomenon in rural regions worldwide, particularly in developing countries. Notwithstanding the multifaceted effects of this phenomenon, such an unbalanced distributional pattern is due primarily to the lack of planning in constructing second homes in most countries including Iran. Absence of planning in this filed appears to be one of the major deficiencies in rural programs, which is deemed to be one of the major factors of underdevelopment in rural construction in many geographical areas.

1.1 Number and geographical configuration of second homes across the world

Identifying the number of second homes is always giving geographical researchers a big headache as there is neither statistics regarding the issue nor the existing statistics are measured with precision (Jaakeon, 1986:369; Muller, 2002:14). In 2000, for example, Ähtäri municipality in Osterbothnia (Spain) which is a small municipality reported the number of second home owners to be 494, with the density of $637/100 \text{ km}^2$. This compares unfavorably with other reports suggesting that there were 265 second home owners in this very region (Müller, 2002:14). Nevertheless, using filed studies and occasionally official statistics, several researchers in different countries have, in a sense, managed to come up with the number of second homes in different geographical areas worldwide. For example, the first official census of second homes in Spain dates back to 2001 when the share of second homes in Galicia was 4.96% in 6.6% of the entire country. This figure in 30 years before then i.e. in 1970 was 2.13% (Borge, 2007:375-76).

Also, the number of holiday homes in EU countries has increased from 600000 in 1962 to 2900000 in 1999 (a 20.68% increase) (INSEE, Recensement général de la population, 1999, cited in Vanoni & Auclair, 2003: 80). Yet observing the construction of second homes in Denmark in 2001 suggests that the number of second homes until 1900

was 4274. This number rose to 5247 in 1900-04 only to rise again to 5534 in 1905-09 and reached 216193 in 1995-99 (Tress, 2002:119). Second home development in Stockholm archipelago has also experienced a 29% increase from 1991 to 2000 (Marjavaara, 2007:34). In 2001, the share of second homes in the total homes was 16%, in which 15% of households resided and the rates of second home growth (in Spain) in 1991 were 11.9% and 15% in 1991 and 2001, respectively (Colás et al., 2007:431). Also, in 2001 there were 182513 second homes in Croatia (9.72% of the total dwellings), of which 117893 properties were located in the coastal regions, accounting for 46.59% of the total second homes in Croatia (Mikačić, 2007, cited in Opačić and Mikačić, 2009: 161). In many countries second home occupancy is not confined to domestic households and many people living in developed countries reside in second homes in other countries of temperate climate. Take the example of Muller analysis (2007) which revealed that Sweden was home to 498943 cottages (second homes) in 1996 which increased to 500 to 700 thousand cottages in 2007. German owners consumed about 4000 and 5500 second homes in Sweden between 1991 to 1996 and 2001 respectively. Germans also occupied 300 thousand second homes in Spain, 100 thousand in France, 80 thousand in Italy, and 65 thousand in Portugal (G. Folkedoter, 2003:49). Second homes are widely distributed across the world. There were, for example, 329000 second homes in South East and South West London (England) in 1994-95 and 502000 in 2003-04. Further, studies suggest that there were nearly 5000 second homes in North Ireland (NI) in 2001 (Paris, 2006:7) and 64000 ones in Colorado in 2005 (long, et al, 2005:1-2). In some places multiple homeownership (two or three holiday homes) is common. For example, in China in the mid 90s there were about 6.2% primary and second home owners, of which 12% owned more than two homes (3 homes at least) (Huang & Yi, 2011: 434). In Iran, northern regions of the country are home to households dwelling in two or more holiday homes. Planning for purchasing or constructing second homes is therefore a common practice everywhere across the world. About 27000 households in NI, for example, currently own second homes, 7000 are considering purchasing one or more, and 33000 are likely to purchase second homes during the next few years (Paris; Jorgensen & Martin: 2006:6). Also, there were 101731 second homes in Denmark in 1966 which reached 148618 in 1974 (Danmarks Statistik, 1976, cited in Tress, 2002:116). Moreover, in 1998, 4.3% of primary (permanent) dwellings in Colorado were turned into second homes (Magnan & Seidl, 2004:9). Notwithstanding the absence of

precise data concerning second homes across the world, it can be inferred that second homes are expanding in many parts of the world, owing to

developments in technology, communication and transport.

Table 1. Indicative number of second homes in some major countries in the 1970s

Year	Country/ Region	The number of second homes	Statistical Year	Country/ Region	The number of second homes
1970	North America	3500000	1971	Sweden	490000
1970	USA	3000000	1969	Britain	200000
1973	Canada	500000	----	East Europe	1000000
---	West Europe	3000000	1967	Czechoslovakia	166000
1966	Denmark	140000	1967	Slovenia	3000
1969	Norway	170000	---	Australia	250000
1970	France	1500000	1971	Australia	200000
Total			14119000		

Source: Coppock (1977); Edited by the Wang, 2006: 26

2. Material and Methods

2.1 Geographical location of Ramsar County

Ramsar is the westernmost county in Mazandaran, North of Iran. It borders the Caspian Sea to the north, Qazvin Province to the south, Tonekabon County to the east, and Gilan province to the west. The area under study is located between latitude 36°67'72"N and 36°89'93"N and between longitude 50°31'30"E and 50°47'05"E. This county is 725 square kilometers in area and takes in four rural districts namely Jannat Roudbar (262 square kilometers in area; population: 627 in 261 households; 27 villages and 36 settlements), Sakht Sar (253 square kilometers in area; population: 6305 in 1695 households; 56 villages and 38 settlements), Eshkevar (151 square kilometers in area; population: 1600 in 428 households; 21 villages), and Chehel Shahid (59 square kilometers in area; population: 9554 in 2707 households; 43 villages). There are a total of 18116 people in 5091 rural households in this county with 137 rural regions (with permanent population) (Statistical Center of Iran, 2006).

Descriptive analysis of population and housing according to geographical patterns

There are two types of population i.e. permanent and temporary in the area under study. Permanent population is denser in plain, coastal and foothill regions than in highlands.

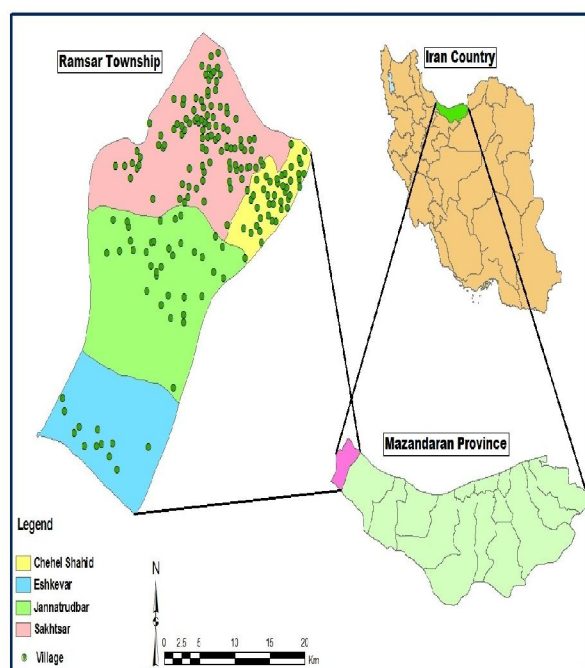


Figure 1- Geographical location map of villages in Ramsar County based on the hierarchy of country classification, 2006

Table 2. Permanent population density and area of rural districts of Ramsar County (2006)

Rural district	Area (km ²)	Population	Population density km ²	Number of settlements	Topography	Climate
Jannat Roudbar	262	627	2/39	46	Forested highlands and highlands	Cold humid
Sakht Sar	253	6305	24/92	52	Plain, foothills, forested highlands, and highlands	Temperate humid / cold humid
Chehel Shahid	59	9584	162/44	146	Plain and foothills	Temperate humid
Eshkevar	151	1600	10/59	12	Highlands	Cold arid
Total	725	18116	-	256	-	-

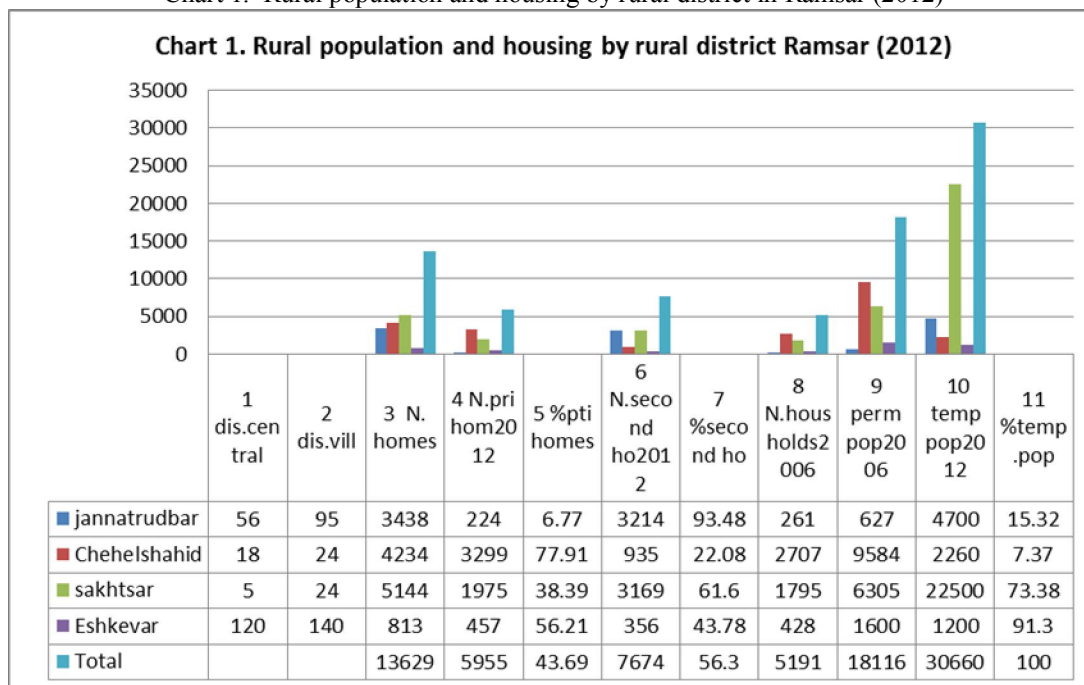
Source: Statistical Center of Iran (2006) and field studies of the author (2012)

Table 3. Rural population and housing by rural district (2012)

Rural district	Distance from the central city (kilometers)	Distance of the furthest village from Ramsar (kilometers)	Total number of homes (field study)	Number of primary homes (field study, 2012)	Primary homes in percentage terms	Number of second homes (field study, 2012)	Second homes in percentage terms	Number of households 2006	Permanent population 2006	Temporary population 2012	Ratio of temporary population to permanent population in percentage terms
Jannat rudbar	56	95	3438	224	6.57	3214	93.48	261	627	4700	15.32
Chehel Sahid	18	24	4234	3299	77.91	935	22.08	2707	9584	2260	7.37
Sakhtsar	5	24	5144	1975	38.39	3169	61.60	1795	6305	22500	73.38
Eshkevar	120	140	813	457	56.21	356	43.78	428	1600	1200	3.91
Total	-	-	13629	5955	43.69	7674	56.30	51.91	18116	30660	100

Source: Statistical Center of Iran (2006) and field studies of the author (2012)

Chart 1. Rural population and housing by rural district in Ramsar (2012)



Source: Khadije Galyan Moghaddam, field studies (2012)

Investigations give clue as to the fact that the rise in the number of second homes in plain and foothill regions of Ramsar County is steadier than in coastal regions and highlands. For example, second homes account for over 93% of rural housing in Jannat Roudbar. It is safe to say that there is a direct relationship between the spread of second homes and the rise of temporary population in Ramsar, which represent 43.8% of the total population (70000). Distance from the city of Ramsar also plays a crucial role in the number and density of second homes in this area.

2.2 Geographical configuration and spatial analysis of second homes according to topography and climate

1. Coastal region: Caspian Sea coastline is located at an elevation of Caspian sea at zero line level. This narrow line is the border between the sea and Ramsar County. A small part of this coastline is located in a rural area.

This narrow strip constitutes the border separating the city of Ramsar and the sea. A small portion of this coastal strip takes in rural areas. The village of Darya Poshteh is the only village bordering the coast. Though occupying a very small space, the village is home to about 50 modern second homes

owned by non-natives, along with a couple of multi-storey houses and several urban stylized primary homes. Dating of holiday villas (second homes) and houses is estimated to be around 40 years and that of primary homes less than 20 years. Second homes have been often constructed alongside the sea, posing danger for the residents in case of tides. Second homes are occupied by the owners at the weekends, summer time, and other holidays.

2. Plain regions: these regions are located at elevations from 0 to 100 meters, with temperate humid climate. The number and configuration of second homes in plain region villages are different and are decided by local conditions, including the rate of income and nativism. This explains why in some major villages there are only a few second homes, whereas in a neighboring village tens of second homes may have been constructed. It is tempting to say that villages with more second homes are relatively more developed. Field studies, however, suggest that constructing second homes in villages is an indicator of income level of rural households and the rate of property sales to non-natives. Said differently, the lower the income level of rural households, the more property households sell. Therefore, there appears to be a direct relationship between the rate of property supply or sales and villagers' income level, and between property purchases by non-natives and their income level. From the standpoint of income level, these two groups are indeed opposite. It thus seems that rural farmers endure overt and covert poverty to avoid which put their farm lands up for sale. Yet, nativism may push the rural community to refuse to take in non-natives. Consider the following examples:

Example one – Shosta village: in this 500-household village only 4 Tehrani households (2%) have constructed second homes (holiday villas), one of whom have lived there permanently since 30 years ago. The reason why the farmers in the said village have refused to supply their lands is their relatively high income derived from farming that meets their economic needs. Not surprisingly, the construction of second homes is under the natives' control.

Example two – Kelayeh Bon village: in this 300-household village around 50 (16.66%) villas have been constructed by non-natives. The same number of villas is under construction. A good proportion of farmlands have been thus far offered for sale by the villagers. Prompted by the low income level of native households, the construction of second homes in this village is growing unmanageably.

Example three – Villages of Tobon and Taleshmahalle Fotouk neighborhood: Tobon village

is home to 104 households and 4 second homes (3.84%) and Taleshmahalle fotouk village has 321-household and 4 second homes (1.24%). (The villages described above do not supply property to non-natives thus the construction of second homes is under the native's control)

3. Foothill regions: these regions are located at elevations from 100 to 400 meters with humid temperate and semi-humid climate. Over the past few years, foothill regions have experienced a number of developments concerning second home construction. Until 25 years ago, this phenomenon was confined to coastal and plain regions. All of a sudden this tradition changed once the villagers began to sell properties to non-natives in some foothill regions, resulting in second home construction. Aarba Kaleh village, for example, currently having 83 permanent households, over the past 16 years has witnessed the construction of several skyscrapers and high-density building blocks over the hills. A total of 354 villas and building blocks have been constructed in this village. Next example is the village of Sarlimak with 60 permanent households which is currently home to 30 modern villas occupied by the owners on holidays.
4. Highlands: these regions are located at the elevation of 400 to 3500 meters with semi-humid temperate, cold and humid, and cold and arid climate. Rural settlements have been constructed at elevations from 400 to 2000 meters. Over the past two decades, second home construction has unprecedentedly expanded in these regions. Configuration and scattering of second homes in highlands is in direct relationship with climate, availability of drinking water, and availability of country roads, such that the convenience of country roads has led to the construction of dense second homes in these settlements. Thus, geographically isolated villages with no access to the country road have fewer second homes which were once primary homes. Desirable climate and magnificent scenery, reverse migrations, rural-urban migrations, and the pressure of urban lifestyle are reasons for the expansion of second homes in these regions. Until 5 decades ago, second homes were dominated by the rich. This tradition, however, was about to change during the past two or three decades when a number of non-natives inclined toward the ever-growing field of second home construction. Javaherdeh village, for example, with an elevation of 1800 meters incorporates 2500 homes, only 76 of which have permanent

residence and over 2400 are second homes. These holiday homes are resided by local people dwelling in plain regions and non-native urban dwellers on holidays and in the summer. Or Garesmasar village located at an elevation of over 2000 meters takes in about 600 second homes. The village has been recently known as a tourism village.

2.3 Configuration of second homes and distance from City Center

Studies so far suggest that besides topography and climate, configuration and scattering of second homes is also decided by the distance from the city. The villages are scattered in all parts of Ramsar County and in a similar fashion the second homes are distributed in this area. Distance from the central city (Ramsar), therefore, has a major role to play in the configuration of second homes. Drawing on the field studies, except for the coastal regions, villages with the shortest and longest distance from the city take in fewer second homes, while there are a great number of permanent homes in these regions. Having said this, configuration of second homes is grouped into 4 groups by distance from the city of Ramsar as follows:

- a) Coastal villages: this high-density residential region is located 3 kilometers of the city center which includes a village called Daryaposhteh covering a very small area. There are 50 modern villas and a couple of multi-storey buildings and cottages inhabited on holidays and weekends.
- b) Plain villages: this region is located between 2 to 15 kilometers of the city center. The number and density of second homes in this region is relatively lower than the coastal strip and higher than foothill regions. The distance from the central city has seemingly no effect on the number and configuration of second homes but income level of the rural household, deciding on to sell or not to sell properties by the villagers, and nativism are deciding factor in second home construction. For example, the 104-household Toben village, located in 3 kilometers of Ramsar is home to only 4 second homes constructed by non-native households. Nativism and natives' unwillingness to offer properties to non-natives are reasons behind the lack of second home construction. Or take the example of Chalkrud village with 50 modern second homes. Due to job loss in fishery and farming in this village, local people put their properties for sale as to overcome economic pressures. Yet another example concerns Shadmoradmahalleh village with 407 households which is located 5.5 kilometers of the city center home to 3 modern second homes constructed by non-

natives. Therefore, nativism and the level of income in this region appear to have a greater effect on second home construction than does the distance from the city.

Foothill regions: this region is located at 15 to 25 kilometers of Ramsar. Second homes appear to scatter individually all over the region. Distance from the city decides the number and configuration of second homes to a great extent yet the income level of rural household is not ineffective. For example, Asyabsar village, located 18 kilometers of the city center, with 170 native households includes 63 second homes and Piyazkash village located 23 kilometers of the city center with 75 households assimilates 15 second homes constructed by non-natives. Accordingly, distance in foothill regions plays a major role in configuration of second homes.

Highlands: these regions are located between 25 to 140 kilometers of Ramsar. Here the distance plays a twofold role. In other word, In other words, there is a higher density of second homes in villages closer to the city than in further ones. For example, the furthestmost village of Sakhtsar rural district is a seasonal village called Javaherdeh located 24 kilometers of Ramsar. This village takes in 2500 residential unit of which 2424 units (96.92%) are second homes which are resided by the 20000-temporary population in summer and on holidays. Or, Namakdarreh in Jannatroudbar rural district, located 55 kilometers of Ramsar, has 205 residential units of which 185 units (90.24%) are second homes. Also, Lega village, as the furthest village in Jannatroudbar district, is located 95 kilometers of Ramsar. There are around 45 residential units in this village, which are consumed by permanent residents. A small number of primary homes have been turned into second homes inhabited by the residents' offspring in summer. A characteristic of the permanent residents in here is their seasonal presence in permanent homes. Said differently, although, due to harsh winter conditions, the permanent residents of Lega village spend the winter in plain lands to feed their cattle, in springtime they return to the village as to resume animal and crop husbandry. The furthestmost villages in the area under study are located in Eshkevar rural district. This district includes 11 villages, the nearest of which is located 120 kilometers of the city center and the furthest 140 kilometers of the city center. The permanent population of villages in this highland district is much more than those of Jannatroudbar rural district and of Sakhtsar highland district. In villages of Eshkevar, most of the residential units have been constructed traditionally and relatively fewer modern villas can be observed. Studies show that over the past few years in some villages of the district a number of modern second homes have been

constructed and some are under construction. Due to the long distance from the city, non-natives have no control over the area. Second homes are thus occupied by local owners who have returned as immigrants and consumed the primary homes as second homes.

In general terms, it is safe to say that the short distance from the central city to the village has demotivated local residents from second home construction yet this proves to be an impetus for non-natives for second home construction in these distances (up to 15 kilometers of the city center). Also, in the distances from 15 to 80 kilometers of Ramsar, both natives and non-natives are motivated enough to construct second homes. In the distances from 80 to 140 kilometers, non-natives are less motivated and the only consumers of second homes are local people of the region, who have returned as seasonal migrants to the region and occupy the primary homes as second homes.

2.4 Configuration of second homes and rural road

Field studies suggest that the rural road plays a major role in second home formation in different regions. Most of the plain land second homes, for example, have been constructed alongside the main road. Further, in foothill regions constructing second homes could be failed once there is no rural road as the slope in these regions impedes carrying heavy modern materials to the construction site. Also, in highland regions, there is quite high density of second homes in villages located abreast of rural road, while villages located far away from the road take in fewer second homes. For example, Ekrasar in Jannatroudbar district, which is located 48.5 kilometers of Ramsar has rural road for about five decades. This 354-household village is very small in area; however, the village has a high residential density such that most of the residents are facing problems in terms of neighborhood boundaries. Of the total residential units in this village, 351 (99.15%) units are second homes occupied on holidays and in summertime.

Another example: Galyan village is located 80 kilometers of Ramsar, at the end of rural road. There are about 85 houses (64 second homes) in this village, of which the construction of some dates back to one and half a century ago. Yet given the antiquity of the houses, this village does not enjoy high residential density. Over the past 10 years, two second homes, in modern architectural style, have been constructed in this village. Yet 4 modern second homes are under construction since 3 years ago.

3. Results and discussions

3.1 Spatial model of second homes in rural regions of Ramsar County

Investigations bear witness to the fact that in the past spatial development of rural areas followed a slow yet organic growth. With the emergence of rural-urban migrations, the growth of summer villages was halted and plain land villages developed greatly. With the second homes on the rise, coastal areas were all of a sudden swarmed with second home construction. However, plain land villages, to some extent, kept themselves away from this frenzy of construction. During the past two decades, second home development in highland regions have shifted from a recession in construction toward high-density construction (villages such as Javaherdeh, Garsmasar, Izaki, Limak Deh, Namak Darreh, Chorteh, Salmal, Sormoshk, Palham Jan, etc.)

Generally speaking, due to low population and abundance of land in the past, rural houses were constructed with great distance again each other and the network of passages followed a chaotic pattern, making the residents to use the spaces between houses as passages. Such a network of passages can be still observed in old settings. The residents also used to hedge around their properties as to protect their properties and to specify neighborhood boundaries. Over the past three decades, however, with the appearance of urban lifestyle in rural environment, the residents started to feel that their properties (primary or second homes) should have boundaries and the yard should not be too close to that of neighbors. This led to the fragmentation of more lands and scattered second home construction. It bears noting, however, that in central rural settings houses are such compact that setting up separate garden for each second or primary home is impossible. In some older villages, the distance from the nearest neighbors does not reach one meter and occasionally properties with separate ownership completely attached (e.g. Javaherdeh village). Yet in places where second home construction has just begun, the distance could range from 10 to 100 meters (e.g. Saray Dasht village).

In very general terms, considering the studies conducted in this area in 2012, two major factors i.e. distance from the city and rural road decide configuration and construction of modern second homes in rural regions. These factors are investigated by rural districts using Pearson correlation as follows:

1. Jannatroudbar rural district: Locating in forested highlands and highlands, this district is 262 kilometers in area with a population density of 2.39 per km². This district includes 43 villages and settlements, 154 primary homes (4.79%), 3214 second homes (95.21%), and it is home to a temporary population of 4700. The furthest and nearest villages to the city are located 47 (Izaki

village) and 95 kilometers (Lega village) of the city. Rural road and the distance from the city exert a major effect on second home configuration in this district. In distances between 47 to 65 kilometers, second home density is much higher than between 65 to 95 kilometers. Ekrasar village, for example, located 48.5 kilometers of Ramsar city center, is situated alongside rural road. Of 354 residential units in this village, 351 units are second homes (modern and traditional). Also, Galyan, located 80 kilometers of the city, and Lega, 95 kilometers of the city are both situated on the opposite side of rural road. There are a total of 85 rural houses in Galyan village, of which 65 are second homes (of which only 5 houses have a modern construction). In Lega, there are also 45 rural houses, of which 35 are primary homes and 10 are second homes (28.57%).



Figure 2- Spatial distribution model of second homes in the central part of village Jannat Rudbar – Ramsar County, 2012

To appreciate the association between the number of second homes and the distance from the city of Ramsar in Jannatroudbar rural district, Pearson correlation has been employed. The correlation coefficient between the two indexes is calculated as -0.26. As the correlation is significant at above 0.05, it is inferred that there is no relationship between the two indexes (Table 4).

Table 4. Analysis of the relationship between the number of second homes and distance from the center of county in Jannatroudbar rural district

Number of second home	distance		
-.026	1	Pearson Correlation	distance
.867		Sig. (2-tailed)	
43	43	N	

Chehelshahid rural district: located in plain and foothill regions, this district is 59 km² in area with a population density of 162.44 in km². It is home to a temporary population of 2260 and includes 44 villages and settlements, 3299 primary homes and 935 second homes (28.34%). The furthest and nearest village to Ramsar are 25 kilometers (Piazkash village) and 6 kilometers (Lowsar village) of the city of Ramsar respectively. Due to geographical location (the fertility of the soil, favorable whether in winter, and unfavorable weather in summertime), there are relatively fewer second homes, compared to primary homes, in this area. Here, natural scenery proves to be more effective in second home construction than are rural road and distance from the city. For example, Aarba Kaleh and Shosta villages are located in 12 kilometers and 15.5 kilometers of Ramsar respectively. Although the two villages are of almost equal distance from the city, in Aarba kaleh, due to its unique topography, its overlooking the sea, and having a pleasant scenery, of the total 438 houses, 355 (76.62%) are second homes and 83 primary homes (23.37%). However, locating in plain lands and lacking a beautiful scenery, Shosta includes only 4 second homes (2%) and 200 primary homes (98%) out of 204 houses in total.

To better understand the relationship between the number of second homes and distance from the city of Ramsar in Chehel Shahid rural district, Pearson correlation has been used. The correlation coefficient between the two indexes equates -0.038 and as it is significant at above 0.05, it can be concluded that there is no relationship between the two indexes (Table 5).

Table 5. Analysis of the relationship between the number of second homes and the distance from the center of Chehel Shahid district

Number on second home		
-.038	Pearson Correlation	distance
.809	Sig. (2-tailed)	
44	N	

Sakhtsar rural district: located at coastal, plain and foothill regions, this district is 253 km² in area with a population density of 24.92 per km². It

has a temporary population of 22500 and is home to 56 villages and settlements, 1795 primary homes, and 3169 second homes. The greatest and smallest distances from the city are attributed to Javaherdeh (24 km) West Tang Darreh (2 km). The distance from the city has no effect on the configuration of second homes, yet favorable sceneries lead to second home development in this area. The coastal village of Daryaposhteh, for example, which is located 3 kilometers of Ramsar has experienced high-density second home construction (50 modern second homes). Conversely, located in 5 km of Ramsar, Mianlat village, though the center of district, is home to only 6 second homes (5.6%) of the total of 106 rural houses, due to lack of desirable sceneries. Also, in highland regions of the district, the effect of distance and rural road on the formation of second homes is clearly observable. That is the more the distance from the city, the more is the effect of rural road on second home development, due to approaching highlands, climate change, and favorable sceneries. For example, the furthest village of this district is Javaherdeh village located in 24 km of the city. This is a purely tourism village which includes 2424 second homes (96.92%) of a total of 2500 houses.

Once more Pearson correlation has been used to study the relationship between the number of second homes and distance from Ramsar in Sakhtsar district. The correlation coefficient is calculated as .022 and since the relationship is significant at less than 0.05 the two indexes are significantly correlated. That is to say, the more the distance from the city center, the more the number of second homes (Table 6).

Table 6. Analysis of the relationship between the number of second homes and the distance from the center of Sakhtsar County

Number on second home	distance		
.374(*)	1	Pearson Correlation	distance
.022		Sig. (2-tailed)	
37	37	N	

* Correlation is significant at the 0.05 level (2-tailed).

Eshkevar district: this district is entirely located in highland regions and is 151 km² in area. Having a population density of 10.59 per km², the district includes 12 villages and settlements, 457 permanent homes, 356 second homes (77.89%), and has a temporary population of 1200. The smallest and greatest distances from the city relate to Keyt village (117 km) and Mij village (140 km). Distance from

the city center and rural road appear to have a grave effect on second home formation and configuration. Given that Eshkevar district has harsh winters and cool summers, second and primary homes are almost equally distributed in the entire district. Yet another issue leading to the distinction between this district and other districts is the small number of modern second homes. Said differently, although the number of primary and second homes (457 and 356 respectively) is almost equal, nearly all second homes have been formed as the result of primary homes turning into second homes. This is due primarily to the relatively great distance of the district from the city and Every single second home is virtually owned by local residents of the district in a hereditary fashion and occupied by residents in summertime.

To understand the association between the number of second homes and the distance from the city, Pearson correlation has been employed. The correlation coefficient between the two indexes is calculated as 0.05. As the correlation is significant at above 0.05, it is inferred that there is no relationship between the two indexes (Table 6).

Table 7. Analysis of the relationship between the number of second homes and the distance from the center of Eshkevar County

Number on second home		
.005	Pearson Correlation	distance
.988	Sig. (2-tailed)	
11	N	

4. conclusions

Several factors underlie geographical configuration of second homes in rural regions of Ramsar County, including, rural road, nativism, climate, topography, distance from the city, income, urban-rural migrations and reverse migrations. Investigations suggest that there is currently a total of 7644 second homes (56.30% of the entire residential units) in this area, which are consumed by a temporary population of 30660 (43.8% of the total population). Drawing on the field studies, different factors including rural road, distance from the city of Ramsar, topography, climate, and nativism decide the number and configuration of second homes in different geographical areas. so finally Regression model is calculated in the following equation.

$$Y = -0.015 a + 0.026 b + 0.325 c + 0.007 d$$

That in above question "a" is the distance from the center of county in Jannatroudbar rural district "b" is the distance from the center of Chehel Shahid district, "c" is the distance from the center of Sakhtsar County and "d" is the distance from the center of Eshkevar County.

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11/4/2012

Comparison of personality of HIV positive people with normal people: A psychological study

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Abstract: Human immunodeficiency virus (HIV) is a lentivirus (a member of the retrovirus family) that causes acquired immunodeficiency syndrome (AIDS), a condition in humans in which progressive failure of the immune system allows life-threatening opportunistic infections and cancers to thrive. A glimpse at the increasing incidences of HIV positive cases the world over, makes it necessary for behavioral scientists to probe into the psyche of individuals, to see what prompts them to become prey to HIV. The present study was an effort to identify some personality correlates of HIV positive individuals. In this study, we used of 100 people. 50 of them were suffered from HIV and 50 of them were healthy. So we aimed to compare their some properties related to their personality such as extraversion, neuroticism, anger and self-esteem. At the end, data were analysed by SPSS software. The main findings of the research indicated that on the traits of Extraversion and Neuroticism, HIV positive individuals scored higher than HIV free subjects. Also, the HIV positive subjects showed low Self Esteem and high anger.

[Maryam Rauof, Bahram Azarifar, Arezo Azarm, Roghaieh Keykha, Maryam Pourabbas. **Comparison of personality of HIV positive people with normal people: A psychological study.** *Life Sci J* 2012;9(4):5009-5012] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 750

Keywords: HIV, Extraversion, Neuroticism, Anger and Self-Esteem.

1. Introduction

Human immunodeficiency virus infection or acquired immunodeficiency syndrome (HIV/AIDS) is a disease of the human immune system caused by the human immunodeficiency virus (HIV) (Sepkowitz, 2001). During the initial infection a person may experience a brief period of influenza-like illness. This is typically followed by a prolonged period without symptoms. As the illness progresses it interferes more and more with the immune system, making people much more likely to get infections, including opportunistic infections, and tumors that do not usually affect people with working immune systems.

HIV is transmitted primarily via unprotected sexual intercourse (including anal and even oral sex), contaminated blood transfusions and hypodermic needles, and from mother to child during pregnancy, delivery, or breastfeeding (Markowitz, 2007). Some bodily fluids, such as saliva and tears, do not transmit HIV (CDC, 2003). Prevention of HIV infection, primarily through safe sex and needle-exchange programs, is a key strategy to control the spread of the disease. There is no cure or vaccine; however, antiretroviral treatment can slow the course of the disease and may lead to a near-normal life expectancy. While antiretroviral treatment reduces the risk of death and complications from the disease, these medications are expensive and may be associated with side effects.

Genetic research indicates that HIV originated in west-central Africa during the early twentieth century (Sharp and Hahn, 2011). AIDS was

first recognized by the Centers for Disease Control and Prevention (CDC) in 1981 and its cause—HIV infection—was identified in the early part of the decade (Gallo, 2006). Since its discovery, AIDS has caused nearly 30 million deaths (as of 2009). As of 2010, approximately 34 million people have contracted HIV globally (UNAIDS, 2011). AIDS is considered a pandemic—a disease outbreak which is present over a large area and is actively spreading (Kallings, 2008).

HIV/AIDS has had a great impact on society, both as an illness and as a source of discrimination. The disease also has significant economic impacts. There are many misconceptions about HIV/AIDS such as the belief that it can be transmitted by casual non-sexual contact. The disease has also become subject to many controversies involving religion.

Eysenck (1947) defined personality as, “the sum total of the actual or potential behavior patterns of the organism, as determined by heredity and environment.” Eysenck also perceived personality as the more or less stable and enduring organization of a person’s character, temperament, intellect and physique, which determines his unique adjustment to the environment. His definition of personality included four main sectors of behavior-patterns, the cognitive sector (intelligence), the conative sector (character), the effective sector (temperament), and somatic sector (constitution). The four personality characteristics chosen for this study were neuroticism, extraversion, anger, and self-esteem. According to Eysenck (1947), individuals can be

broadly allocated along two dimensions of personality i.e., Extraversion/Introversion (E/I), and Neuroticism (N).

According to Spielberger (1988) “the concept of ‘Anger’ refers to an emotional state that consists of feeling that varies in intensity, from mild irritation or annoyance, to intense fury and rage. Although ‘hostility’ usually involves angry feelings, this concept has the connotation of the complex set of attitudes that motivate aggressive behaviors directed towards destroying objects or injuring other people.....while anger and hostility refer to feelings and attitudes, the concept of ‘aggression’ generally implies destructive or punitive behavior directed towards other persons or objects.”.

Self-esteem is a concept that includes a person's sense of self-respect, of their competence, and their acceptability to others. It encompasses their internal self-scheme, based on their past experiences of success or failure and their interpersonal experiences of acceptance or rejection. The aim of present study was to compare of personality of HIV positive people with normal people.

2. Materials and methods

The method thus used for the selection of participants was that of incidental sampling; hence the patients who were available were taken for this study. This study was carried out in Iran during the 2012. The respondents of the study are a group of people with HIV/AIDS.

A total of 200 HIV positive participants were selected for this research, out of which there were 150 males and 50 females. Equal number of male and female subjects was selected out of the total 200 HIV free sample so that 100 of them were male and female in each. The age range in both groups was the same.

The instruments used for the present study were following:

For the assessment of personality, we used Eysenck Personality Inventory (Eysenck & Eysenck, 1968) to measure two dimensions of personality; Extroversion/Introversion and Neuroticism/ Emotional Stability. This form is a 57 item true-false questionnaire, out of which 24 items are for assessing Neuroticism/Emotional Stability, 24 items for assessing Extroversion/Introversion, and the rest of 9 items for constituting the Lie scale.

Anger Expression Inventory was used to assess the dimensions of State Anger, Trait Anger, Anger-in, Anger-out, and Anger Control. This form consists of 44 items which use a four-point frequency scale ranging from 1 (almost never) to 4 (almost always).

Self-Esteem was assessed with the Self-Esteem Scale, a 15 item self-report instrument with

five-point Likert-type scale, initially developed by Connie Palladino (5= very high, 4= moderately high, 3= average, 2= moderately low, 1= very low) which measures about how much your self-esteem is related to feeling of success.

3. Results

The Means and SD's of all the variables of males, females, and total samples of HIV positive and HIV free subjects on all the tests were computed and data are given in tables below (table 1).

Table 1: comparative traits between HIV-positive and normal people

EPI	Sex	HIV-positive patients	Normal peoples
		Mean±SD	Mean±SD
E/I	Male	10.80±2.65	9.90±2.35
	Female	10.95±2.61	9.98±2.70
N	Male	14.05±2.70	12.03±3.64
	Female	13.53±2.63	11.82±3.21
L	Male	5.84±3.80	4.81±2.69
	Female	5.81±3.23	4.63±2.23
Anger	Male	28.35±4.51	4.52±1.12
	Female	28.12±4.39	4.01±1.24
Self-esteem	Male	12.72±3.46	10.24±2.33
	Female	12.93±3.20	10.46±2.09

4. Discussion and conclusion

HIV/AIDS affects women and men differently in terms of vulnerability and impact. There are biological factors, which make women more vulnerable to infection than men and structural inequalities in the status of men that make it harder for them to take measures, to prevent infection and also intensify the impact of AIDS on them. Unprotected sex has been seen to be associated with being impulsive and sexually compulsive. Among women it has been related to being less empathetic, less assertive, and more rebellious (Crepaz & Marks, 2002).

Eysenck and Eysenck (1968) describe Extraversion as impulsive behavior with sociable tendencies. The typical extravert is sociable, likes parties has many friends, needs to have people to talk to and does not like reading or studying by himself. He craves for excitement, takes chances and is generally an impulsive individual. Neuroticism refers to a general emotional over responsiveness, emotional ability and liability to neurotic breakdown under stress. The general nature of Neuroticism is assessed as instability, inadaptability, depressive moods, weak dependable attitude, narrow interest and symptoms of nervous breakdown (Eysenck, 1953). Penedo et al. (2003) evaluated relationship between personality traits and quality of life among 116 men

and women living with HIV/AIDS. Results showed that personality traits such as neuroticism were significantly associated with poorer quality of life. Conscientiousness and extraversion were associated with better quality of life. Fenaughty and Fisher (1998) developed a typology from a sample of 283 drug users based on alcohol use variables. This study showed that neuroticism in the alcohol typology was significantly related to several sexual risk behaviors. These two dimensions were taken up in the present work. Extraverts would be more influenced by the peer group pressures; they are also sensation seeking. The neurotics would be predisposed to anxiety prone impulsive behavior making them more susceptible to HIV which is risk proneness. In the light of the research work done on Extraversion and Neuroticism, the first hypothesis was proposed:

Hypothesis 1: The HIV positive individuals will score relatively higher on Extraversion and Neuroticism.

Mohan (2003) observed that adolescent violence is often related to intimate relationships, such as violence in dating situations. Dating violence may be defined as the penetration or threat of an act of violence by at least one member of unmarried couple on the other member within the context of dating or courtship. When frustrated and angry for a long time, a person may develop a hostile aggressive and a violent behavior, by forcing unsafe sex, and rape attempts on either their spouse or girlfriends that can lead to a high risk of HIV infection. As the studies show, anger is an outcome of frustration, because of which an individual may fall prey to high risk behavior, and hence the second hypothesis was proposed:

Hypothesis 2: HIV/AIDS positive individuals will score relatively higher on both Anger-S (state) and Anger-T (trait).

In regard to HIV, low self-esteem may be a factor in not protecting themselves or others from HIV. No one has been able to measure a drop in self-esteem as a result of becoming infected because self-esteem may have been low to start with. However, with stigmatization, guilt, loss of a positive body image, loss of roles, loss of work, and loss of social network, it seems intuitive that self-esteem would be threatened (Hoffman, 1996). The relationship between low Self-Esteem and HIV-related risk behaviors, and the factors that predict self-esteem levels of "at risk" women, was explored by Sterk et al., (2004). Poor self-esteem is thus likely to make an individual fall prey to peer pressure and faulty behavior and hence the third hypothesis was proposed:

Hypothesis 3: HIV positive individuals will have relatively lower self-esteem.

On Extraversion the comparison indicates that HIV positive subjects are slightly higher than the HIV free sample. The difference is significant at .05 level only. A typical Extravert is sociable, craves for excitement, is influenced by others, and is generally impulsive. It is their inconsistency between the thought and the behavior that despite intellectual ability of knowledge of HIV/AIDS unstable extraverted youth engage in behavior associated with risk behavior. Also their emotional instability that is inability to tolerate, boredom, sadness, intense outburst in mood, lead them to pursue pleasurable experiences, however risky they may be. Such impulsive youth is usually influenced by others and are more vulnerable to alcohol, drug abuse and get involved in experimental sex, therefore high risk of contracting infection. Therefore, there is a need to educate today's youth about the hazards of excitement seeking activities and helping them to divert their energies into positive directions.

On Neuroticism the present results show that HIV positive sample has scored significantly higher than the HIV free sample. Individuals who score high on neuroticism are more likely than the average to experience such feelings as anxiety, anger, guilt, and clinical depression. A combination of anxiety, depression, worrying nature and reacting strongly to all kinds of stimuli may lead an individual high on Neuroticism to be vulnerable to high risk behavior, as is seen in the present study. The younger generation responds more poorly to environmental stress, and is more likely to interpret ordinary situations as threatening, and minor frustrations as hopelessly difficult. They are often self-conscious and shy, and they may have trouble controlling urges and delaying gratification, with the result out of anxiety they may get involved in high risk behaviors, leading to HIV Infection. These tendencies lead to having irrational ideas and an inability to cope with stress effectively, therefore the classroom teaching should help the young students to have rational ideas, to deal with the situations properly and react in a socially approved manner without showing anxiety and depression.

The high scores of HIV positive individuals in the present study could be due to emotional immaturity frustration or unfair treatment which takes the form of anger/aggressiveness, hence making them fall prey to sexually active behaviors. An aggressive person tries to force his will on others to fulfill his demands or desire to harm others. Lollis et al., (1995) also report anger to be associated with high risk behavior. Anger is a negatively toned emotion, subjectively experienced as an aroused state of antagonism towards someone or something perceived to be the source of an aversive event. Anger aggression and hostility have been found to be

personality features of most of the chronic illness. Anger directed towards others may be expressed in physical acts such as assaulting other persons, destroying objects and slamming doors, verbal threats and the extreme use of profanity (Speilberger et al., 1983).

Self-Esteem refers to ones evaluation of oneself. It may be defined as the degree of correspondence between an individuals' ideal and actual concept of himself (Cohen, 1959). Low self-esteem people are dependent on the receipt of positive evaluation from others. As a result, they are likely to seek approval from others and more prone to conform to the beliefs and behaviors of those they respect than are high self-esteem groups (Robins, 1999). This may have led the HIV positive subjects of the present study in peer pressure to get involved in high risk behavior.

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11/14/2012

Smart Environment Effect on Running Logarithmic-Based Model of Emergency Demand Response Programs in Electricity Markets

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Abstract: The deregulation of power system has introduced new challenges in the field of power system utilization. The main goal of deregulation can be summarized as defining a competitive market for maximizing the overall social welfare while maintaining power system reliability. The consumers have a vital role in new electricity market because their offer in pool markets has a great effect on power system operation. Therefore, it is necessary to modeling demand-side responses in electricity market. A new model for demand-side should be capable of considering the objectives and interests of each stakeholder and also should be based on technical and economical analysis. Demand response programs (DRPs) are new tools to analysis effect of demand-side in electricity markets. The results of such programs are improvement of some technical and economical characteristic of power system. DRPs are divided into two categories which are priced-based and incentive-based demand response programs. The goal of this paper is logarithmic modeling of emergency demand response programs (EDRP) as incentive-based DRPs. In Regard to this purpose, nonlinear behavioral characteristic of elastic loads is considered which causes to more realistic modeling of demand response to EDRP rates. To demonstrate the validity of the proposed technique, a real world power system is considered as test system. Where, Iranian power system is investigated. Simulation results emphasis on the effectiveness impact of running EDRP programs using proposed logarithmic model on load profile of the peak day of the proposed power system.

[Mehdi Nikzad, Shoorangiz Shams Shamsabad Farahani, Mohammad Bigdeli Tabar, Hossein Tourang, Behrang Yousefpour. **Smart Environment Effect on Running Logarithmic-Based Model of Emergency Demand Response Programs in Electricity Markets.** *Life Sci J* 2012;9(4):5013-5018] (ISSN:1097-8135).
<http://www.lifesciencesite.com>.751

Keywords: Demand Response Programs, Elasticity, Emergency Demand Response Programs.

1. Introduction

A power system which is modern and intelligent is referred to Smart Grid. This system would have a wide range of advantages for electrical power industry. Smart Grid's characteristics will help customers to respond to changes in electricity price and vary their energy consumption during the day more effectively. In this new environment, even smallest customers would have the ability to participate in power market and to adjust their consumption with electricity price to reach the highest welfare. Enabled by Smart Grid infrastructures, each customer would be able to install his own electric plant and appear as a producer who sells power to the grid at times of extra production [1-3].

U.S. Department of energy defines Smart grid as today's grid joined by advanced metering and control devices such as Information Technology (IT), sensors, high speed, real-time two way communications, energy Storages, Distributed Generation (DG), In-home energy controllers, automated home energy use.

Enabled by smart infrastructures, each customer will pay the instantaneous market price

(depending on market, price will be determined every hour, half an hour or every quarter). Smart grid enables the use of distributed generation in all voltage levels and with real time pricing and smart meters, even domestic customers would be able to install their own distributed generator. Domestic generators such as wind turbines or photovoltaic cells would help customers to reduce their energy bills and even sell extra to demand electricity to the grid.

Hybrid cars would be able to act as distributed storages, storing the energy at times of low electricity price and discharging the stored energy at times of high price. An in-home controller would be needed to control all of these actions. The controller receives energy spot price trough high speed connections and controls home appliances. In other words, it makes it possible for customers to use electricity as flexible as possible. For example the controller can be set to increase room temperature at times of high spot price, or to turn on washing machines at times of low spot price (2 or 3 am). Some of Smart Grid's characteristics can be summarized as figure 1.

According to the U.S. Department of Energy (DOE) report, the definition of demand response (DR)

is: "Changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized"[4].

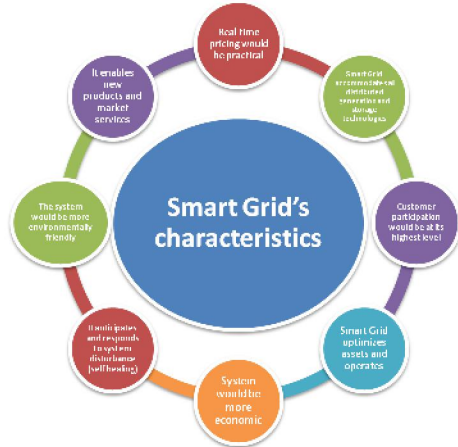


Figure 1: Smart Grid's characteristics

According to DOE classification, demand response programs (DRPs) are divided into two categories as follows:

Price-based Options

- Time-of-use
- Real-time pricing
- Critical Peak Pricing

Incentive-Based Programs

- Direct load control
- Interruptible/curtailable (I/C) service
- Demand Bidding/Buyback Programs
- Emergency Demand Response Programs *
- Capacity Market Programs
- Ancillary Services Market Programs

In this paper, we focus on Emergency Demand Response Programs (EDRPs) as incentive-based programs. In EDRPs a significant amount of money (almost 10 times of the off peak electricity price) as an incentive payments provide to customers who reduce their load during reliability-triggered events; EDRPs may or may not contain penalties for non respondent customers. However, participation in such programs is voluntary. Running these programs had been very good results in USA. Figure 2 shows the implementation results of this program in New York Electricity Market in 2002 [4]. As it is shown, the ISO had been able to mitigate the price spark and turn prices back to its normal value. Also Peak load reduction is another result of EDRP implementation [5, 6].

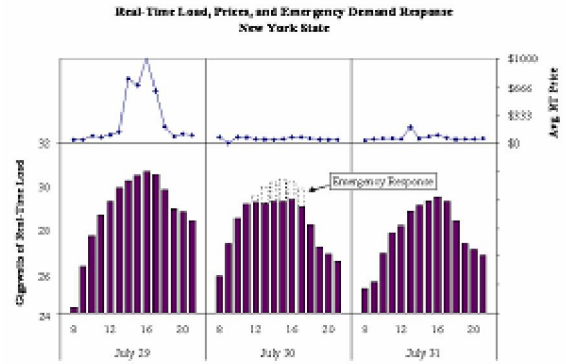


Figure 2. Impact of New York ISO emergency demand response during July 2002[5]

Considerable researches have been done to introduce and extend linear economic modeling of DRPs [7-12]. This simple and widely used model is based on an assumption in which demand will change linearly in respect to the elasticity. Based on nonlinear behavior of real demand, those models don't be able to simulate demand responses accurately.

In this paper, a logarithmic model to describe price dependent loads is developed such that the characteristics of EDRP programs can be imitated. Also Smart Grid as a new tool for better execution of EDRP programs is introduced, modeled and analyzed. The remaining parts of the paper are organized as following: the definition of elasticity is reviewed in section 2. Logarithmic modeling of DR based on the concept of price elasticity of demand is developed in section 3. Section 5 is devoted to simulation results where the impact of EDRP programs via proposed exponential model on load profile of the peak day of the Iranian power system in 2007 is investigated. The impact of Smart grid on EDRP programs is discussed and it is shown that EDRP programs would be executed more effectively in a smart grid. Finally, the paper is concluded in section 5.

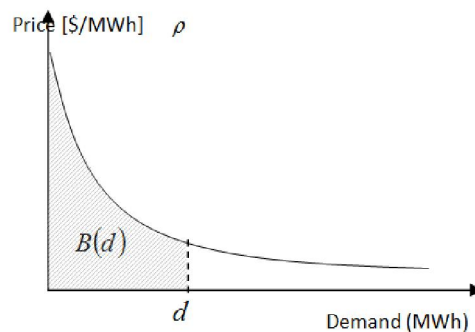


Figure 3: demand curve

2. Elasticity definition

Generally, electricity consumption like most other commodities, to some extent, is price sensitive. This means when the total rate of electricity decreases, the consumers will have more incentives to increase the demand. This concept is shown in figure 3, as the demand curve.

Hachured area in fact shows the customer marginal benefit from the use of d MWh of electrical energy. This is represented mathematically by:

$$B(d) = \int_0^d \rho(d) \cdot \partial d \tag{1}$$

Based on economics theory, the demand-price elasticity can be defined as follows:

$$e = \frac{\frac{\Delta d}{d^0}}{\frac{\Delta \rho}{\rho}} \tag{2}$$

For time varying loads, for which the electricity consumptions vary during different periods, cross-time elasticity should also be considered. Cross-time elasticity, which is represented by cross-time coefficients, relates the effect of price change at one point in time to consumptions at other time periods. The self-elasticity coefficient, e_{tt} , (with negative value), which shows the effect of price change in time period t on load of the same time period and the cross-elasticity coefficient, $e_{t\ell}$, (with positive value) which relates relative changes in consumption during time period t to the price relative changes during time period ℓ are defined by following relations:

$$e_{tt} = \frac{\frac{\partial d_t}{d_t^0}}{\frac{\partial \rho_t}{\rho_t}} \tag{3}$$

$$e_{t\ell} = \frac{\frac{\partial d_t}{d_t^0}}{\frac{\partial \rho_\ell}{\rho_\ell}} \tag{4}$$

3. Logarithmic modeling of elastic loads

The proper offered rates can motivate the participated customers to revise their consumption pattern from the initial value d_t^0 to a modified level d_t in period t .

$$\Delta d_t = d_t - d_t^0 \tag{5}$$

Total incentive paid to customer in programs which contain incentive inc_t for load reduction in period t , will be as follows:

$$INC(\Delta d_t) = inc_t \cdot (d_t^0 - d_t) \tag{6}$$

It is reasonable to assume that customers will always choose a level of demand d_t to maximize their total benefits which are difference between incomes from consuming electricity and incurred costs; i.e. to maximize the cost function given below:

$$B[d_t] - d_t \cdot \rho_t + INC(\Delta d_t) \tag{7}$$

The necessary condition to realize the mentioned objective is to have:

$$\frac{\partial B[d_t]}{\partial d_t} - \rho_t + \frac{\partial INC(\Delta d_t)}{\partial d_t} = 0 \tag{8}$$

Thus moving the two last term to the right side of the equality,

$$\frac{\partial B[d_t]}{\partial d_t} = \rho_t + inc_t \tag{9}$$

Substituting (9) to (3) and (4), a general relation based on self and cross elasticity coefficients is obtained for each time period t as follows:

$$\frac{\partial d_t}{d_t^0} = e_{t\ell} \frac{\partial(\rho_t + inc_t)}{\rho_t + inc_t} \tag{10}$$

By assuming constant elasticity for NT-hours period, $e_{t\ell} = \text{Constant for } t, \ell \in NT$ integration of each term, we obtain the following relationship.

$$\int_{d_t^0}^{d_t} \frac{\partial d_t}{d_t^0} = \sum_{\ell=1}^{NT} \left\{ e_{t\ell} \left[\int_{\rho_t^0}^{\rho_t} \frac{\partial \rho_t}{\rho_t + inc_t} + \int_0^{inc_t} \frac{\partial inc_t}{\rho_t + inc_t} \right] \right\} \tag{11}$$

Combining the customer optimum behavior that leads to (9), (10) with (11) yields the power model of elastic loads, as follows:

$$d_t = d_t^0 + d_t^0 \prod_{\ell=1}^{NT} \text{Ln} \left[\frac{(\rho_t + inc_t)^2}{\rho_t(\rho_t^0 + inc_t)} \right]^{e_{t\ell}} \tag{12}$$

Parameter η is demand response potential which can be entered to model as follows:

$$d_t = d_t^0 + \eta d_t^0 \prod_{\ell=1}^{NT} \text{Ln} \left[\frac{(\rho_t + inc_t)^2}{\rho_t(\rho_t^0 + inc_t)} \right]^{e_{t\ell}} \tag{13}$$

The larger value of η means the more customers' tendency to reduce or shift consumption from peak hours to the other hours.

4. Simulation results

In this section numerical study for evaluation of proposed model of EDRP programs in smart and non-smart grids are presented. For this purpose the peak load curve of the Iranian power grid on 28/08/2007 (annual peak load), has been used for our simulation studies [13]. Also the electricity price in Iran in 2007 was 150 Rials¹. This load curve, shown in figure 4, divided into three different periods, namely valley period (00:00 am–9:00 am), off-peak period (9:00 am–7:00 pm) and peak period (7:00 pm–12:00 pm).

¹ Unit of Iranian currency.

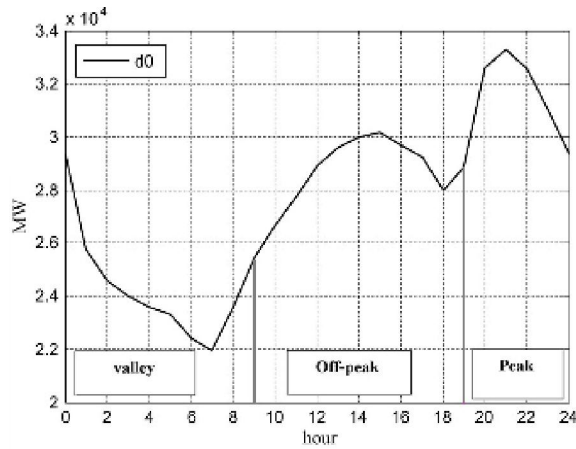


Figure 4: Initial load profile

The selected values for the self and cross elasticities have been shown in Table 1.

Table 1: Self and cross elasticities

	Low	Off-peak	Peak
Low	-0.10	0.010	0.012
Off-peak	0.010	-0.10	0.016
Peak	0.012	0.016	-0.10

As it has been discussed in the introduction section, smart grid helps customers to be able to buy less energy from grid at times of high price, by shifting loads, using their own DG plant or even through discharging batteries of their hybrid vehicle charged during the last night. So Smart Grid's characteristics can be added to the proposed model as an increase in self and cross elasticities of demand between different time periods. It is assumed that in smart environment, demand response potential increases for 10% and reaches a portion of 40%. Elasticities between different time intervals are increased comparing to the case of non-smart grid. The increase is 10% for self elasticities and 100% for cross. In order to investigate about the effect of smart grid on the considered DRP, different scenarios are considered according to Table 2.

Table 2: The Considered Scenarios

Scenario number	Grid type	EDRP rates (Rials/MWh)	Incentive in peak periods (Rials/MWh)	Demand response potential (%)
1	Non-smart	Flat 150	30	10%
2	Non-smart	Flat 150	60	10%
3	smart	Flat 150	30	40%
4	smart	Flat 150	60	40%

The impact of adopting scenarios 1-4 on load profile have been shown all together in figure 5.

As it is seen in all scenarios, the load of peak periods is reduced. In scenario 1 and 2, load shift effect is not sensible. By considering smart grid (according to scenarios 3 and 4), the peak reduction and load shift are more increased. It shows that smart grid leads to an effective peak reduction and load shift.

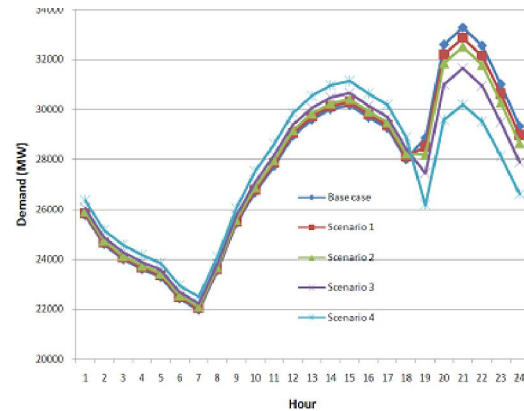


Figure 5: The impact of adopting different scenarios on load profile

Technical characteristics of the load profile in scenario 1-4 have been given in table 3. It is seen that the technical characteristics such as energy and peak reduction, values of load factor and peak to valley in different scenarios have been improved respect to the base case.

Table 3: Technical characteristics of the load profile in scenarios 1-4 in comparison with the base case.

	Base case	Scenario 1	Scenario 2
Energy (MWh)	662268	661592.7	661262.5
Energy reduction	0	0.1%	0.2%
Peak (MW)	33286	32874.4	32513.7
Peak reduction	0	1.2%	2.3%
load factor	0.829	0.839	0.847
Load factor improvement	0	1.1%	2.2%
Peak to valley (MW)	11318	10842.2	10415.4
	Base case	Scenario 3	Scenario 4
Energy (MWh)	662268	659566.7	658245.8
Energy reduction	0	0.4%	0.6%
Peak (MW)	33286	31639.6	31137.5
Peak reduction	0	4.9%	6.5%
load factor	0.829	0.869	0.881
Load factor improvement	0	4.8%	6.3%
Peak to valley (MW)	11318	9414.8	8648.5

Figure 6 shows the impact of adopting scenarios 1-4 on energy and peak reduction as well as load factor improvement in percent. By looking to these figures can be concluded that for a specific incentive rate, smart environment causes to better results. Also by increasing the amount of incentive rate, these technical factors (i.e. energy and peak reduction and load factor improvement) are increased in both smart and non smart grids. According to

figure 6, in scenarios 1 and 3 which incentive rate is 30 Rial/MWh, results in smart grid are about 4 times greater than the results in non smart grid. While in scenarios 1 and 2 in which incentive rate has increased (60 Rial/MWh), these amounts in smart grid are about 3 times greater than the results in non smart grid. It shows that the smart grid preferences, from technical view point, are more obvious in lower incentive rates.

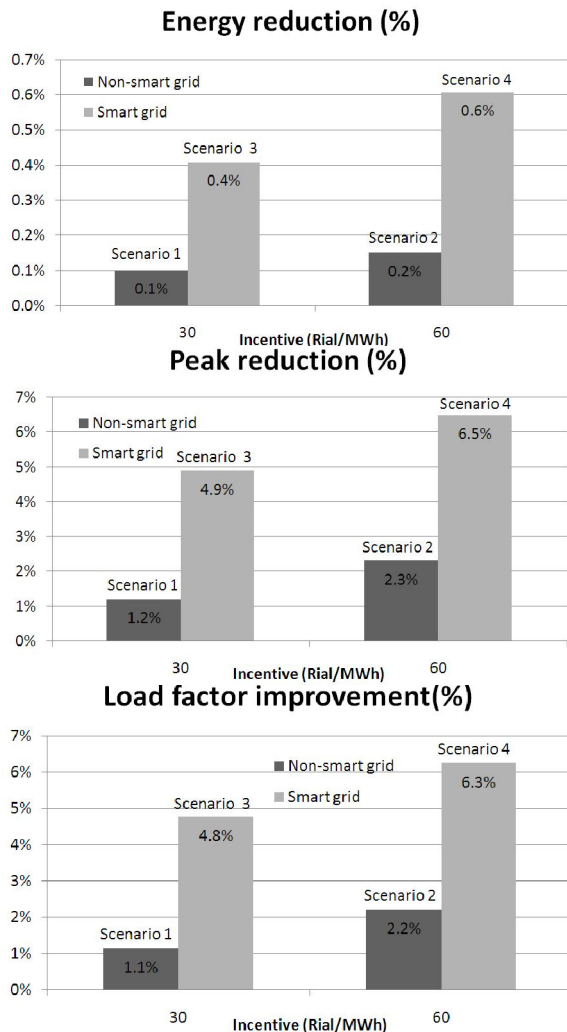


Figure 6: The impact of adopting scenarios 1-4 on energy and peak reduction as well as load factor improvement in percent.

According to data reported in table 4 which are economical characteristics of the load profile in different scenarios, running EDRP program is profitable for participated customers. By increase of incentive rate and demand response potential according to scenario 1-4 customers' profit is increased and it leads to more satisfaction of customers to participate in EDRP program.

Table 4: Economical characteristics of the load profile in scenarios 1-4 in comparison with the base case.

	Bill in scenario 1 (Rials/day)	Incentive (Rials/day)	Bill reduction (profit)(%)
Base case	99340200	0	0
Scenario 1	99169293	69608.64	0.17%
Scenario 2	98928149	261219.1	0.41%
Scenario 3	98656574	278434.6	0.69%
Scenario 4	97691996	1044876	1.66%

Figure 7 shows the impact of adopting scenarios 1-4 on customers' bill reduction in percent. For a specific incentive rate, customers more satisfy in smart environment than non smart one. Also by increasing the amount of incentive rate, customers' profit is increased. In scenarios 1 and 3 which incentive rate is 30 Rial/MWh, customers' profit in smart grid is 3.5 times greater than its value in non smart grid. Also in scenarios 1 and 2 in which incentive rate has been greater (60 Rial/MWh), this value in smart grid is 4.25 times greater than customers' profit in non smart grid. It shows that the smart grid preferences, from economical view point, are more obvious in higher incentive rates.

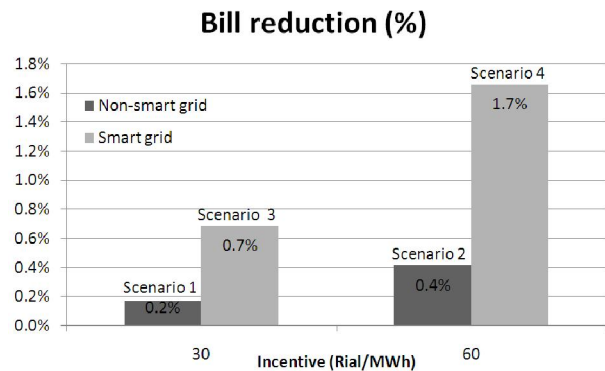


Figure 7: The impact of adopting scenarios 1-4 on bill reduction (profit) in percent.

5. Conclusion

In this paper, effect of smart grid on running EDRP through a logarithmic demand response model has been investigated. Simulation results have been done over Iranian power system. It has been shown that smart environment causes to better result for EDRP execution from economical and technical view points. Also preference of smart grids respect to non smart grids is seen in low incentive rates for technical

view point, and in high incentive rate for economical view point. Application to a real world power system such as Iranian power system guarantees the viability of the proposed EDRP model.

Acknowledgement

The authors gratefully acknowledge the financial and other support of this research, provided by Islamic Azad University, Islamshahr Branch, Tehran, Iran.

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11/24/2012

Detection of LTR Retrotransposons Reactivation induced by *in vitro* Environmental Stresses in Barley (*Hordeum vulgare*) via RT-qPCR

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Abstract: The effects of four environmental stresses of heat, drought, wounding and cell culture, on the transcriptional reactivation of seven long terminal repeat retrotransposons (LTRs) of barley (*Hordeum vulgare*) genome, were investigated. These LTRs included two *Copia*-type (*Bare* and *Maximus*); and five *Gypsy*-type (*Erika*, *Jeli*, *Sabrina*, *Sukkula1* and *Sukkula3*) LTRs. RT-qPCR analyses revealed that *Erika1* LTR was highly reactivated under heat, drought, and wounding with 28.1, 9.9 and 9.4 fold increments, respectively. *Sabrina* LTR was 6.2 fold reactivated under cell culture. *Bare1* LTR was reactivated by drought (4.1 fold) and cell culture (3.4 fold). Transcription activity of *Jeli* LTR was increased by 3.4 fold under cell culture. *Sukkula1*, *Sukkula3* and *Maximus* LTRs were slightly reactivated under drought, wounding and cell culture. These changes in the reactivation pattern of LTRs provide fingerprints for tracking the molecular changes occurred in barley genome upon exposure to environmental stresses, which might result in gain or loss of yield. Such sensitive LTR expression profiles underline one of the important role of LTR genetics in agriculture.

[A.M. Alzohairy, M.A. Yousef, S. Edris, B. Kerti, G. Gyulai and A. Bahieldin. **Detection of LTR Retrotransposons Reactivation induced by *in vitro* Environmental Stresses in Barley (*Hordeum vulgare*) via RT-qPCR.** *Life Sci J* 2012;9(4):5019-5026] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 752

Keywords: LTR retrotransposons; RT-qPCR, environmental stresses; barley (*Hordeum vulgare*), TREP

List of Abbreviations: LARD-LTRs (large retrotransposons derivatives), LTRs (long terminal repeat retrotransposons), RT-qPCR (reverse transcription–quantitative polymerase chain reaction), TREP (triticeae repeat sequence database server).

1. Introduction

Transposable elements (TEs) are major genetic elements of the eukaryotic genomes (Jurka *et al.*, 2007; Mansour, 2007). In plant, TEs comprise about 15% (*Arabidopsis thaliana*), 50-80% (most grass genomes), or more (some *Liliaceae* species) of the nuclear genome (Sabot and Schulman, 2006). In human, TEs comprise nearly half (42%) of the nuclear genome (IHGSC, 2001).

Next to DNA transposons, retrotransposons (RTs) are the main groups of TEs. The latter move ('or jump') by copy-and-paste way of life cycles through molecular steps of transcription, reverse transcription and integration of the cDNA copies back into host genome (Alisch *et al.*, 2005; Grandbastien *et al.*, 2005; Brady *et al.*, 2007; Saito *et al.*, 2008; Geuking *et al.*, 2009). LTR retrotransposons (long terminal repeats or LTRs) are the most abundant class of RTs in plant (Wicker *et al.*, 2005). On average, LTRs comprise 60% of the genomes of maize, wheat and barley (Vicent *et al.*, 1999; Myers *et al.*, 2001; Wicker *et al.*, 2001). LTRs are the main source of insertional inactivation mutagenesis (Zedek *et al.*, 2010), which results in

'genomic shock' (McClintock, 1984), polyploidy (Vitte and Panaud, 2005), genome remodeling (Wicker *et al.*, 2005), changes in gene expression (Servant *et al.*, 2008), and genome size enlargement. The latter can occur within one plant generation (Bennetzen, 2002), and might be reversible resulting in genome fluctuation by expansion and contraction (Shirasu *et al.*, 2000; Bennetzen, 2002).

Experiments confirmed the elevated transcriptional activities (reactivation) of LTRs induced by exogenous environmental stresses of chilling, salt, light, infections, nitrate limitations, mechanical damage, and also by *in vitro* regeneration. These activities result in the development of doubled haploids and hybridization (Grandbastien *et al.*, 2005; Nellaker *et al.*, 2006; Stribinskis and Ramos, 2006; Salazar *et al.*, 2007; Sharma *et al.*, 2008; Maumus *et al.*, 2009; Woodrow *et al.*, 2010). As a result of plant defense mechanisms, LTRs can be silenced epigenetically by hypermethylation (Kumar and Bennetzen, 1999).

In the present study, the reactivation of seven barley LTRs; two *Copia*-type (*Bare1* and *Maximus*) and five *Gypsy*-type (*Erika*, *Jeli*, *Sabrina*, *Sukkula1*

and *Sukkula3*) induced by three abiotic stresses (heat, drought and wounding) and cell culture was successfully detected via RT-qPCR. Utilization of these retrotransposons can provide an indirect estimation of transcriptional patterns of these repetitive elements and play a major role in improving the annotation of genomic sequences used to search EST databases.

2. Materials and Methods

Plant materials

Barley (*Hordeum vulgare*; $2n=2x=14$ chromosomes; ~ 5500 MB genome size) seeds of the cultivar Giza 2000 were germinated and grown in the greenhouse under controlled growth conditions.

Environmental stresses

For mild heat stress, five-leaf-stage seedlings were grown for 3 days under high temperature (37°C) as recommended for cereals (Yildiz and Terzi, 2008). For drought stress, seedlings were grown for 27 days with minimum watering to keep them at the wilting stage. Eight replicated pots were used in which two seeds were planted in each plastic pot of 5130 cm³ containing 4000 g of dry soil in the greenhouse. Mass water content (kg/kg) corresponding to soil matric potentials of ≈ -20 and -500 kPa were determined from the retention curve to simulate well-watered and severe water deficit treatments, respectively. It was experimentally determined that addition of 500 and 100 ml of water every other day was required to maintain the desired soil matric potentials for plants up to 8–10 weeks. Soil water status thus presumably became progressively slightly ‘drier’ (lower matric potential) than the target levels as plants grew further and used more soil water. For wounding stress, seedlings were cut into pieces. For cell culture condition, cell suspension culture was applied for 27 days in liquid, aseptic nutritive media according to Mansour *et al.* (2008) following Bittsánszky *et al.* (2006). Statistical analyses for different experiments were performed following the procedure outlined by Gomez and Gomez (1984).

RNA extraction and synthesis of first-strand cDNA

Barley leaves (0.1 g) were used to isolate total RNA with Trizol (Invitrogen, Carlsbad, CA, USA) following the manufacturer’s instructions. In 200 μ l, 1x DNase I buffer (10 mM Tris-HCl, pH 7.5; 2.5 mM MgCl₂, 0.1 mM CaCl₂, 20 U DNase I [Fermentas International Inc., Burlington, Canada], 5 mM DTT, 100 U RiboLock™ Ribonuclease Inhibitor) and the RNA samples (20 μ l each) were applied and incubated at 37°C for 60 min. Total RNA, in 1x TE,

was incubated at 70°C for 5 min and chilled on ice. The reaction mixture (50 μ l), composed of 1x reaction buffer for reverse transcription (50 mM Tris-HCl, pH 8.3, at 25°C), 50 mM KCl, 4 mM MgCl₂, 10 mM DTT, 10 mg of total RNA, 50 U (RiboLock) ribonuclease inhibitor, 5 μ M of random primers, 1 mM dNTPs, was incubated at 5°C for 10 min and chilled on ice. Then, 1000 U RevertAida, M-MuLV reverse transcriptase (Fermentas International Inc., Burlington, Canada) were added. Then, the reaction mixture was incubated at 4°C for 60 min. Finally, 150 μ l TE was added and solution was stored in -20°C until use (Mansour *et al.*, 2008).

RT-qPCR

The QIAGEN OneStep RT-PCR kit was used according to Gyulai *et al.* (2005) and Bittsánszky *et al.* (2006). The PCR reactions mixture (25 μ l) contained 3 μ l cDNA, 1x PCR buffer (10 mM Tris-HCl, pH 8.8 at 25°C), 2.5 mM MgCl₂, 50 mM KCl, 0.1 % Triton X-100, 300 nM of each primer pair (Table 1), 0.2 mM dNTPs and 1 U DNase II DNA polymerase. PCR (PTC-225 DNA Engine Tetrad cycler, MJ Research, USA) cycles consisted of: 95°C for 2 min; 30 cycles of 95°C/15 sec, 52°C, 56°C or 60°C for 1 min; and 72°C for 2 min, with a final extension step at 72°C for 10 min. For gel electrophoresis (80V/3 h), samples (10 μ l) were mixed in 2x loading buffer and loaded to 1.7% agarose gel (1x STBE). Bands were detected by ethidium bromide staining. The expression levels of LTRs were determined by densitometer program of GelAnalyzer (<http://www.GelAnalyzer.com/>). Constitutively expressed α -tubulin gene was used as a control according to Suprunova *et al.* (2007).

LTR-specific primer sequences

The sequences of retrotransposon families were collected from the Triticeae repeat sequence database server (TREP) (<http://wheat.pw.usda.gov/ITMI/Repeats/>). The server provides sequence entries for the *Copia*-type LTRs of *Bare1* (70 entries) and *Maximus* (9 entries), and the *Gypsy*-type LTRs of *Erika* (9 entries), *Jeli* (14 entries), *Sabrina* (61 entries), *Sukkula1* and *Sukkula3* (7 entries). Downloaded TREP sequences were aligned for determining consensus sequences by MULTALIN© server (Combet *et al.*, 2000) and FastPCR© program (Kalendar *et al.*, 2009). For the analyses of inter specific sequence diversity and phylogeny, LTRs were analyzed *in silico* by BioEdit (Hall, 1999) and MEGA4 (Tamura *et al.*, 2007) programs.

Table 1. Nucleotide sequences of primer pairs used for RT-qPCR analyses of seven retrotransposons (LRTs) as well as the constitutively expressed α -tubulin gene used as a control (Suprunova *et al.*, 2007). Amplified fragment sizes in base pairs (bp) are indicated.

LRTs	Primer sequences	LRTs	Primer sequences
<i>α-tubulin</i> (400 bp)	F: tccatgatggccaagtgtga R: ctcattgtaccgtgggatgctc	<i>Jeli</i> (380 bp)	F: accatgaccacataactacaacgcag R: cgtcttctggttaattcttgcctcag
<i>Bare1</i> (198 bp)	F: acgacacctccgcgttcag R: ccgaccacatgcctccacggttttct	<i>Sabrina</i> (326 bp)	F: ttgggtcataccgtgcggtgac R: ggtgaacaattactgtcagca
<i>Maximus</i> (422 bp)	F: tgtgtttgtgagtgtacacagg R: acttggcgtggctatcgaacggctc	<i>Sukkula1</i> (294 bp)	F: Tctcagagttgaggtttccac R: gtcagacataacccccacgtgctc
<i>Erika1</i> (209 bp)	F: ttatgttcccggattgttgcgtc R: gaccaacactcagaggagcac	<i>Sukkula3</i> (333 bp)	F: acgaccaagatgcggtcctttcc R: agacagatgatcccgcaggcac

3. Results and Discussion

In silico sequence analyses

During primer design, two samples of LTR retrotransposon families of available *Copia*-type (all *Maximus*) and *Gypsy*-type (all *Jeli*) were studied *in silico* based on full TREP data. Sequences showed distinctive DNA compositions with higher GC content in *Jeli* LTRs and higher AT content in *Maximus* LTRs with a single exception (*Maximus* TREP1711) (Figure 1). This obviously indicates independent origin of the two LTR families studied (Wicker *et al.*, 2007).

Phylogeny of *Hordeum* LTRs (Figure 2) showed high level of sequence diversity, however, with consensus stretches useful for primer design (Table 1). Sequence diversities also indicated that the active life cycles of LTRs, as new sequence combinations of LTRs, are always generated during their life cycles due to the lack of proof-reading activity of the RNA-dependent DNA polymerase (RdDpol), the reverse transcriptase (RT), which amplify the double-stranded cDNA copy from the transcribed single-stranded RNA transcriptomes of the LTRs (Wilhelm and Wilhelm, 2001).

RT-qPCR analyses of the reactivation of LTRs

Copia-type LTRs

The *Copia*-type *Bare1* LTR family was the first highly abundant ($1.66 \pm 0.6 \times 10^4$ copies) full-length retrotransposon described in barley (*Hordeum vulgare*), which accounts for approximately 3% of barley genome (Chang and Schulman, 2008). It actively transcribes, translates and assembles into virus-like particles. It is involved in genomic diversification within the genus. The *Bare1* was also found active in genome remodeling (Kalendar *et al.*, 2000; Shirasu *et al.*, 2000). Our results showed that *Bare1* LTR retrotransposon was reactivated by drought (4.1 fold increment) and cell culture (3.4 fold), but not by heat or wounding (Figure 3, Table 2). The *Maximus* LTRs of cereal genomes were found to be slightly reactivated in our study by heat wounding (1.5 fold increment) and cell culture (1.9 fold) (Figure 3, Table 2).

Gypsy-type LTRs

The internal domain sequence of *Erika1* is 63% identical to the *Gypsy*-type *Bagy-1* retrotransposon of barley (NCBI Y14573) (Wicker *et al.*, 2007), and showed 69% identity to *Sukkula* LTRs with a poor match at the 5' end. A maize (*Zea mays*) *gypsy/Ty-3* LTR was detected recently in common millet (*Panicum miliaceum*) by AFLP analysis (Gyulai *et al.*, 2011). The transcription activity of *Erika1* LTR was elevated by stresses of heat (28.1 fold increment), drought (19.9 fold) and wounding (9.4 fold), however, the stress during cell culture showed no influence on the transcription activity (Figure 3, Table 2). The *Jeli* LTR, described first in hexaploid wheat (*Triticum aestivum*) genome, provided useful multiple genetic markers for common wheat (Melnikova *et al.*, 2011). Our results showed that *Jeli* LTRs in barley has no activation with most stresses studied, except with a slight reactivation during cell culture with 3.4 fold increment (Figure 3, Table 2). The *Sabrina* LTR, described as an active retrotransposons in common grasses (Todorovska, 2007), showed reactivation capacity by heat (1.4 fold) and during cell culture with 6.2 fold transcriptional increments (Figure 3, Table 2). *Sukkula* LTRs, described as Solo-LTR elements, are the most highly expressed elements in the cultivated barley (Shirasu *et al.*, 2000), however, they lack the coding sequences making it the main type of LARD-LTRs (large retrotransposons derivatives). Both *Sukkula1* and *Sukkula3* were transcriptionally slightly reactivated during cell culture (1.3 and 1.7 fold increment, respectively) and not by heat and wounding stresses. Nevertheless, *Sukkula3* was slightly reactivated by drought (1.6 fold increment) stress (Figure 3, Table 2).

Generally speaking, our results showed different retrotransposon responses to different environmental stresses (data not shown) in accordance with Beguiristain *et al.* (2001), Salazar *et al.* (2007) and Chang and Schulman (2008). *Tnt1A* element of tobacco was reactivated by wounding, biotic elicitors and pathogen attacks of fungal extracts (Melayah *et*

al., 2001). These reactivations seemed to be mainly caused by the *Tnr1A* promoter that has the potential to be activated by various biotic and abiotic stimuli (Grandbastien *et al.*, 2005; 2007). These stimuli were specifically repressed in tobacco when the LTR promoter was replaced in a heterologous position (Grandbastien, 1998).

The sequences of LTR retrotransposons contain environmental stress responsive elements (Niinimets and Valladares, 2004). The *cis*-regulatory elements, similar to those of plant stress responsive genes, may be involved in binding active retrotransposons to similar defense-induced transcription factors (Casacuberta and Santiago, 2003; Dunn *et al.*, 2006). Also, there are numerous stress inductive gene promoters that share strong sequence similarities with LTRs (Casacuberta and Santiago, 2003; Dunn *et al.*, 2006). The *TLC1.1* retrotransposon was reactivated by multiple stress-related signaling molecules of salicylic acid (SA), abscisic acid (ABA), methyl jasmonate (MeJA), hydrogen peroxide (H₂O₂) and the synthetic auxin 2,4-D (Salazar *et al.*, 2007).

In conclusion, our results show that the studied LTR retrotransposon families responded to environ-

mental stresses with different rates of expression. RT-qPCR analyses revealed that *Erika1* LTR was highly reactivated under heat, drought, and wounding with 28.1, 9.9, and 9.4 fold increment, respectively. *Sabrina* LTR was reactivated under cell culture with 6.2 fold increment. *Bare1* LTR was reactivated by drought (4.1 fold) and under cell culture (3.4 fold). Transcription activity of *Jeli* LTR was increased by 3.4 fold under cell culture. *Sukkula1*, *Sukkula3* and *Maximus* LTRs were reactivated slightly under drought, wounding and cell culture. No explanation can be given for this phenomenon. Changes in the studied transcriptional activities of LTRs provide sensitive molecular fingerprints for tracking the molecular changes occurring in the barley genome exposed to environmental stresses (Koorneef *et al.*, 2004). This indicates that global warming might have an influence in the near future. These stress responsive LTR reactivations might result in gain or loss of yield in economically important crop plants like barley, which underline the important role of LTR genetics in agriculture.

Table 2. Expression levels of the seven LTR retrotransposons of barley (*Hordeum vulgare*) exposed to four stresses as compared to the constitutively expressed α -tubulin gene (control). Results of the RT-qPCR were calculated by GelAnalyzer densitometer program on gel photos (see Figure 3).

LTRs	Stress			
	Heat	Drought	Wounding	Cell culture
α -tubulin (control)	1.0	1.0	1.0	1.0
<i>Bare1</i>	1.0	4.1	1.0	3.4
<i>Maximus</i>	1.0	1.0	1.5	1.9
<i>Erika1</i>	58.1	19.9	9.4	1.0
<i>Jeli</i>	1.0	1.0	1.0	3.4
<i>Sabrina</i>	14.4	1.0	1.0	6.2
<i>Sukkula1</i>	1.0	1.0	1.0	1.3
<i>Sukkula3</i>	1.0	1.6	1.0	1.7

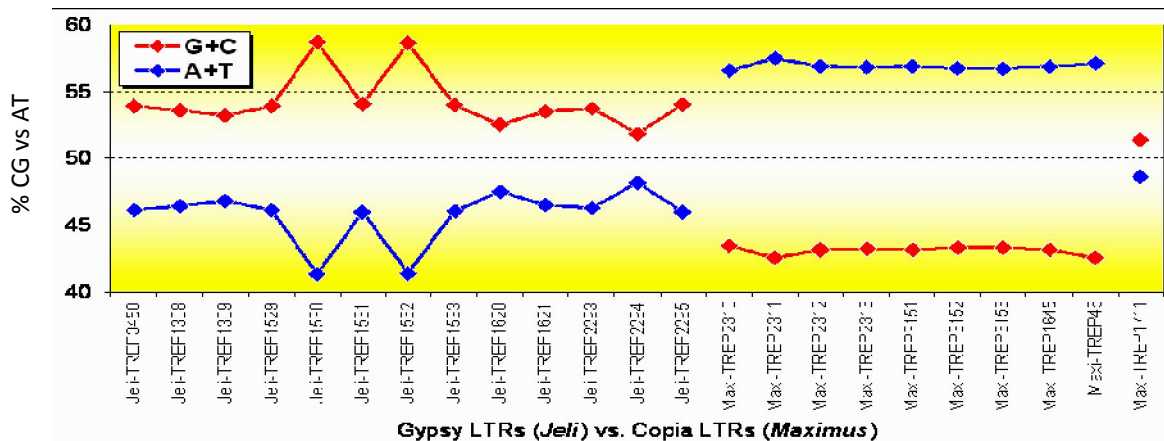


Figure 1. Differences between percentages of GC and AT nucleotide contents of *Copia*-type (all *Maximus* available) and *Gypsy*-type (all *Jeli* available) LTR retrotransposons. Full-length TREP sequences (indicated) were analyzed by BioEdit (Hall, 1999).

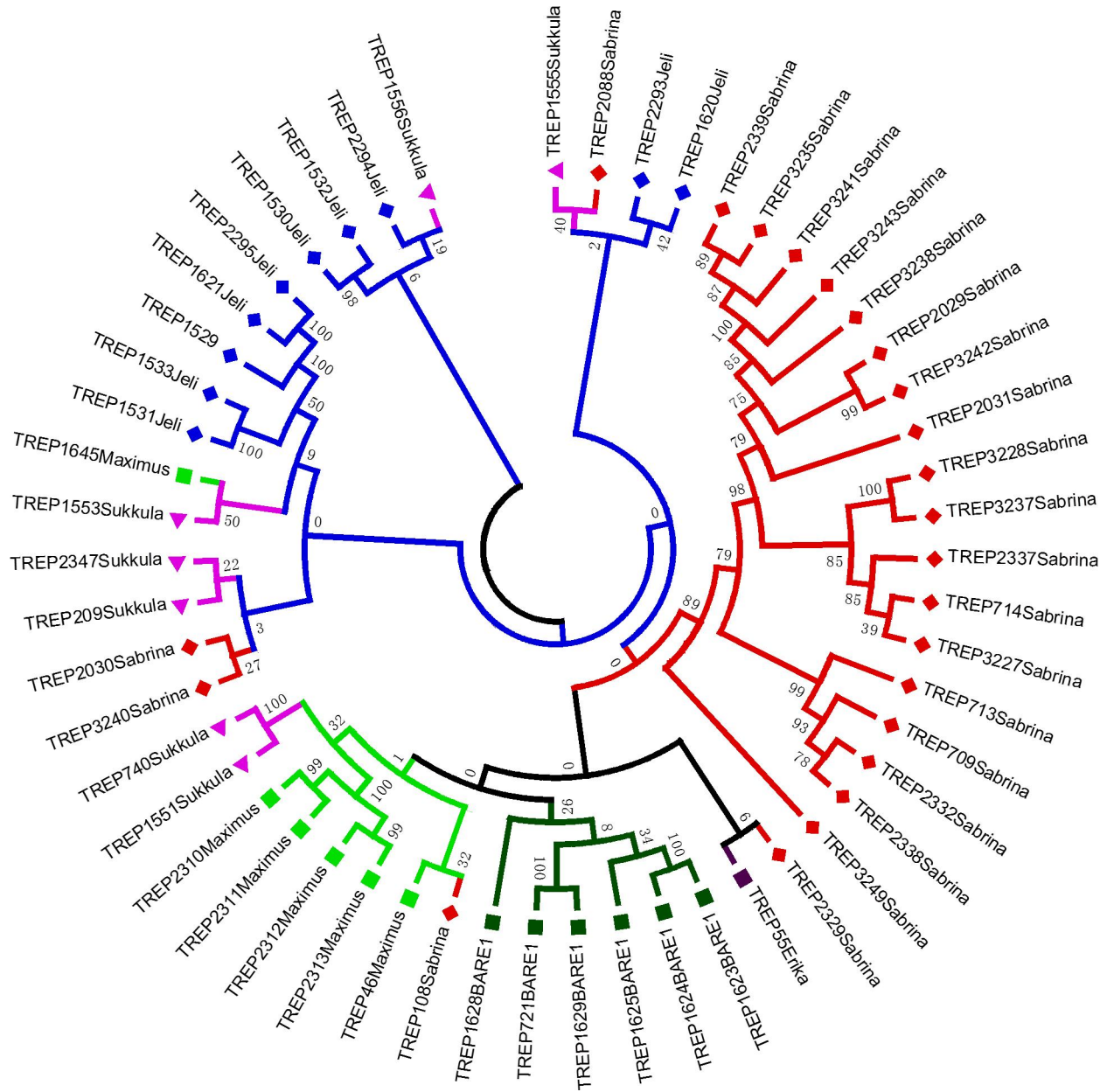


Figure 2. Bootstrap consensus dendrogram derived from the nucleotide sequences of LTR retrotransposons of *Hordeum* genome. Full-length TREP sequences of *Copia*-type (*Bare1* and *Maximus*) and *Gypsy*-type (*Erika*, *Jeli*, *Sabrina* and *Sukkula*) LTR retrotransposons were compared. Full-length TREP sequences of *Bare1* (six of the 65 LTRs available), *Maximus* (9 LTRs), *Erika* (1 LTR), *Jeli* (15 LTRs), *Sabrina* (23 LTRs) and *Sukkula* (7 LTRs) were aligned (BioEdit; Hall, 1999) and edited (MEGA4; Tamura *et al.*, 2007). LTRs of the same families are indicated with different colored symbols. Bootstrap supporting values from 1000 replicates are provided at node.

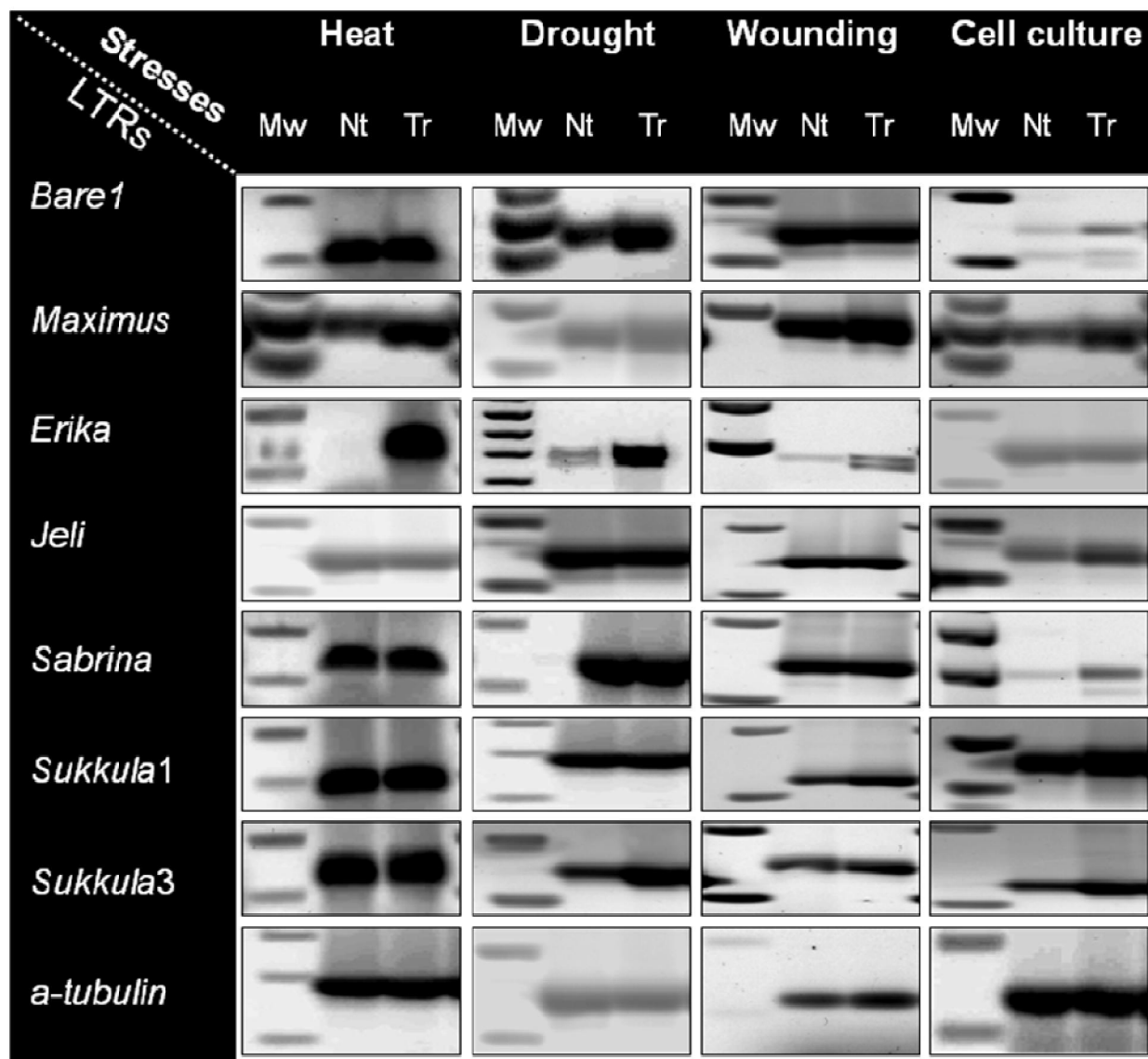


Figure 3. RT-qPCR analyses of the transcriptional reactivations of seven LTR retrotransposons of barley (*Hordeum vulgare*) genome. Two *Copia*-type (*Bare1* and *Maximus*); and five *Gypsy*-type (*Erika*, *Jeli*, *Sabrina*, *Sukkula1* and *Sukkula3*) LTR retrotransposons were investigated under stresses of heat, drought, wounding, and cell culture. For control, the level of the constitutively expressed α -tubulin gene was applied. Amplified fragment sizes are indicated in Table 1. *Mw* (molecular weight markers), *Nt* (Not treated), *Tr* (treated samples).

Acknowledgments

Authors wish to thank Dr. Luther Waters (Auburn University, AL, USA) for the comments on the manuscript. This project was funded by the Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah, under Grant no. (14-3-1432/HiCi). The authors, therefore, acknowledge with thanks DSR technical and financial support.

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11/24/2012

Detection of Stably Expressed Genes Contributing To PCD Triggered by Exogenous Oxalic Acid Treatment in Tobacco

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Abstract: The present study aims at detecting genes expressed at stable levels and contributing to PCD triggered by exogenous oxalic acid (OA) treatment (20 mM, pH 7.0) in tobacco (*Nicotiana benthamiana*). Qualitative and quantitative time-course analysis of cell death indicated some PCD-like features 24 hrs after OA treatment. Expression of a number of 17 genes contributing to PCD was also examined. Results of cell death in virus induced gene silencing (VIGS) corresponding to 14, out of the 17, genes indicated either increased or reduced amount of cell death. However, RT-PCR for the relative abundance of transcripts of these genes in tobacco wild type (WT) indicated that expression of six genes is not regulated at the transcriptional level. These genes are *MAPKα*, *NRC1*, *WIPK*, *RARI*, *SIPK* and *FLS2*. The results of VIGS corresponding to five, out of the six, genes indicated a reduced relative amount of cell death under OA treatment for 24 hrs as compared to the WT. Only one VIGS corresponding to *FLS2* gene resulted in an increased amount of cell death under OA treatment for 24 hrs. This indicates that OA triggers PCD, but has no influence on triggering these six PCD-related genes. Besides, these six genes might be regulated at step(s) downstream transcription. Our results will scope the light on the possible use of these genes in conferring resistance to environmental stimuli by retarding the machinery of PCD in plant.

[A. Bahieldin, A.M. Ramadan, A. Atef, N.O. Gadalla, S. Edris, A.M. Shokry, S.M. Hassan, H.F. Eissa, K.B.H. Kamal, S. Rabah, O.A. Abuzinadah, M.A. Al-Kordy and F.M. El-Domyati. **Detection of Stably Expressed Genes Contributing To PCD Triggered by Exogenous Oxalic Acid Treatment in Tobacco.** *Life Sci J* 2012;9(4):5027-5034] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 753

Keywords: VIGS, Abiotic stress, Apoptotic genes, RT-PCR, Gene knock down.

1. Introduction

Apoptosis or PCD is a highly conserved process that is used to remove unwanted cells in eukaryotes. As in animals, a programmed type of cell death occurs in plants as part of normal growth and development, including reproduction, seed germination, aerenchyma formation, tracheary element differentiation, and senescence (Filonova *et al.*, 2002, Kuriyama and Fukuda, 2002, Lim *et al.*, 2007, Turner *et al.*, 2007) in which initiation phase involves signaling cascades that prepare the cell for entry into the execution phase. PCD in plants is less studied compared with animals, but it is well known to be triggered by biotic and abiotic stresses (Zhang and Klessig 2001). Although release of mitochondrial cytochrome c has been identified in plants (Thomas and Franklin-Tong 2004, Yao *et al.*, 2004, van Doorn and Woltering, 2005), many genes, encoding components of the apoptotic machinery, either have not yet been identified in plants or are simply not present (Woltering *et al.*, 2002).

Emerging evidence has indicated, in necrotrophic fungus-plant interactions, active involvement of the pathogen in influencing host pathways to direct plant cells towards death (Van Baarlen *et al.*, 2004). For example, *Sclerotinia* sp. secretes a wide array of substances to facilitate their necrotrophic life style within the plant cell (Annis & Goodwin, 1997). In addition to cell-wall-degrading enzymes, oxalic acid (OA) plays a key role in pathogenesis, fungal development and plant cell death (Dutton and Evans, 1996). OA is toxic, non-specific phytotoxin, which degrades or weakens the plant cell wall via acidity. It was noted that gene expression of mitogen-activated protein kinases (MAPKs), required for sclerotial formation in *S. sclerotiorum*, is activated by acidic pH mediated via OA (Rollins and Dickman, 2001, Chen *et al.*, 2004, Kim *et al.*, 2008).

Virus-induced gene silencing (VIGS) is a method that takes advantage of the plant RNAi-mediated antiviral defense mechanism (Velásquez *et al.*, 2009). With virus vectors carrying sequences

derived from host genes, the process can be targeted against the corresponding host mRNAs. VIGS has been adapted for high-throughput functional genomics in plant by using the Ti plasmid of the plant pathogen *Agrobacterium tumefaciens* to deliver a recombinant virus carrying part of the gene sequence targeted for silencing. Then, systemic virus spread and the plant's endogenous RNAi machinery accelerate the silencing process in which dsRNAs corresponding to the target gene are produced and then cleaved by the ribonuclease Dicer into siRNAs of 21-24 nucleotides in length. These siRNAs ultimately guide the RNA-induced silencing complex (RISC) to degrade the target transcript (Carrington & Ambros 2003). Different vectors have been employed in VIGS and one of the most frequently used is based on tobacco rattle virus (TRV). Two different *A. tumefaciens* strains are used for VIGS, one carries pTRV1, which encodes the replication and movement viral functions, while the other carries pTRV2, which harbors the coat protein and the sequence used for VIGS (MacFarlane, 1999, Liu *et al.*, 2002). Inoculation of *Nicotiana benthamiana* seedlings with a mixture of both strains results in gene silencing. Silencing of the endogenous phytoene desaturase (*PDS*) gene, which causes photo-bleaching, is used as a control for VIGS efficiency. RNA transcript abundance of the gene of interest is measured to ensure that it has efficiently been knocked down (Senthil-Kumar *et al.*, 2007).

In this report, we show that exogenous OA functions as an elicitor of PCD or apoptotic-like features in tobacco plants by triggering pathways and signals responsible for PCD. A number of candidate genes related to PCD will be utilized. Some of which are known to function during plant's defense against invading pathogens via a mechanism known as the hypersensitive response (HR) (Ren *et al.*, 2006).

2. Materials and Methods

Plant material and bacterial strains

Wild-type tobacco (*Nicotiana benthamiana*) plants were grown from seed in a growth room at 25°C with 16-hrs light periods as previously described (Dickman *et al.*, 2001). *Agrobacterium tumefaciens* and *Escherichia coli* strains were grown in Luria-Bertani medium at 30 and 37°C, respectively. Antibiotics were used at the following concentrations: ampicillin (100 µg/ml), kanamycin (50 µg/ml) and rifampicin (100 µg/ml).

Virus induced gene silencing (VIGS)

VIGS of a number of PCD-related genes (Table 1) were kindly provided by Professor GB Martin, Professor of Plant Pathology and Plant-Microbe Biology, Boyce Schulze Downey Research Chair, Boyce Thompson Institute, Cornell University, Tower Road, Ithaca, NY 14853-1801, USA. VIGS

were utilized as described by Velásquez *et al.*, (2009). All *N. benthamiana* plants were kept in a growth chamber with a 16-h day length, a temperature of 20-22°C, and 50% relative humidity (RH) for 25 days before they were used for the assays. *A. tumefaciens* harboring pTRV2, pQ11, pTRV2::PDS and pTRV2: or Q11::target gene fragment are grown at 30°C for 2 days on LB agar plates supplemented with 50 µg/ml of kanamycin and 100 µg/ml of rifampicin. The kanamycin selects for the pTRV2 and pQ11 plasmids, while the rifampicin for the *Agrobacterium*. Silencing of PDS causes the plants to photo-bleach and is used as a control to detect silencing efficiency. Gateway compatible pTRV2 vector was used by the provider for cloning as described by Liu *et al.*, (2002). For the PDS-silenced control plants, photo-bleaching starts to be seen in new leaves 10 days after infiltration up to senescence.

Table 1. List of VIGS utilized in the present work to detect knock down of a number of genes contributing to PCD triggered by oxalic acid. pTRV2 and pQ11 are empty vectors, with different antibiotic resistance genes, used as negative controls. pQ11:PDS is the VIGS causing photo-bleaching (positive control) in new leaves when *PDS* gene is knocked down.

Stock no.	Construct	Reference
3698	pTRV2	(Velásquez <i>et al.</i> , 2009)
3835	pQ11	
3836	pQ11::PDS	(Velásquez <i>et al.</i> , 2009)
3861	pQ11::NbMAPK α	(del Pozo <i>et al.</i> , 2004)
4850	pTRV2::NRC1	(Gabriëls <i>et al.</i> , 2007)
3594	pTRV2::WIPK	(Ekengren <i>et al.</i> , 2003)
3582	pTRV2::RAR1	(Ekengren <i>et al.</i> , 2003)
3589	pTRV2::SIPK	(Ekengren <i>et al.</i> , 2003)
4892	pQ11::FLS2	(Ekengren <i>et al.</i> , 2003)

OA treatment and measurement of cell death

Leaf discs of different WT and VIGS of *N. benthamiana* plants were obtained from 7-week-old plants using a 10-mm-diameter cork borer. Then, discs were submerged in OA (Sigma-Aldrich) at 20 mM for 24 hours. Cell death was determined and quantified by using Evans blue as described (Kim *et al.*, 2008). Cell membranes are permeable and, thus, stained when cell death occurs (Baker and Mock, 1994). Briefly, treated leaf discs were submerged in 0.25% (w/v) Evans blue solution (MP Biomedicals, Santa Anna, CA, USA) for 20 min. Excess and unbound dye was removed with deionized water. The discs were placed in liquid nitrogen, homogenized, placed in 1% (w/v) sodium dodecyl sulfate (SDS) solution, and incubated for 10 min at 37°C. Solutions were centrifuged at 13,000 \times g for 5 min. The quantity

of remaining dye was spectrophotometrically measured at 600 nm. Measurements were expressed as relative values, with 1 corresponding to a maximum of a sample tested.

For the detection of DNA laddering as a sign of PCD, total plant DNA was extracted from leaf discs using a modified method (Ryerson and Heath, 1996). Discs were homogenized using liquid nitrogen, incubated for 30 min at room temperature in DNA extraction buffer (0.1 M glycine, 50 mM NaCl, 10 mM EDTA, 2% SDS and 1% sodium lauryl sarcosine) and mixed with an equal volume of Tris-saturated phenol. The mixture was centrifuged for 15 min at 10,000 \times g. The supernatant was treated with chloroform/isoamyl alcohol (24:1, v:v). After re-centrifugation at 10,000 \times g, DNA was precipitated with a twofold volume of 100% ethanol, washed with 70% ethanol and dissolved in Tris-EDTA buffer containing RNase A (40 μ g/ml). DNA was recovered after phenol extraction and ethanol precipitation. DNA samples were separated on a 1.5% agarose gel in 0.5x Tris-borate-EDTA, stained with ethidium bromide and visualized using the Gel Doc XR from Bio-Rad.

RT-PCR to analyze gene expression

Leaf discs of 7-week-old *N. benthamiana* plants were submerged in OA (Sigma-Aldrich) at 20 mM for 3, 6, 12 and 24 hours. Then, discs were frozen in liquid nitrogen to extract RNAs. Untreated leaf discs were used as a negative control. Total RNA was extracted from three similar-sized (10 mm²) leaf discs per plant (approximately 50 mg tissue) collected from upper leaves using Trizol (Invitrogen) and treated with RNase-free DNase (Promega). First-strand cDNA was synthesized using 2.5 μ g of total RNA, 0.5 μ g oligo (dT) primer and Superscript II reverse transcriptase (Invitrogen) to a final volume of 20 μ l. PCR was performed in 20- μ l reactions using 1 μ l cDNA, 1x PCR buffer (with 1.5 mM MgCl₂), 200 μ M dNTPs, 200 nM of each gene-specific primer and 0.2 U of Taq DNA polymerase (Promega). To ensure that no DNA contamination occurred, PCR for the original RNA samples was run and results were negative (Data provided upon request). To ensure that similar amounts of cDNAs were used for silenced and non-silenced genes, parallel reactions with *actin* primers were run as a positive control. Each PCR cycle included denaturation at 94°C for 15 sec, annealing at 48-52°C for 30 sec, and extension at 72°C for 45 sec. Number of cycles was 40 for amplifying fragments of all genes except *RARI* whose PCR was run for 50 cycles. Amplicons were analyzed on a 1.2% agarose gel stained with ethidium bromide and visualized using the Gel Doc XR from Bio-Rad.

RT-PCR was performed twice. The first was done for RNAs of WT plant discs to detect transcript levels of all genes (Table 1) across time of OA treatment. The second was done for VIGS of each gene untreated with OA to prove knock down of corresponding gene (data provided upon request). RT-PCRs were done for replicated samples with similar results. Also, the two RT-PCRs were repeated with similar results.

3. Results and Discussion

Effectiveness of VIGS in silencing target genes in tobacco

To examine the effectiveness of VIGS in tobacco, pTRV2 carrying a fragment of the phytoene desaturase gene, TRV2::PDS, was used in silencing. The results indicated that silencing of the *PDS* gene inhibited carotenoid biosynthesis and gave rise to a visible phenotype of photo-bleaching of the new leaves (Figure 1). Photo-bleaching of leaves was uniform throughout the plant in which none of the leaves turned completely white. This indicates the homogeneous low rate spread of the virus and partial silencing of the gene in the plant. This phenomenon can be advantageous when silencing PCD-related genes.



Figure 1. Silencing of the *PDS* control gene causes photo-bleaching in *N. benthamiana* plants. Photographs were taken 21 days after infiltration.

Based on these results, we concluded that TRV-based silencing is potentially effective for characterizing the possible involvement of OA in triggering apoptosis in PCD-related genes. VIGS has previously proven useful for a detailed characterization of the role of PCD-related MAPKs (mitogen-activated protein kinases) cascade such as MAPKKK α (del Pozo *et al.*, 2004). One of which, namely NPK1, plays a role in the placement of certain MAPKs, or calcium-dependent protein kinases (CDPKs), in the N and Cf9 pathways (Romeis *et al.*, 2001, Jin *et al.*, 2002, 2003). VIGS occurs naturally in plants when they are infected with a virus carrying sequences homologous to a host nuclear gene. The virus infection triggers the cytoplasmic degradation of any RNA with sufficient homology to the target sequence via RNAi machinery

(Lindbo & Dougherty 1992, Ding 2000, Fagard *et al.*, 2000, Lindbo *et al.*, 2001, Vance & Vaucheret, 2001). This activity results in post-transcriptional silencing (PTGS) of the homologous nuclear genes, and resistance to viruses containing the target sequence. Many studies have demonstrated that VIGS is a powerful tool for systematically shuttling plant gene sequences into plants and screening infected plants to determine gene function (Lindbo *et al.*, 2001, Vance and Vaucheret, 2001, Sahu *et al.*, 2012).

Apoptosis-like cell death in tobacco cells induced by OA

Qualitative and quantitative time-course analysis of cell death upon treatment with OA in tobacco WT leaf discs were measured using Evans blue staining. Gradual cell death was clearly observed across time of OA treatment (Figure 2a&b). Our results indicated that treatment beyond 24 hrs is not necessary. Longer treatment time (48 hrs) resulted in recovering poor quality RNAs for further gene expression analysis. Kim *et al.*, (2008) indicated substantial increases in tobacco cell death 48 through 96 hrs after OA treatment with concentration (20 mM) similar to this in the present study. However, they indicated that 96 hrs treatment resulted in extensive tissue collapse. This reflects the difficulty of isolating good quality RNA for gene expression analysis. They also indicated that lower concentration of OA (10 mM) yielded similar but delayed results. Based on the kinetics of the cell death in response to OA, tobacco DNA was isolated at several time points. DNA cleavage resulting in a characteristic DNA laddering pattern associated with apoptotic cell death started to appear 24 h after OA treatment (Figure 2b). Kim *et al.*, (2008) proved that PCD induction is not due to the acidic nature of OA but rather to a property of OA itself.

PCD is a major process by which eukaryotes regulate normal growth and development as well as stress responses (Vaux and Strasser, 1996). Accumulating evidence shows that inappropriate regulation of PCD can have inadequate consequences for a given organism. In humans, cancer can be promoted when PCD does not occur, while it normally occurs. Cell death has been correlated with the accumulation of ROS during the oxidative burst (Dickman and Reed, 2003). OA was reported by Kim *et al.*, (2008) as a non-specific phytotoxin in plant tissue. Rather, it functions as a signaling molecule or elicitor to subvert and redirect host pathways toward cell death with the involvement of ROS. The latter are major components induced under oxidative stresses such as H₂O₂ and hallmarks of apoptotic-like cell death. Kim *et al.*, (2008) also indicated that OA is multifunctional as it could lower the pH, hence,

enhance fungal pathogenicity and induce PCD by inhibiting the oxidative burst of the plant.

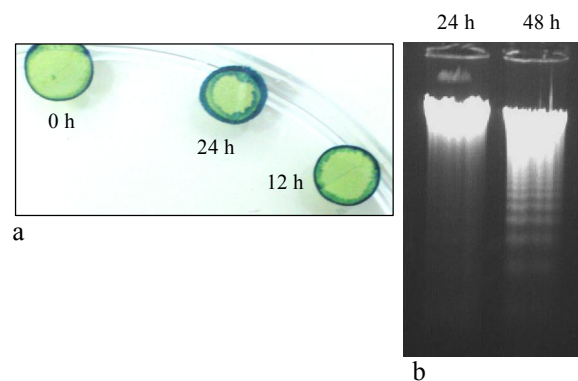


Figure 2. OA-induced cell death as measured by Evans blue staining (a) and DNA laddering (b) in tobacco leaf discs across time of treatment (0, 12 and 24 hrs for staining experiment and 24 and 48 hrs for DNA laddering experiment).

Several evidences were consistent with OA being a specific elicitor of plant PCD. First, OA induces DNA laddering in a time- and dose-dependent manner (Kim *et al.*, 2008). Second, OA-deficient nonpathogenic mutant culture filtrates of fungus did not exhibit laddering, however, laddering was restored when OA was exogenously supplied. Third, other organic acids at similar concentrations were unable to induce ladders. Forth, OA-induced PCD does not occur at acidic pH (3 to 4), but rather at pH 5 and 6. Low pH can cause cell death but it does not appear to be programmed, thus, represents an OA-producing pathogenic fungal necrotic type of death.

Detection of genes contributing to PCD triggered by OA

Many genes with a role in PCD-like features were detected in tobacco. Seventeen of these genes were utilized in the present study. Results of cell death in VIGS corresponding to these genes indicated that silencing 14 of them either increased or reduced amount of cell death (data provided upon request). The other three VIGS include MEK1, cyclophilin and cytochrome C. The mean relative cell death for these three VIGS after 24 hrs of OA treatment was about 0.76, which is the mean value for the WT plant (Table 2). However, RT-PCR for the relative abundance of transcripts of these genes in tobacco WT indicated that expression of six, out of the 14, genes was unchanged across time of OA treatment (Figure 3). This indicates that these genes are not regulated by OA treatment at the transcriptional level. Similarly, the MAPK cascade of genes was shown to be regulated by various mechanisms, including transcriptional, translational regulation and post-

transcriptional regulation such as protein-protein interactions (Katuo *et al.*, 2005, Taj *et al.*, 2010). In the present study, the results of VIGS corresponding to five, out of the six, genes indicated a reduced relative amount of cell death under OA treatment for 24 hrs as compared to the WT (Table 2). Only one VIGS corresponding to *FLS2* gene resulted in an

increased amount of cell death under OA treatment for 24 h. The results of RT-PCR for VIGS corresponding to these six genes untreated with OA resulted in the production of no amplicons. These results indicate the silencing of these genes in VIGS (data provided upon request).

Table 2. Multiple comparisons of the mean relative cell death as responses of tobacco WT and VIGS leaf discs following OA (20 mM, pH 7.0) treatment for 24 h as determined by Evans blue staining. Dye released from dead cells was measured at absorbance at 600 nm. Measurements were expressed as relative values with 1 corresponding to the maximum of a sample. Data are presented as means from two independent experiments with three replicates each.

VIGS	Treatment for 24 hrs		Response
	Oxalic acid	Water	
WT	0.75 ^B	0.33 ^A	Control
pTRV2	0.76 ^B	0.26 ^A	Control
MAP3K α	0.56 ^C	0.30 ^A	Reduced amount of cell death
NRC1	0.50 ^C	0.28 ^A	Reduced amount of cell death
WIPK	0.62 ^C	0.33 ^A	Reduced amount of cell death
RAR1	0.63 ^C	0.31 ^A	Reduced amount of cell death
SIPK	0.54 ^C	0.29 ^A	Reduced amount of cell death
FLS2	1.00 ^A	0.31 ^A	Increased amount of cell death

Means within each column followed by the same letter are not significantly different by Duncan's New Multiple Range test (<0.05).

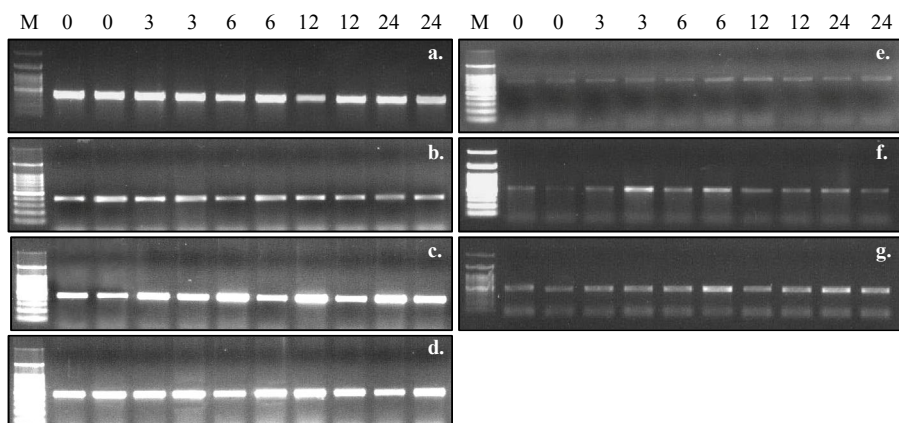


Figure 3. Expression of genes contributing to PCD triggered by oxalic acid treatment for 0, 3, 6, 12 and 24 h with unchanged rate of expression in tobacco wild type plants. a. *actin* (positive control), b. *MAPK α* , c. *NRC1*, d. *WIPK*, e. *RAR1*, f. *SIPK*, g. *FLS2*.

MAPKs are highly conserved across eukaryotes. They are Ser/Thr kinases that are activated by dual phosphorylation of Thr and Tyr residues in a TXY motif. In plants, MAPK cascades have emerged as key players in some of the most essential roles in plant signaling networks. They have been shown to be activated by a variety of stresses, including pathogen infection, wounding, drought, salinity, osmolarity, UV irradiation, ozone, and reactive oxygen species (Tena *et al.*, 2001, Zhang and Klessig, 2001, Li *et al.*, 2007). Activation can involve types of regulation other than transcriptional regulation. Some of which, ex. Arabidopsis AtMPK3, are involved in osmotic and oxidative stresses, as

well as in abscisic acid and pathogen elicitor signaling (Nakagami *et al.*, 2005). Other genes like *NRC1* (NB-LRR protein required for hypersensitive response (HR)-associated cell death 1) are also associated with cell death (Gabiëls *et al.*, 2007). The gene is involved in multiple HR and resistance pathways. Knock down of *NRC1* in tomato confirmed its requirement for induced HR, and revealed that the gene is also required for Cf-4-mediated resistance to *C. fulvum*. MAPKKK α gene was reported to be involved in regulation of host cell death during both immune and susceptible plant-pathogen interactions (del Pozo *et al.*, 2004). The latter authors presented evidence that the signal transduction pathway

initiated by MAPKKK α involves two distinct MAPK cascades, the first is well-known to result in HR cell death via salicylic acid-induced protein kinase (SIPK) regulation and the other is speculated to result in disease-associated cell death (Figure 7, del Pozo *et al.*, 2004). SIPK and wound-induced protein kinase (WIPK) are two tobacco (*Nicotiana tabacum*) MAPKs that are rapidly activated after various challenges, such as osmotic stress (Droillard *et al.*, 2000; Mikolajczyk *et al.*, 2000) and are activated after wounding. Using transgenic cultivated tobacco, Wu *et al.*, (2007) demonstrated that both SIPK and WIPK regulate each other's transcript accumulation, highlighting the complicated transcriptional crosstalk that occurs among protein kinases. Multiple genetic screens have led to the identification of RAR1 (Required for MLA12 Resistance 1) inducer as a key component required for several R protein functions. RAR1 has been shown to be co-chaperons for the HSP90 (Heat-Shock Protein 90) protein responsible for the stability of some R proteins (Shirasu, 2009). This gene was reported to be located upstream the cascade of events towards disease resistance through the downstream MAPKKs, MEK1 and MEK2 and the MAPKs, WIPK and Ntf4 during Pto-mediated disease resistance pathway in tomato (Ekengren *et al.*, 2003, Ren *et al.*, 2006). FLS2 is a pattern recognition receptors (PRR, Chakravarthy *et al.*, 2010) recognizing pathogen-associated molecular patterns (PAMPs) to trigger PAMPs-triggered immunity (PTI) (Bent and Mackey, 2007). Plants with disrupted expression of the *FLS2* gene are compromised for PTI and more susceptible to certain bacterial pathogens (Heese *et al.*, 2007).

In plants, MAPK signaling appears to involve cross-talk with a variety of stress responses forming complex interconnected networks within cells (Zhang and Klessig, 2001, Asai *et al.*, 2002, Pedley & Martin, 2005). Tobacco NtMEK2 (MAP2K)-SIPK/WIPK are reported to be involved in osmotic stress (Kiegerl *et al.*, 2000, Yang *et al.*, 2001, Kroj *et al.*, 2003). In the present study, we have detected six PCD-related genes are not regulated at the transcriptional level. However, they were found to trigger PCD as indicated by the Evans blue staining of dead cells. This indicates that OA triggers PCD, but has no influence on triggering these PCD-related genes. We conclude that these genes might be regulated at step(s) downstream transcription by binding encoded protein to other proteins, protein phosphorylation, activation by SA or other transcription factors, etc. Further investigation is required in order to detect the proper level of regulation of these PCD-related genes. This will scope the light on the possible use of these genes in

conferring resistance to environmental stimuli or in retarding the machinery of PCD in plant.

Acknowledgments

This project was funded by the Deanship of Scientific Research (DSR), King Abdulaziz University, Jeddah, under Grant no. (4-3-1432/HiCi). The authors, therefore, acknowledge with thanks DSR technical and financial support.

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11/24/2012

The Role of The Third World in International Law

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Abstract: The threat of recolonisation is haunting the third world.¹ The process of globalization has had deleterious effect on the welfare of third world peoples. Three billionaires in the North today hold assets more than the combined GNP of all the least developed countries and its 600 million people.² International law is playing a crucial role in helping legitimize and sustain the unequal structures and processes that manifest themselves in the growing north-south divide. Indeed, international law is the principal language in which domination is coming to be expressed in the era of globalization.³ It is displacing national legal systems in their importance and having an unprecedented impact on the lives of ordinary people. Armed with the powers of international financial and trade institutions to enforce a neo-liberal agenda, international law today threatens to reduce the meaning of democracy to electing representatives who, irrespective of their ideological affiliations, are compelled to pursue the same social and economic policies. Even international human rights discourse is being manipulated to further and legitimize neo-liberal goals. In brief, the economic and political independence of the third world is being undermined by policies and laws dictated by the first world and the international institutions it controls. Unfortunately, TWAIL (third world approaches to international law) has neither been able to effectively critique neo-liberal international law or project an alternative vision of international law. The ideological domination of Northern academic institutions, the handful of critical third world international law scholars, the problems of doing research in the poor world, and the fragmentation of international legal studies has, among other things, prevented it from either advancing a holistic critique of the regressive role of globalising international law or sketching maps of alternative futures. It is therefore imperative that TWAIL urgently finds ways and means to globalize the sources of critical knowledge and address the material and ethical concerns of third world peoples.⁴ This paper seeks to take a small step in that direction. It presents a critique of globalising international law and proposes a set of strategies directed towards creating a world order based on social justice. The aim is to *initiate a debate* on the subject rather than to make a definitive statement. The paper is divided into five further sections. Section II considers whether it is still meaningful to talk about a “third world”. Section III discusses the different ways in which the relationship between State and international law is being reconstituted in the era of globalization to the distinct disadvantage of third world States and peoples. Section IV examines the ideology of globalising international law. Section V looks at the theory and process of resistance to unjust and oppressive international laws. Section VI identifies certain elements of a future TWAIL agenda. Section VII contains brief final remarks.

[Javad Babajani Roodi. **The Role of The Third World in International Law.** *Life Sci J* 2012;9(4):5035-5049] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 754

Keywords: Role; Third World; International Law

1. End of the Third World?

It is very often argued that the category “third world” is anachronistic today and without purchase for addressing the concerns of its peoples.⁵ Indeed, from the very inception it is said to have ‘obscured specificity in its quest for generalizability’.⁶ The end of the cold war (or the demise of the second world) has only strengthened the tendency towards differentiation.⁷ According to Walker, the “great dissolutions of 1989” shattered all cold war categories and ‘as a label to be affixed to a world in dramatic motion the Third World became increasingly absurd, a tattered remnant of another time . . .’⁸ It can hardly be denied that the category “third world” is made up of ‘a diverse set of countries, extremely varied in their cultural heritages, with very

different historical experiences and marked differences in the patterns of their economies . . .’⁹ But too much is often made of numbers, variations, and differences in the presence of structures and processes of global capitalism that *continue to bind and unite*. It is these structures and processes that produced colonialism and have now spawned neo-colonialism. In other words, once the common history of subjection to colonialism, and/or the continuing underdevelopment and marginalization of countries of Asia, Africa and Latin America is attached sufficient significance, the category “third world” assumes life. In any case, the diversity of the social world has not prevented the consolidation and articulation of international law in universal abstractions. Today, international law prescribes rules that deliberately

ignore the phenomena of uneven development in favor of prescribing uniform global standards. It has more or less cast to flames the principal of special and differential treatment.¹⁰ In other words, the process of aggregating in international law a diverse set of countries with differences in the patterns of their economies also validates the category “third world”. That is to say, because legal imagination and technology tend to transcend differences in order to impose uniform global legal regimes, the use of the category “third world” is particularly appropriate in the world of international law. It is a necessary and effective response to the abstractions that do violence to difference. Its presence is, to put it differently, crucial to organizing and offering collective resistance to hegemonic policies. Unnecessary importance is often attached to the end of the cold war. The growing north-south divide is sufficient evidence, if any were needed, of the continuing relevance of the category “third world”. Its continuing usefulness lies in pointing to certain structural constraints that the world economy imposes on one set of countries as opposed to others. At one point, the arrival of the newly industrializing countries was seen to be a definitive pronouncement on the inadequacy of the category “third world”.¹¹ But their fate in the financial crisis of the late nineties reveals that the divide between these countries and the rest is not as sharp as it first appeared. Furthermore, as critics of the category “third world” concede, the alternative of multiplying the number of categories to cover distinctive cases, may not be of much help. Worsley himself recognized that ‘we can all think of many difficulties, exceptions, omissions, etc. for any system of classifying countries, even if we increase the number of worlds.’¹² Crow has aptly pointed out in this context that ‘a typology which has as many types as it has cases is of limited analytical value since it has not made the necessary move beyond acknowledgement of the uniqueness of each individual case to identifying key points of similarity and difference’.¹³ However, the presence or absence of the third world, it is worth stressing, is not something that is either to be dogmatically affirmed or completely denied. It is not to be viewed as an either/or choice in all contexts. The category “third world” can coexist with a plurality of practices of collective resistance. Thus, regional and other group identities do not necessarily undermine aggregation at the global level. These can coexist with transregional groupings and identities. In the final analysis, the category “third world” reflects a level of unity imagined and constituted in ways which would enable resistance to a range of practices which systematically disadvantage and subordinate an otherwise diverse group of people. This unity can express itself in

diverse ways. How the internal unity of the “third world” is to be maintained amidst a plurality of individual concerns and group identities can only be determined through practical dialogue which abandons a damaging *a priorism*. There is, to put it differently, no substitute for concrete analysis of particular international law regimes and practices to determine the demands, strategy and tactics of the third world. But there is a need to be alert to the politics of critique of the category “third world”. To misrepresent and undermine the unity of the Other is a crucial element in any strategy of dominance. From which flows the suggestion that the category “third world” is

Irrelevant to the era of globalization. It represents the old divide and rule strategy with which third world peoples are exceedingly familiar. Such a policy seeks to prevent a global coalition of subaltern States and peoples from emerging through positing divisions of all kinds. Thereby, the transnational elite seeks to subvert collective modes of reflection on common problems and solutions. Critique is not the only weapon that hegemonic States deploy against the unity of the third world. Dominant States also take direct measures to weaken the third world coalition. Thus, for example, the North did not take kindly in the past to the Bandung spirit.¹⁴ As Samir Amin writes:

One could add to the above list names (Lumumba, Che Guevara, Allende) and left movements (Indonesia, Nicaragua, Angola) that have been at the receiving end of Northern subversive strategies.¹⁶ Billions of dollars have been spent to undo regimes and movements not favourable to the dominant States. It has prevented an effective third world coalition from emerging as a counterweight to the unity of the first world. It is left to emphasize that our understanding of the category “third world” diverges sharply from that of its ruling elite. The latter scrupulously overlook the class and gender divides within. Furthermore, in the era of globalization, the ruling elite in the third world is coming to be an integral part of an emerging transnational ruling elite that seeks to establish the global rule of transnational capital on the pretext of pursuing “national interests”. The welfare of the peoples of the third world does not have priority in this scheme of things. Thus, there is an obvious dialectic between struggles inside third world countries and in external fora. There can be little progress on one front without some progress in the other. At the same time, a global coalition of the poor countries remains a viable model of collective resistance. For the aspirations of the people, despite the emergence of the non-governmental organizations, is still most effectively represented by the State in international fora. But the third world State has to be

compelled through peoples struggles to engage in collective action.

2. State and International Law in the Era of Globalization

The State is the principal subject of international law. But the relationship between State and international law continually evolves. Each era sees the material and ideological reconstitution of the relationship between state sovereignty and international law. The changes are primarily driven by dominant social forces and States of the time. The era of globalisation is no exception to this rule. Globalisation is not an autonomous phenomenon. It is greatly facilitated by the actions of States, in particular dominant States.¹⁷ The adoption of appropriate legal regimes plays a critical role in this process.¹⁸ The on going restructuring of the international legal system is not entirely dissimilar to the one that saw capitalism establish and consolidate itself in the national sphere. In that case the State 'shaped itself around pre-existing political structures, inserting itself among them, forcing upon them whenever it could, its authority, its currency, its taxation, justice and language of command. This was a process of both infiltration and superimposition, of conquest and accommodation'.¹⁹ In this case what is at stake is the creation of a *unified global economic space* with appropriate international law and international institutions to go along. Towards this end, international law is coming to define the meaning of a "democratic State" and relocating sovereign economic powers in international institutions, greatly limiting the possibilities of third world States to pursue independent self-reliant development. These developments seek to accommodate the interests of a transnational ruling elite which has come to have unprecedented influence in shaping global policies and law.

Mapping the changes which are visiting the relationship between State and international law and grasping the consequences of the metamorphosis is the most crucial task before third world international law scholars. For the transformed relationship between State sovereignty and international law may have far reaching consequences for the peoples of the third world. Attention may be drawn in this regard to *some of the major overlapping* developments that are redefining and reconstituting the relationship of State and international law and institutions, albeit with *differential impact on third world States and peoples*. First, international law is now in the process of creating and defining the "democratic State."²⁰ It has led to the internal structure of States coming under the scrutiny of international law. An emerging international law norm requires States to hold periodic and genuine elections. However, it pays scant

attention to the fact that formal democracy excludes large, in particular marginal groups, from decision making power.²¹ The task transnational capital can flourish. To facilitate this, the State (read the third world State) has seceded, through "voluntary" undertaken obligations, national sovereign economic space (pertaining to the fields of investment, trade, technology, currency, environment etc.) to international institutions that enforce the relevant rules.²² But despite the relocation of sovereign powers in international institutions, international law does not take global democracy seriously. Global or transnational systems of representation and accountability are yet to be established. In brief, international law today operates 'with a set of ideas about democracy that offers little support for efforts either to deepen democracy within nation-states or to extend democracy to transnational and global decision-making'.²³ Second, international law now aspires to *directly* regulate property rights. A key feature of the new age is the *internationalization of property rights*. By "internationalization of property rights" is meant their specification, articulation and enforcement through international law or the fact that the change in the form and substance of property rights is brought about through the intervention of international law. There are a series of overlapping legal developments/measures through which international property rights are being entrenched: (a) the international specification and regulation of intellectual property rights; indeed, as one observer notes, 'TRIPS [i.e., Agreement on Trade-Related Aspects of Intellectual Property Rights] marks the beginning of the global property epoch';²⁴ (b) the privatization of State owned property through the medium of international financial institutions and international monetary law; (c) the adoption of a network of international laws that lift constraints on the mobility and operation of the transnational corporate sector;²⁵ (d) the definition of sustainable development in a manner which implies the redistribution of property rights between the first and the third worlds, ²⁶ and also, subject to some conditions, the regulation of process and production methods; ²⁷ and (e) the metamorphosis of the area of common heritage of humankind (be it the domain of knowledge, environment or specific geographical spaces such as the seabed) into a system of corporate property rights. ²⁸ Third, at the level of circulation of commodities, international law defines the conditions in which international exchange is to take place. It is a truism that 'markets cannot exist without norms or rules of some sort, and the ordering of market transactions takes place through layers of rules, formal and informal'.²⁹ In this regard, international law *inter alia* lays down rules with regard to the sales of goods,

market access, government procurement, subsidies and dumping. Many of these rules are designed to protect the corporate actor in the first world from efficient production abroad even as third world markets are being pried open for its benefit. Thus, the rules of market access are now sought to be linked to the regulation of process and production methods in order to allow first world States to construct non tariff barriers against commodities exported from the third world.³⁰ Likewise, the rules on anti-dumping are designed to protect inefficient corporations in the developed home State.³¹ On the other hand, some forms of market intervention are frowned upon. Thus, international commodity agreements which seek to stabilise the incomes of third world countries from primary commodity exports are actively discouraged.³² Fourth, international law increasingly requires the ‘deterritorialization of currencies’ subjecting the idea of a “national currency” to growing pressure. The advantages of monetary sovereignty are known. It is, among other things, ‘a possible instrument to manage macroeconomic performance of the economy; and [. . .] a practical means to insulate the nation from foreign influence or constraint’.³³ The first world is today using international financial institutions, and the ongoing negotiations relating to the General Agreement on Trade in Services (GATS), to compel third world States to accept monetary arrangements, such as capital account convertibility, which are not necessarily in their interests.³⁴ Thus, it will not be long before capital account convertibility becomes the norm, despite its negative consequences for third world economies.³⁵ The loss of monetary sovereignty, as the East Asian crisis showed, has serious fallouts for the ordinary people of the third world. Their standards of living can substantially erode overnight. Fifth, the internationalisation of property rights has been accompanied by the internationalisation of the discourse of human rights. Human rights talk has come to have a pervasive presence in international relations and law. This development has been variously expressed: ‘a new ideal has triumphed on the world stage: human rights’; ³⁶ ‘human rights discourse has become globalized’; ³⁷ ‘human rights could be seen as one of the most globalized political values of our time’. ³⁸ The fact that the omnipresence of the discourse of human rights in international law has coincided with increasing pressure on third world States to implement neo-liberal policies is no accident; the right to private property, and all that goes along with it, is central to the discourse of human rights.³⁹ While the language of human rights can be effectively deployed to denounce and struggle against the predator and the national security state, its promise of emancipation is

constrained by the very factor that facilitates its pervasive presence viz., the internationalisation of property rights. This contradiction is in turn the ground on which intrusive intervention into third world sovereign spaces is justified. For the implementation of neo-liberal policies is at least one significant cause of growing internal conflicts in the third world.⁴⁰ Sixth, labor market deregulation prescribed by international financial institutions and international monetary law has caused the deterioration of the living conditions of third world labor. Deregulation policies are an integral part of structural adjustment programs. They are based ‘on the belief that excessive government intervention in labor markets – through such measures as public sector wage and employment policies, minimum wage fixing, employment security rules – is a serious impediment to adjustment and should therefore be removed or relaxed’.⁴¹ The growing competition between third world countries to bring in foreign investment has further led to easing of labor standards and a “race to the bottom.”⁴² In the year 2000, nearly 93 developing countries had export processing zones (EPZs), compared with 24 in 1976.⁴³ Women provide up to 80 per cent of labor requirements in EPZs and are the subject of economic and sexual exploitation.⁴⁴ The United Nations Secretary-General himself has pointed to ‘adverse labor conditions as a major factor contributing to the increased feminization of poverty.’⁴⁵ The position of migrant labor in the first world is not very different from that of working classes in deregulated labor markets of the third world. There are increasing restrictions on their rights within European Union and the United States.⁴⁶ Seventh, the concept of jurisdiction is being rendered more complex than ever in the past. Among other things, digital capitalism threatens to make ‘a hash of geopolitical boundaries’ and reduce the ability of third world States to regulate transnational commerce. ⁴⁷ There is, in the era of globalization, an intersection of jurisdictions which gives rise to multiple (or concurrent) and extra-territorial jurisdiction to a far greater extent than before. Where international law does not penetrate national spaces, powerful states put into effect laws that have an extraterritorial effect; third world States have little control over processes initiated without its consent in distant spaces.⁴⁸ There is, therefore, a legitimate fear among third world States of ‘a tyranny of sameness’ or the ‘extension transnationally of the logic of Western governmentality’⁴⁹ The fear is accentuated by the fact that international laws are being increasingly understood in ways that redefine the concept of jurisdiction. Thus, for example, international human rights law is being interpreted to delimit sovereign jurisdiction in diverse manner, as is reflected in

developments ranging from the Pinochet case to armed humanitarian interventions.⁵⁰ While these developments have a progressive dimension they can easily be abused to threaten third world leaders and peoples unless they are willing to accept the dictates of the first world. Eighth, there has been a proliferation of international tribunals that subordinate the role of national legal systems in resolving disputes. These range from international criminal courts to international commercial arbitration to the WTO dispute settlement system (DSS). It is not the greater internationalisation of interpretation and enforcement of rules that is problematic but its differential meaning for, and impact on, third world States and peoples. The neglect of the views and legal systems of societies visited by internal conflict in the setting up of ad hoc international criminal tribunals, even as the United States refuses to ratify the Rome Statute, is an instance of such practices.⁵¹ Take also the differential impact of the WTO DSS. It was accepted in the belief that a rule oriented and compulsory DSS would protect the interests of third world countries. This expectation has been belied because, among other things, the substantive rules themselves are biased in favour of the first world, and have therefore not yielded the expected gains in terms of market access.⁵² Second, the third world countries lack the expertise and the financial resources to make effective use of the DSS. Third, the WTO Appellate Body has interpreted the texts in a manner as to upset the balance of rights and obligations agreed to by third world States. For example, the subject of tradeenvironment interface has received an interpretation that was never envisaged by third world States. With the result that their exports are threatened by unilateral trade measures taken by first world States.⁵³ Ninth, the State is no longer the exclusive participant in the international legal process even though it remains the principal actor in law making. The globalisation process is breaking the historical unity of law and State and creating 'a multitude of decentralized law-making processes in various sectors of civil society, independently of nation-states'.⁵⁴ While this is not entirely an unwelcome development, the "paradigmatic case" of 'global law without the state' is *lex mercatoria*, revealing that the transnational corporate actor is the principal moving force in decentralised law making.⁵⁵ The practices of *lex mercatoria* include standard form contracts, customs of trade, voluntary codes of conduct, private institutions formulating legal rules for adoption, intra firm contracts and the like.⁵⁶ Some of these practices do not raise concerns for third world countries. Others however deserve our attention for several reasons. First, there is the lack of a "public" voice in the emergence of corporate law without a State. Second,

corporations take advantage of their "inner legality" to avoid tax and other liabilities. Thus, for example, intra-firm transactions are used to avoid paying taxes and respecting foreign exchange laws of many a third world country. Third, the internal legal order may be used to, among other things, present a picture of law and human rights observance when the contrary is true. Such is, for example, the case with voluntary codes of conducts that are adopted by transnational corporations.⁵⁷ Tenth, there is the refusal to affirmatively differentiate between States at different stages of the development process. International law today articulates rules that seek to transcend the phenomena of uneven global development and evolve uniform global standards to facilitate the mobility and operation of transnational capital. There is no longer space for recognizing the concerns of States and peoples subjected to long colonial rule. Poor and rich states are to be treated alike in the new century and the principle of special and differential treatment is to be slowly but surely discarded. Equality rather than difference is the prescribed norm. The prescription of uniform global standards in areas like intellectual property rights has meant that the third world State has lost the authority to devise technology and health policies suited to its existential conditions. But since capital now resides everywhere, it abhors difference, and globalised international plays along.⁵⁸ Eleventh, the relationship between the State and the United Nations is being reconstituted. There is the trend to turn to the transnational corporate actor for financing the organization. The corporate actor also has come to play a greater role within different UN bodies.⁵⁹ Its growing influence and linkages is being used by the corporate actor to legitimize its less than wholesome activities. As Onyango and Udigama warn, 'a danger exists of such linkages being exploited by the latter, while only paying lipservice to the ideals and principles for which the United Nations was created and to which it continues to be devoted. Moreover, because the actors who are being linked up with have considerably more financial and political clout, there is a danger that the United Nations will come out the loser'.⁶⁰ What may be called the *privatization of the United Nations system* reduces, among other things, the possibility of the organization being at the center of collective action by third world countries. In sum, the meaning of the reconstitution of the relationship between State and international law is the creation of fertile conditions for the global operation of capital and the promotion, extension and protection of internationalised property rights. There has emerged a transnational ruling elite, with the ruling elite of the third world playing a junior role, which guides this process. It is seeking to create a global system of governance suited to the needs of transnational capital

but to the disadvantage of third world peoples. The entire ongoing process of redefinition of State sovereignty is being justified through the ideological apparatuses of Northern States and international institutions it controls. Even the language of human rights has been mobilised towards this end. If this trend has to be reversed in terms of equity and justice, the battle for the minds of the third world decision-makers and peoples has to be won. In brief, the changing constellation of power, knowledge and international law needs to be urgently grasped if the third world peoples have to resist recolonisation.

3. Ideology, Force, and International Law

There is the old idea, which has withstood the passage of time, that dominant social forces in society maintain their domination not through the use of force but through having their worldview accepted as natural by those over whom domination is exercised. Force is only used when absolutely necessary, either to subdue a challenge or to demoralize those social forces aspiring to question the “natural” order of things. The language of law has always played, in this scheme of things, a significant role in legitimizing dominant ideas for its discourse tends to be associated with rationality, neutrality, objectivity and justice. International law is no exception to this rule. It legitimizes and translates a certain set of dominant ideas into rules and thus places meaning in the service of power. International law, in other words, represents a *culture* that constitutes the matrix in which global problems are approached, analyzed and resolved. This culture is shaped and framed by the dominant ideas of the time. Today, these ideas include a particular understanding of the idea of “global governance” and accompanying conceptions of state, development (or non-development) and rights. The process through which the culture of international law is shaped is a multifarious one. Academic institutions of the North, with their prestige and power, play a key role in it. These institutions, in association with State agencies, greatly influence the global agenda of research.⁶¹ Third world students of international law tend to take their cue from books and journals published in the North. From reading these they make up their minds as to what is worth doing and what is not? Who are good scholars and who are bad, or, which is the same, what are the standards by which scholarship is to be assessed? It is therefore important that third world international lawyers refuse to unquestioningly reproduce scholarship that is suspect from the standpoint of the interests of third world peoples. Progressive scholars in particular need to be careful. For, ‘cultural imperialism (American or otherwise) never imposes itself better than when it is served by progressive intellectuals (or by ‘intellectuals of color’

in the case of racial inequality) who would appear to be above suspicion of promoting the hegemonic interests of a country [and one may add system] against which they wield the weapons of social criticism’.⁶² International institutions also play an important role in sustaining a particular culture of international law. These institutions ‘ideologically legitimate the norms of the world order’, co-opt the elite from peripheral countries, and absorb counter-hegemonic ideas.⁶³ International institutions also actively frame issues for collective debate in manner which brings the normative framework into alignment with the interests of dominant States. This is also done through the exercise of authority to evaluate the policies of member States.⁶⁴ The knowledge production and dissemination functions of international institutions are, in other words, steered by the dominant coalition of social forces and States to legitimize their vision of world order. Only an oppositional coalition can evolve counter-discourses which deconstruct and challenge the hegemonic vision. The alternative vision needs to respond to the individual elements that constitute hegemonic discourse.

3.1. *The Idea of Good Governance*

Today, globalising international law, overlooking its history, and abandoning the principle of differential treatment, legitimizes itself through the language of blame. The North seeks to occupy the moral high ground through representing the third world peoples, in particular African peoples, as incapable of governing themselves and thereby hoping to rehabilitate the idea of imperialism.⁶⁵ The inability to govern is projected as the root cause of frequent internal conflicts and the accompanying violation of human rights necessitating humanitarian assistance and intervention by the North. It is therefore worth reminding ourselves that colonialism was justified on the basis of humanitarian arguments (the civilizing mission). It is no different today.⁶⁶ The contemporary discourse on humanitarianism not only seeks to retrospectively justify colonialism but also to legitimize increasing intrusiveness of the present era.⁶⁷ Indeed, as we have observed elsewhere, ‘humanitarianism is *the* ideology of hegemonic states in the era of globalization marked by the end of the Cold War and a growing North- South divide.’⁶⁸ Overlooked in the process is the role played by international economic and political structures and institutions in perpetuating the dependency of third world peoples and in generating conflict within them.

3.2. *Human Rights as Panacea*

The idea of humanitarianism is framed by the discourse of human rights. Its globalization is a function of the belief that the realm of rights, albeit a particular vision of rights, offer a cure for nearly all

ills which afflict third world countries and explains the recommendation of the mantra of human rights to post-conflict societies.⁶⁹ Few would deny that the globalization of human rights does offer an important basis for advancing the cause of the poor and the marginal in third world countries. Even the focus on civil and political rights is helpful in the struggle against the harmful policies of the State and international institutions. There is a certain dialectic between civil and political rights and democratic practice that can be denied at our own peril. But it is equally true that the focus allows the pursuit of the neo-liberal agenda by privileging private rights over social and economic rights. Thus, for example, the preamble to the TRIPs text baldly states that ‘intellectual property rights are private rights’. It does not, on the other hand, talk of the right to health of individuals or peoples;⁷⁰ indeed, the Doha declaration on the TRIPs agreement and public health had to be insisted upon for this very reason.⁷¹ The argument here is not rooted in ‘an excessively narrow, proprietary conception of rights’,⁷² but rather on the continuous failure to realize welfare rights. It is this failure that gives rise to the belief that the language of civil and political rights mystifies power relations and entrenches private rights. This belief is strengthened by the fact that official international human rights discourse eschews any discussion of the accountability of international institutions such as the IMF/ World Bank combine or the WTO which promote policies with grave implications for both the civil and political rights as well as the social and economic rights of the poor. Finally, there are the wages of taking civil and political rights too seriously. There is ‘the violence that underpins the desire of rights’, of realizing rights at any cost.⁷³ Wars and interventions are unleashed in its name.

3.3. *Salvation Through Internationalisation of Property Rights*

In recent years, a particular form of State (the neo-liberal State) has come to be touted as its only sensible and rational form. It has been the ground for justifying the erosion of sovereignty through relocating it in international institutions. What this has permitted is the privatization and internationalization of collective national property. In order to understand the on going process, the State needs to be understood in two different ways. First, ‘states are clearly institutions of territorial property’.⁷⁴ As Hont explains, ‘holding territory is a question of property rights, and states, including ‘nation-states’, are owners of collective property in land . . .’⁷⁵ It explains why third world diplomacy has, through various resolutions relating to “natural resources”, emphasized ‘the function of sovereignty as a demarcation of property rights within international

society’.⁷⁶ This has begun to change under the ideological onslaught which declares that the internationalization of property rights is the surest way to bring welfare to third world peoples. The idea of sustainable development has also been deployed towards this end. Second, the State is to be understood ‘as a social form, a form of social relations’.⁷⁷ It allows the debunking of the concept of “national interest” and the insight that the third world ruling elite is actively collaborating with its first world counterparts in entrenching the process of privatization and internationalization of property rights in its own interest. This process is legitimised through the ideological discrediting of all other forms of State. Such thinking needs to be contested in a bid to safeguard the wealth of third world peoples. The permanent sovereignty over “natural resources” must vest in the people.

3.4. *The Idea of Non-development*

In recent years it has been argued that “development” itself is the trojan horse and that the ideology it embodies is responsible for third world peoples and States being willingly

Drawn into the imperial embrace.⁷⁸ It is suggested that the post-colonial imaginary has been colonised allowing the major organising principle of Western culture, that is ‘the idea of infinite development as possibility, value and cultural goal’ to be implanted in the poor world.⁷⁹ If only the third world countries were to choose nondevelopment (of whatever local variety), its people would be spared much of the misery that they have suffered in the post-colonial era. The general idea here is to displace the aspirations of third world peoples and scale down development to more tolerable levels. This would help avoid the burden of sustainable development from falling on the North and help sustain its high consumption patterns. To be sure, the post colonial era has witnessed the massive violation of human rights of ordinary peoples in the name of development. But it is particular kind of development policies that are responsible for these violations and not development *per se*. It is development through structural adjustment programs or neo-liberal policies that need to be indicted, rather than the aspirations of the people to be able to exercise greater choices and a higher standard of life. The uncritical celebration of all that is non-modern is merely a way of obstructing the development of third world countries. Such celebration also risks romanticising oppressive traditional structures in the third world. It is somehow to be the fate of the poor, the marginal, and the indigenous or tribal peoples to preserve traditional values from destruction, while the elite enjoys the fruits of development, often in the first world. What is perhaps called for is a critical approach that

recognises the discontents spawned by modernity without overlooking its attractions over pre-capitalist societies.⁸⁰ 4.5. *The Use of Force* Powerful States, it is being argued, exercise dominance in the international system through the world of ideas and not through the use of force. But from time to time force is used both to manifest their overwhelming military superiority and to quell the

Possibility of any challenge being mounted to their vision of world order. On such occasions, dominant States do not appear to be constrained by international law norms, be it with regard to the use of force or the minimum respect for international humanitarian laws. The US intervention in Nicaragua and the Gulf War and the NATO intervention in Kosovo are just a few examples of this truth. Thus, peace in the contemporary world is in many ways the function of dominance.

4. The Story of Resistance and International Law

The critique of dominant ideology is necessary if the interests of third world peoples is to be safeguarded. But it has to go hand in hand with a theory of resistance. The critique has to be integrally linked to the struggles of people against unjust and oppressive international laws. Among other things, it has to be recorded and brought to bear upon the international legal process. A proposed theory of resistance has to avoid the pitfalls of *liberal optimism* on the one hand, and *left wing pessimism* on the other. The first view believes that the world is progressively moving towards a just world order. It believes that more law and institutions are steps in this direction, in particular imaginative ways of securing enforcement of agreed norms and principles. The second view completely rejects this narrative of progress. It only sees 'the endlessly repeated play of dominations'.⁸¹ In this view 'humanity installs each of its violences in a system of rules and thus proceeds from domination to domination'.⁸² This understanding is tied to radical rule scepticism: 'Rules are empty in themselves, violent and unfinalized; they are impersonal and can be bent to any purpose'.⁸³ This pessimistic understanding is (couched in the vocabulary of political realism) also shared by the 'back to the future' themes that have emerged in the post cold war era.⁸⁴ There is room here for a third view that hopes to occupy the vast intermediate space between liberal optimism and left wing pessimism. This view does not subscribe either to the facile view that humankind is inevitably and inexorably moving towards a just world order or the idea that resistance to domination is an empty historical act. A key issue from the perspective of a theory of resistance is the question of agency. More specifically, it is about the role of old social movements (OSMs) in ushering in a just world order. Increasingly today, the story of resistance is

coming to be identified with new social movements (NSMs) in the third world.⁸⁵ The NSMs arrived on the scene in the North in the 1970s with a focus on individual issue areas: women's movement, ecology movements, peace movement, gay and lesbian movements etc.⁸⁶ They began to make their presence felt in the South a decade later. The collapse of 'actually existing socialism' and the subsequent marginalization of class based movements led to a marked presence of NSMs. The rapid growth of non-governmental organisations (NGOs) with their ability to reach out through using modern means of

Communication contributed greatly to this presence. The NSMs, generally speaking,

Tend to view with suspicion OSMs with their accent on class based struggles.

The OSMs emerged in the nineteenth century when the working class became sufficiently organised to harbour the ambitions of capturing state power. The key date perhaps is 1848 as the 'revolution in France marked the first time that a proletarian based political group made a serious attempt to achieve political power and legitimise worker's power (legalisation of trade unions, control of the workplace'.⁸⁷ The globalisation process with the increased mobility of capital and the intensification of both inter-state and intra-state international trade has meant 'huge movements' into the global labour force.⁸⁸ According to Harvey, 'the global proletariat is far larger than ever and the imperative for workers of the world to unite is greater than ever'.⁸⁹ There is the growing numbers of unemployed in the North that has been witnessing jobless growth. Of course, '... the bulk of the Reserve Army of capital is located geographically in the peripheries of the system'.⁹⁰ It is made up of the enormous mass of urban unemployed and semi-employed, as also the large mass of rural unemployed.⁹¹ In other words, never before has the slogan of 'workers of the world unite' has meant so much to so many. It is however not entirely surprising that class-based struggles are coming to be neglected by NSMs as the OSMs have failed to reach out to them. The privileging of non-class struggles is also encouraged by the transnational ruling elite for it prevents effective opposition to its neo-liberal policies. After all, global strategies and concentrated power cannot be fought by decentralised means and forms of resistance. In the circumstances, what we need to do is 'to preserve what has been gained from struggles of the 1850-1950 period (both the concrete institutions and the intellectual understanding) and add to it a strong dash of daring new approaches derived from the post-1945 experience'.⁹² It calls for a dialogue between new and old social movements for, as Wallerstein notes, 'all existing movements are in some ghetto'.⁹³ What is required is 'a conscious

effort at empathetic understanding of the other movements, their histories, their priorities, their social bases, their current concerns'.⁹⁴ Their need to be strategic alliances not only in the short but also in the medium term. Of course, there is also the necessity to think about long term goals. On our part, we would like to revisit the idea of socialism. Socialism should not be seen as a fixed ideal or a frozen concept. It should today be perceived as expressing the aspirations of equality and justice of subaltern peoples. *The ideal is to be realised through non-violent means and should exclude all manner of dogmatic thinking and undemocratic practices.* The ideal of *democratic socialism* would be actualised by *way of reform and not revolution and would not exclude reliance on market institutions.* It would be realised through the collective struggles of different oppressed and marginal groups. The identity and role of these groups, as we have noted above, is not fixed in history. New identities of oppression emerge and vie for space with other groups. If this understanding is accepted then we need 'an international political movement capable of bringing together in an appropriate way the multitudinous discontents that derive from the naked exercise of bourgeois power in pursuit of a utopian neoliberalism'.⁹⁵ This calls for 'the creation of organisations, institutions, doctrines, programs, formalised structures, and the like, that work to some common purpose'.⁹⁶ There is, in other words, a need to build a movement that cuts across space and time, involving NSMs and OSMs in every struggle, to form a global opposition force that can challenge those transnational social forces which bolster the regime of capital at the expense of peoples interests. Today, from Seattle to Genoa we are witnessing an upsurge of sentiment against the neo-liberal form of globalisation. New forms of struggle have been invented to mobilise people against the injustices of globalisation. There has been adroit and imaginative use of digital space to create a global public sphere in which the evolving international civil society can register its protest. While the sentiments that are expressed have no unified outlook, and are in fact riddled with contradictions, the significance of the protest cannot be disregarded. If these protests can draw in the OSMs, and the latter respond to it and present a *united* front, there would be much to cheer about. Albeit, in terms of framing a theory of resistance we need to distinguish between those demands that are not so good for third world countries and those that are. Thus, for example, the demand for bringing in labour standards into WTO is inimical to the interests of third world countries as it would be used as a device of protection by the North.⁹⁷ From the standpoint of TWAIL, it is necessary first, to make the story of resistance an integral part of the narration

of international law. There is perhaps a need to experiment with literary and art forms (plays, exhibitions, novels, films) to capture the imagination of those who have just entered the world of international law. Second, we need to strike alliances with other critics of the neo-liberal approach to international law. Thus, for instance, both feminist and third world scholarship address the question of exclusion by international law. There is therefore a possibility of developing coherent and comprehensive alternatives to mainstream Northern scholarship. In other words, we should collaborate with feminist approaches to reconstruct international law to address the concerns of women and other marginal and oppressed groups. Third, we need to study and suggest concrete changes in existing international legal regimes. The articulation of demands would assist the OSMs and NSMs to frame their concerns in a manner as to not do harm to third world peoples.

5. The Road Ahead: Further thoughts on a TWAIL Research Agenda

Identifying the future tasks of TWAIL is severely constrained by the protocols of what are acceptable goals and what is deemed good academic work. It compels the academia to playing a self-fulfilling role as the protocols, in a manner of speaking, shame individual academics into imagining only certain kind of social arrangements. For those who accept the protocols are held up as models of clear thinking. On the other hand, a variety of social and peer pressures are brought to bear on dissenting academics to neutralize their critical energies. Even eminent personalities are unable to be bold and courageous in evaluating contemporary trends and imagining alternative futures. Thus, for instance, Falk writes of the report *Our Global Neighborhood* produced by the Commission of Global Governance: 'Its most serious deficiency was a failure of nerve when it came to addressing the adverse consequences of globalization, a focus that would have put such a commission on a collision course with adherents of the neoliberal economic world picture'.⁹⁸ In contrast, we would urge critical third world scholars to willingly court "irresponsibility" if that is what it takes to boldly critique the present globalization process and project just alternative futures. The commitment to ushering in a just world order has of course to be translated into a concrete research agenda in the world of international law. In addition to the ideological and substantive tasks already identified, we list below *some* subjects that deserve the attention of third world scholars.

5.1. Increasing Transparency and Accountability of International Institutions

International law, we have argued, does not today promote democracy either within States or in

the transnational arena. Those who seek to contest the present state of the relationship between State and international law need to identify the constraints imposed on realizing democracy in the internal and transnational arenas and push forward the global democracy agenda. The steps leading to global democracy will not conform to a neat model. Instead, it will be the result of slowly increasing the transparency and accountability of key actors like States, international institutions and transnational corporations. There is much work that needs to be done in this respect. Thus, for example, a correlative of international institutions possessing legal personality and rights is *responsibility*. It is 'a general principle of international law' concerned with 'the incidence and consequences of illegal acts', in particular the payment of compensation for loss caused.⁹⁹ There is a need to elaborate this understanding and develop the law (either in the form of a declaration or convention) on the subject of responsibility of international institutions. This would allow powerful institutions such as the IMF, World Bank and WTO to be made accountable, among others, to the global poor.¹⁰⁰ Towards this end, there is also an urgent need to democratize decisionmaking within international institutions such as the IMF and the World Bank for they have come to exercise unprecedented influence on the lives of ordinary people in the third world.¹⁰¹ This calls for solutions that temper the desire for change with a strong dose of realism.

5.2. *Increasing Accountability of Transnational Corporations*

There are several steps that can be taken to make the transnational corporations (TNCs) responsible in international law. The steps could include: (i) adoption of the draft United Nations code of conduct on TNCs; (ii) the assertion of consumer sovereignty manifesting itself in the boycott of goods of those TNCs that do not abide by minimum human rights standards; (iii) monitoring of voluntary codes of conduct adopted by TNCs in the hope of improving their public image; (iv) the use of shareholders rights to draw attention to the needs of equity and justice in TNC operations; (v) the imaginative use of domestic legal systems to expose the oppressive practices of TNCs; and (vi) critique of bodies like the International Chambers of Commerce for pursuing the interests of TNCs to the neglect of the concerns of ordinary citizens.¹⁰² All these measures call for the critical intervention of international law scholarship.

5.3. *Conceptualizing Permanent Sovereignty as Right of Peoples and not States*

Research needs to be directed towards translating the principle of permanent sovereignty over "natural resources" into a set of legal concepts

which embed the interests of third world peoples, as opposed to its ruling elite. In the past, the Program and Declaration of action for a New International Economic Order and the Charter of that the State is, in terms of international demarcation of territories, an institution of collective property, the ultimate control over this property is to vest with people. From this perspective, there is a need to address the difficult question of how to give legal content to peoples sovereign rights? There is often in this respect the absence of appropriate legal categories and are difficult to implement in practice. Thus, for example, Article 8(j) of the Convention on Bio-Diversity calls for empowering local communities.¹⁰³ Yet it has not easy to implement the provision given the absence of clarity about the legal definition of local communities.

5.4. *Making Effective Use of Language of Rights*

There is the need to make effective use of the language of human rights to defend the interests of the poor and marginal groups. The recent resolutions passed by different human rights bodies drawing attention to the problematic aspects of international economic regimes offers the potential to win concessions from the State and the corporate sector.¹⁰⁴ The implications of these resolutions need to be analysed in depth and brought to bear on the international and national legal process. A second related task is to expose the hypocrisy of the first world with respect to the observance of international human rights law and international humanitarian laws.

5.5. *Injecting Peoples Interests in Non Territorialised Legal Orders*

From the standpoint of the development of international law, the emergence of global law without the State is both empowering and worrisome. The trend needs to be analysed from a peoples perspective. The process is empowering in as much as it can be used by progressive OSMs and NSMs to project an alternative vision of world order through the production of appropriate international law texts. Much work needs to be done in this direction. At the same time, there is a need to explore 'the tension between the *geocentric* legality of the nation-state and the new *egocentric* legality of private international economic agents' in order to ensure that the interest of third world peoples are not sacrificed.¹⁰⁵

5.6. *Protect Monetary Sovereignty Through International Law*

A great deal of research needs to be directed towards finding ways and means to protecting the monetary sovereignty of third world countries. Third world States are presently doing so *inter alia* through the creation of capital controls (e.g., Malaysia after 1997), tax on financial transactions (Chile), prescription of a fixed period of stay

Before departure, a regional monetary fund etc. But there is a need for a new financial architecture that more readily responds to the anxieties of third world States and peoples. This calls for the informed intervention of international law. But the role of the international financial market and institutions in eroding the monetary sovereignty of third world countries is little understood even today. Indeed, few areas cry out for more attention than international monetary and financial law. This situation needs to be immediately corrected.

5.7. *Ensuring Sustainable Development With Equity*

There is an urgent need to shape an integrated response to global environmental problems. In this context, 'the whole question of constructing an alternative mode of production, exchange, and consumption that is risk reducing and environmentally as well as socially just and sensitive can be posed'.¹⁰⁶ From an international law perspective, the empty concept of sustainable development needs to be filled with legal content that does not stymie the development of the third world countries.¹⁰⁷ At the moment, the North is exploiting all forums to avoid what Jameson calls the "terror of loss."¹⁰⁸ It explains, for example, the approach of the Bush administration to the Kyoto protocol. In other words, there is a need to ensure that the burden of realising the goal of sustainable development is not shifted to the poor world or used as a tool of protection.

5.8. *Promoting the Mobility of Human Bodies*

While capital and services have become increasingly mobile in the era of globalization, labor has been spatially confined. More significantly, in the realm of forced (as opposed to voluntary) migration the first world has, through a series of legal and administrative measures, undermined the institution of asylum established after the second world war. The post Cold War era has seen a whole host of restrictive practices which prevent refugees fleeing the underdeveloped world from arriving in the North.¹⁰⁹ A sustained critique of these practices is called for. It will, among other things, prevent the first world from occupying the moral high ground.

6. Conclusion

International law has always served the interests of dominant social forces and States in international relations. However, domination, history testifies, can coexist with varying degrees of autonomy for dominated States. The colonial period saw the complete and open negation of the autonomy of the colonized countries. In the era of globalization, the reality of dominance is best conceptualized as a more stealthy, complex and cumulative process. A growing assemblage of international laws, institutions and practices coalesce to erode the independence of third world countries in favor of transnational capital

and powerful States. The ruling elite of the third world, on the other hand, has been unable and/or unwilling to devise, deploy, and sustain effective political and legal strategies to protect the interests of third world peoples. Yet, we need to guard against the trap of legal nihilism through indulging in a general and complete condemnation of contemporary international law. Certainly, only a comprehensive and sustained critique of present-day international law can dispel the illusion that it is an instrument for establishing a just world order. But it needs to be recognized that *contemporary* international law also offers a protective shield, however fragile, to the less powerful States in the international system. Second, a critique that is not followed by construction amounts to an empty gesture. Imaginative solutions are called for in the world of international law and institutions if the lives of the poor and marginal groups in the third and first worlds are to be improved. It *inter alia* calls for exploiting the contradictions that mark the international legal system. The economic and political interests of the transnational elite are today not directly translatable into international legal rules. There is the need to sustain the illusion of progress and maintain the inner coherence of the international legal system. Furthermore, individual legal regimes have to offer some concessions to poor and marginal groups in order to limit resistance to them both in the third world and, in the face of an evolving global consciousness, in the first world. The contradictions which mark contemporary international law is perhaps best manifested in the field of international human rights.

Law which even as it legitimizes the internationalization of property rights and hegemonic interventions, codifies a range of civil, political, social, cultural and economic rights which can be invoked on behalf of the poor and the marginal groups. It holds out the hope that the international legal process can be used to bring a modicum of welfare to long suffering peoples of the third and first worlds.

* I would like to thank Antony Anghie for his comments on an earlier draft of the paper. The usual caveat applies. First published in: Antony Anghie, Bhupinder Chimni, Karin Mickelson and Obiora Okafor (Eds), *International Community Law Review* 8: 3–27, 2006. 3 ©2006 Koninklijke Brill NV. Printed in the Netherlands. The Third World and International Order: Law, Politics and Globalization (Martinus Nijhoff Publishers, 2003).

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- 1 The word "recolonisation" is being *inter alia* used to indicate first, the reconstitution of the relationship between State and international law so as to undermine the autonomy of third world States and to the disadvantage of its peoples.

- Second, the expansion of *international* property rights which are to be enforced by third world States without possessing the authority to undertake the task of redistribution of incomes and resources. Third, the relocation of sovereign economic powers in international trade and financial institutions. Fourth, the inability of third world states to resist the overwhelming ideological and military dominance of the first world.
- 2 See UNDP, Human Development Report (1999).
 - 3 We adopt here the definition of domination offered by Thompson: "We can speak of 'domination' when established relations of power are 'systematically asymmetrical', that is, when particular agents or groups of agents are endowed with power in a durable way which excludes, and to some significant degree remains inaccessible to, other agents or groups of agents, irrespective of the basis upon which such exclusion is carried out." See J. Thompson, *Ideology and Modern Culture*, in *The Polity Reader in Social Theory* (1994), 133 at 136.
 - 4 Our political referents "third world" or "third world peoples" is "not there in some primordial, naturalistic sense" or "reflect a unitary or homogeneous political object". See H. Bhabha, *The Location of Culture*, at 26 (1994). There is the class and gender divides, among others, to be reckoned with.
 - 5 See J. Ravenhill, *The North-South Balance of Power*, 66:4 *International Affairs* 731 (1990). See also M. Berger, *The End of the 'Third World'*, 15:2 *Third World Quarterly*, 257-275 (1994).
 - 6 See S.N. Macfarlane, *Taking Stock: The Third World and the End of the Cold War*, in L. Fawcett and Y. Sayigh (Eds.), *The Third World Beyond the Cold War: Continuity and Change* 15, at 21 (1999). 7 *Id.*
 - 10 The principle has been replaced in different legal regimes by the idea of transitional periods or its extension to least developed countries. Where special and differential treatment has been granted to all third world countries the obligation has been cast in soft law language.
 - 11 See N. Harris, *The End of the Third World: Newly Industrializing Countries and the Decline of an Ideology* (1987).
 - 12 See *Development* in P. Worsley (Ed.), *The New Introducing Sociology* 2 (1987).
 - 13 See C. Graham, *Comparative Sociological and Social Theory: Beyond the Three Worlds* 8 (1997).
 - 14 In 1955 an Asian African Conference was held in Bandung in Indonesia. "The importance of Bandung was that for the first time a group of former colonial territories [29 States attended] had met together without any of the European powers, and all those taking part . . . this was an assertion of their independence." See P. Willets, *The Non-Aligned Movement: Origins of a Third World Alliance* 3 (1978). Later came the non-aligned movement which had its roots in Bandung.
 - 15 See A. Samir, *The Social Movements in the Periphery: An End to National Liberation*, in S. Amin et al. (Eds.), *Transforming the Revolution: Social Movements and the World-System* 96, at (1990).
 - 16 See P. James and V. Steve, *The Decline of Revolutionary Politics: Capitalist Detour and the Return of Socialism*, 24 *Journal of Contemporary Asia* 1, at 1 (1994). Is it just accidental that a year later, France, Britain, and Israel attempted to overthrow Nasser through the 1956 aggression. The true hatred that the West had for the radical third world leaders of the 1960s, Nasser in Egypt, Sukarno in Indonesia, Nkrumah in Ghana, Modibo Keita in Mali, almost all overthrown at about the same time (1965-1968), a period which also saw the Israeli aggression of June 1967, shows that the political vision of Bandung was not accepted by imperialist capital. It was thus a politically weakened nonaligned camp that had to face the global economic crisis after 1970-71. The West's absolute refusal to accept the proposal for a New International Economic Order shows that there was a real logic linking the political dimension and the economic dimension of the Afro-Asian attempt crystallised after Bandung. 158 See R.B.J. Walker, *Space/Time/Sovereignty*, in M.E. Denham and M.O. Lombardi (Eds.), *Perspectives on Third World Sovereignty: The Postmodern Paradox* 13, at 15 (1996).
 - 9 See P. Worsley, *The Three Worlds: Culture and World Development* 306 (1984). THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 7
 - 17 See B. Jones, *The World Upside Down? Globalisation and the Future of the State* 4 (2000), Camoy, Martin and Castells, Manuel, *Globalisation, the Knowledge Society, and the Network State: Poulantzas at the Millennium*, 1 *Global Networks* 1, at 5 (2001).
 - 18 *Id.*, at 63. 19 See F. Braudel, *Civilization and Capitalism 15th-18th Century*, Vol. II, 513 (1979). 8 B.S. CHIMNI 20 See T. Franck, *The Emerging Right to Democratic Governance*, 86 *American Journal of International Law* 46, at 46 (1992).
 - 21 See J. Crawford and M. Marks, *The Global Democracy Deficit: an Essay in International Law and its Limits*, in D. Archibugi et al. (Eds.) *Re-imagining Political Community: Studies in Cosmopolitan Democracy* 72-90, at 80 (1998).
 - 22 With respect to the WTO two points need to be made as regards the "voluntary" nature of the obligations undertaken under the Final Act of the Uruguay Round of Trade Negotiations. First, the negotiations leading to the adoption of the agreements constituting the Final Act lacked transparency and the practice of green room consultations left a large number of third world countries effectively out of the negotiations. Second, the entire set of agreements were offered as a single undertaking. Therefore, States could not choose the agreements it wished to accept. This was justified on the ground that the Final Act represented a package deal that would unravel if the pick and choose policy were permitted. However, it is now clear that the third world countries gained little from the Uruguay Round agreements undermining the legitimacy of the single undertaking practice. It explains the launch of the Doha round of trade negotiations as a development round. So far as the system of conditionalities recommended by international financial institutions is concerned their acceptance is voluntary in the most tenuous sense. For the fact of the matter is that third world countries have little choice but to abide by them.
 - 23 *Id.*, at 85. That is, until their absence manifests itself in internal or international wars, and the gross violation of human rights which accompany them, when international law is brought back in to reconstruct formal democracy. THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 9
 - 24 See J. Braithwaite and P. Drahos, *Global Business Regulation* Cambridge: Cambridge 63 (2000). For the text of the Agreement on TRIPS, see WTO The Results of the

- Final Act of the Uruguay Round of Multilateral Trade Negotiations Geneva 365 (1994).
- 25 A whole host of international laws seek to free transnational capital of spatial and temporal constraints. This has been achieved, or is in the process of being achieved, first, through hundreds of bilateral investment protection treaties between the industrialized and third world countries. By 1999, 1857 BITS were concluded (up from 165 at the end of the seventies and 385 at the end of eighties), a predominant number of which were concluded between the industrialized world and the third world countries, see UNCTAD, *Bilateral Investment Treaties 1959 to 1999* 1 (2000). Second, the Agreement on Trade Related Investment Measures took a number of measures in this direction viz. local content and balancing requirements cannot be imposed on foreign capital. For the text of the agreement see WTO, *The Results of the Final Act of the Uruguay Round of Multilateral Trade Negotiations* (1994). Third, there are soft law texts such as the World Bank Guidelines on Foreign Investment (1992), which recommend that constraints on the entry and operation of transnational capital be limited. (For text see UNCTAD, *International Investment Instruments: A Compendium vol. I – Multilateral Instruments* 247 (1996). Fourth, there is the proposed negotiation of a multilateral agreement on investment on the agenda of Doha round of trade negotiations. See WTO, WT/MIN (01)/DEC/W/1, 14 November 2001 – Ministerial Conference, Fourth Session, Doha, 9–14 November 2001: Ministerial Declaration. Fifth, a Multilateral Investment Guarantee Agency (MIGA) has been established under the auspices of the World Bank to insure foreign capital against non commercial risks. (For the text of the agreement establishing MIGA see UNCTAD, (1996), at 213). Sixth, there is the September 1997 statement of the IMF Interim Committee endorsing a move towards capital account convertibility despite all evidence showing the grave consequences for the economies embracing it. This is in contrast with original obligations contained in the 1944 Articles of Agreement which called for the “avoidance of restrictions on payments for current transactions” see J. Bhagwati, *The Capital Myth*, *Foreign Affairs* 7 (May/June 1998). Finally, mention needs to be made of the fact that the Draft Code of Conduct on Transnational Corporations which imposed certain duties – respect for host country goals, transparency, respect for environment etc. – has been abandoned (for the text see UNCTAD, (1996), *above* at 161. And the UN Centre for Transnational Corporations which was bringing some transparency to the functioning of TNCs was shut down in 1993.
- 26 For ‘as industrial countries developed, global private rights were granted to polluters; now, developing countries are asked to agree to a redistribution of those property rights without compensation for already depleted resources’, see P. Uimonen and J. Whalley, *Environmental Issues in the New Trading System* 66 (1997).
- 27 See Uimonen and Whalley, *id.* See also B.S. Chimni, *WTO and Environment: The Shrimp-Turtle and EC-Hormone Cases*, *Economic and Political Weekly* 1752–1762 (May 13, 2000), *WTO and Environment: Legitimization of Unilateral Trade Sanctions*, *Economic and Political Weekly* 133–140 (January 12–18, 2002).
- 28 See G. Teeple, *Globalization as the Triumph of Capitalism: Private property, Economic Justice and the New World Order*, in T. Schrecker (Ed.), *Surviving Globalism: The Social and Environmental Challenges* 15–38, at 15 (1997).
- 10 B.S. CHIMNI
- 29 See D. Campbell and S. Picciotto, *Exploring the Interaction Between Law and Economics: the Limits of Formalism*, 18 *Legal Studies* 249–278, at 265 (1998).
- 30 See B.S. Chimni, (2000) and (2002), *supra* note 27.
- 31 See B.M. Hoekman and M. Kostecki, *The Political Economy of the World Trading System: from GATT to WTO* 174 (1995).
- 32 See B.S. Chimni, *International Commodity Agreements: A Legal Study* (1987), *Marxism and International Law: A Contemporary Analysis*, *Economic and Political Weekly* 337–349, at 341 (February 6, 1999).
- 33 See B. Cohen, *Money in a Globalized World*, in N. Woods (Ed.), *The Political Economy of Globalization* 77, at 84 (2000).
- 34 See C. Raghavan, *GATS may result in Irreversible Capital Account Liberalization* (2002), online <<http://www.twinside.org.sg/>>: that monetary relations can be used coercively like all other economic instruments should come as no surprise. According to Kirshner: “monetary power is remarkably efficient component of state power . . . the most potent instrument of economic coercion available to states in a position to exercise it” (cited by Cohen, *supra* note 33, at 87). It is the coercive element that concerns third world states and distinguishes their situation from the relinquishment of monetary sovereignty by States of the European Union (EU). For the text of GATS see WTO 1994: 325.
- 35 See Bagwati, *supra* note 25, at 7–12. THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 11
- 36 See C. Douzinas, *The End of Human Rights: Critical Legal Thought At the Turn of the Century* 1 (2000).
- 37 See G. Teubner, *The King’s Many Bodies: The Self-Destruction of Law’s Hierarchy*, 31 *Law and Society Review* 763, at 770 (1997).
- 38 See R.A. Wilson, *Introduction* in R.A. Wilson (Ed.), *Human Rights, Culture and Context: Anthropological Perspectives* 1 (1997).
- 39 See B.S. Chimni, *International Law and World Order: A Critique of Contemporary Approaches* 291 (1993).
- 40 See A. Orford, *Locating the International: Military and Monetary Interventions after the Cold War*, 38 *Harvard International Law Journal* 443– 485 (1997). See also OAU Report of the International Panel of Eminent Personalities asked to Investigate the 1994 Genocide in Rwanda and the Surrounding Events (2000), online: <<http://www.oau-oua.org/Document/ipep/ipep.htm>>.
- 41 L.L. Lim, *More and Better Jobs for Women: An Action Guide*, Geneva: ILO 19–20.
- 42 See J. Oloka-Onyango and D. Udigama, *The Realization of Economic, Social and Cultural Rights: Globalization and its Impact on the Full Enjoyment of Human Rights Rights*, E/CN.4/Sub.2/2000/13, 15 June 2000, Sub-Commission on the Promotion and Protection of Human Rights, Fifty-Second session, para 34.
- 43 *Id.*, para 35.
- 44 *Id.*, para 35.
- 12 B.S. CHIMNI
- 45 *Id.*, para 39.
- 46 *Id.*, para 28.
- 47 See D. Schiller, *Digital Capitalism: Networking the Global Market System* 72 (1999).
- 48 See M. Shaw, *International Law*, 3 ed. (1997) and B. Chimni, (2002), *supra* note 27.

- 49 See J. Weiner, Globalisation and the Harmonisation of Law 195 and 188 (1999).
- 50 See B.S. Chimni, *The International Law of Humanitarian 103 Intervention*, in State Sovereignty in the 21st Century 103–132 (2001, New Delhi: Institute for Defense Studies and Analyses).
- 51 See B. Rajagopal, *The Pragmatics of Prosecuting the Khmer Rouge*, *Yearbook of International Humanitarian Law*, Vol. 1, 189–204 (1998) and *From Resistance to Renewal: The Third World, Social Movements, and the Expansion of International Institutions*, 41 *Harvard International Law Journal* 531–578 (2000). THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 13
- 52 See UN A/CONF. 198/3, 1 March 2002: Monterrey Consensus on Financing for Development, paras 26–38 UNGA (2001) A/CONF. 191/12, 2 July 200: Brussels Declaration on Least Developed Countries para 6.
- 53 See B.S. Chimni, *supra* note 27. On problems relating to international commercial arbitration see
- M. Sornarajah, *The Climate of International Arbitration*, 8:2 *Journal of International Arbitration* 47–86, at 79 (1991) and *Power and Justice in Foreign Investment Arbitration*, 14 *Journal of International Arbitration* 103–140, at 103 (1997).
- 54 See Teunber *supra* note 37, at xiii.
- 55 *Id.*, at 3 and 8.
- 56 In response to criticism that *lex mercatoria* is still dependent on the sanctions of national courts, Teunber writes that ‘it is the phenomenological world construction within a discourse that determine the globality of the discourse, and not the fact that the source of use of force is local’. See Teunber, *supra* note 37, at 13.
- 57 Global laws without the State are, more generally, ‘sites of conflict and contestation, involving the renegotiation and redefinition of the boundaries between, and indeed the nature and forms, of the state, the market, and the firm’. See S. Picciotto and J. Haines, *Regulating Global Financial Markets*, 26:3 *Journal of Law and Society* 351–368, at 360 (1999). Thus, for example the work of the Basle Committee has been crucial in regulating the liquidity and solvency of banks in individual jurisdictions in the United States and the European Union; see J. Wiener, Globalisation and the Harmonisation of Law, Chapter 3 (1999). The work of the Committee led to legislation (the Foreign Bank Supervision Enhancement Act of 1991) being enacted by the US to incorporate the guidelines suggested by it and which may lead to the exclusion of third world banks from operating there.14
- B.S. CHIMNI
- 58 The meaning of the Doha Declaration on the TRIPS Agreement and Public Health adopted on
- 14 November, 2001 is far from clear. See WTO, WT/MIN (01)/DEC/W/2, 14 November 2001 – Ministerial Conference, Fourth Session, Doha, 9–14 November 2001: Declaration on the TRIPS Agreement and Public Health (2001). Albeit, there is clear recognition that the TRIPS Agreement ignores its impact on public health.
- 59 See B.S. Chimni, *Marxism and International Law: A Contemporary Analysis*, *Economic and Political Weekly* 337–349 (February 6, 1999).
- 60 See J. Oloka-Onyango and D. Udigama, The Realization of Economic, Social and Cultural Rights: Globalization and its Impact on the Full Enjoyment of Human Rights Rights E/CN.4/Sub.2/2000/13, 15 June 2000, Sub-Commission on the Promotion and Protection of Human Rights, Fifty-Second session (1999). THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 15
- 61 Thus, it is well pointed out, ‘the ideas about international law popular at a given moment in some countries are more influential than those popular in others simply because some countries are more powerful; money, access to institutional resources, relationships to underlying patterns of hegemony, and influence – is central to the chance that a given idea will become influential or dominant within the international law profession.’ See D. Kennedy, *What is New Thinking in International Law?*, *ASIL Proceedings of the 94th Annual Meeting*, 104–125, at 121 (April 5–6, 2000).
- 62 See P. Bourdieu and L. Wacquant, *On the Cunning of Imperial Reason*, 16 *Theory, Culture & Society* 41–58, at 51 (1999).
- 16 B.S. CHIMNI
- 63 See R.W. Cox, *Gramsci, Hegemony and International Relations: An Essay in Method*, in S. Gill (Ed.), *Gramsci, Historical Materialism and International Relations* 49–66 (1993).
- 64 See B.S. Chimni, *Marxism and International Law: A Contemporary Analysis*, *Economic and Political Weekly* 337–349 (February 6, 1999).
- 65 See F. Furedi, *The Moral Condemnation of the South*, in C. Thomas and P. Wilkins (Eds.), *Globalization and the South* 76–89, at 79 (1997).
- 66 See A. Anghie, *Universality and the Concept of Governance in International Law*, in E.K. Quashigah and O.C. Okafor (Eds.), *Legitimate Governance in Africa* 21–40, at 25 (1999) and J. Gathii, *Good Governance as a Counter-Insurgency Agenda to Oppositional and Transformative Social Projects in International Law*, 5 *Buffalo Human Rights Law Review* 107–177, at 107 (1999).
- 67 *Id.*, at 78.
- 68 See B.S. Chimni (2000), *supra* note 27, at 244. THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 17
- 69 See B. Chimni, *Post-conflict Peace Building and the Repatriation and Return of Refugees: Concepts, Practices and Institutions* (forthcoming in 2002).
- 70 Even when the question of health is mentioned, as in article 8 of the TRIPs text, it is subject to the rights of the patent holders.
- 71 For the text of the declaration see WTO, WT/MIN (01)/DEC/W/2, 14 November 2001 – Ministerial Conference, Fourth Session, Doha, 9–14 November 2001: Declaration on the TRIPS Agreement and Public Health. (2001).
- 72 See K. Baynes, *Rights as Critique and the Critique of Rights: Karl Marx, Wendy Brown, and the Social Function of Rights*, 28 *Political Theory* 451–468 (2000).
- 73 See C. Douzinas, *The End of Human Rights: Critical Legal Thought At the Turn of the Century* 315 (2000).
- 74 See I. Hont, *The Permanent Crisis of a Divided Mankind: ‘Contemporary Crisis of the Nation State’ in Historical Perspective*, in J. Dunn (Ed.), *Contemporary Crisis of the Nation State?* 166–231 (1995).
- 18 B.S. CHIMNI
- 75 *Id.*, at 173.
- 76 See D.L. Blaney and N. Inayatullah, *The Third World and a Problem with Borders*, in Mark E. Denham and Mark Owen Lombardi (Eds.), *Perspectives on Third World Sovereignty: The Postmodern Paradox* 83–102, at 91 (1996), and N. Schrijver, *Sovereignty over Natural Resources: Balancing Rights and Duties* (1997).

- 77 J. Holloway, *Global Capital and the National State*, in Werner Bonefeld and J. Holloway, (Eds.), *Global Capital, National State and the Politics of Money* 116–141 (1995) and R. Palan, J. Abbott, and P. Deans, *State Strategies in the Global Political Economy* 43 (1999).
- 78 See A. Escobar, *Anthropology and Development*, 154 *International Social Science Journal* 497–515, at 497 (1997).
- 79 See J. Tomlinson, *Cultural Imperialism: A Critical Introduction* 156 and 163 (1991). THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 19
- 80 *Id.*, at 144.
- 81 See M. Foucault, *Nietzsche, Genealogy, History*, in Paul Rabinow (Ed.), *The Foucault Reader* 76–100, at 85 (1984).
- 82 *Id.*, at 86.
- 83 *Id.*
- 84 See J. George, 'Back to the Future'?, in Greg Fry and Jacinta O'Hagan (Eds.), *Contending Images of World Politics* 33–48 (2000). 20 B.S. CHIMNI
- 85 See B. Rajagopal, *From Resistance to Renewal: The Third World, Social Movements, and the Expansion of International Institutions*, 41 *Harvard International Law Journal* 531–578 (2000).
- 86 See I. Wallerstein, *Antisystemic Movements: History and Dilemmas*, in S. Amin, et al. (Eds.), *G. Transforming the Revolution: Social Movements and the World-System* 13–54, at 41 (1990).
- 87 *Id.*, at 16.
- 88 See D. Harvey, *Spaces of Hope* 42 (2000). And China is not alone in this. The export-oriented garment industry of Bangladesh hardly existed twenty years ago, but it now employs more than a million workers (80 per cent of them women and half of them crowded into Dhaka). Cities like Jakarta, Bangkok, and Bombay, as Seabrook (1996) reports, have become Meccas for formation of a transnational working class –heavily dependent upon women – living under conditions of poverty, violence, chronic environmental degradation, and fierce repression'. See Harvey at 42.
- 89 *Id.*, at 45.
- 90 See Amin, *supra* note 15, at 99.
- 91 *Id.* THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 21
- 92 See Wallestein, *supra* note 86.
- 93 *Id.*, at 53.
- 94 *Id.*, at 52.
- 95 See Harvey, *supra* note 88, at 49.
- 96 *Id.* 22 B.S. CHIMNI
- 97 See S. Gopal, *American Anti-Globalization Movement*, *Economic and Political Weekly*, (August 25, 2001) page 3226–3233.
- 98 See R. Falk, *Global Civil Society and the Democratic Prospect*, in B. Holden (Ed.), *Global Democracy: Key Debates* 62–179, at 170 (2000). THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 23
- 99 See I. Brownlie, *Principles of Public International Law*, 4th ed., 701 and 433 (1990).
- 100 See A. Anghie, *Time Present and Time Past: Globalization, International Financial Institutions and the Third World*, 32:2 *New York University Journal of International Law and Politics* 243–290 (2000).
- 101 To take the case of the IMF, the decision making process in it is based on a system of weighted voting which excludes its principal users, the poor world, from a say in the policy making. The Third World voice is not heard even as the policies of the Fund inflict enormous pain and death on the people who inhabit it. Nearly 4.4 billion people or 78 per cent of the world's 1990 population live in the Third World. Despite constituting an overwhelming majority of the membership the Third World countries as a whole had a voting share of approximately 34 per cent in the IMF in the mid-nineties. See R. Gerster, *Proposals for Voting Reform within the International Monetary Fund*, *Journal of World Trade* 121–133 (1993). Without the OPEC countries (who act as creditor states in the institution) this share is reduced to 24 per cent. 24 B.S. CHIMNI
- 102 See the Irene Report, *Controlling Corporate Wrongs: The Liability of Multinational Corporations: Legal Possibilities, Strategies and Initiatives for Civil Society*, (2000), online: <<http://elj.warwick.ac.uk/global/issue/2000-1/irene.html>> See also J. Madeley, *Big Business Poor Peoples: The Impact of Transnational Corporations on the World's Poor* 169–180 (1999).
- 103 Article 8(j) of the Convention on Biological Diversity, 1982 states: Each Contracting Party shall, as far as possible and as appropriate: (j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices; . . . For the text of the Convention see N. Arif, *International Environmental Law: Basic Documents and SelectReferences* 279 (1996).
- 104 E/CN.4/Sub.2/2000/7, Commission on Human Rights: Sub-Commission on the Promotion and Protection of Human Rights – The Realization of Economic, Social and Cultural Rights: Intellectual Property Rights and Human Rights, 17 August, 2000. Para 3 of the resolution 'reminds all Governments of the primacy of human rights obligations over economic policies and agreements'. THIRD WORLD APPROACHES TO INTERNATIONAL LAW: A MANIFESTO 25
- 105 See J. Robe, *Multinational Enterprises: The Constitution of a Pluralistic Legal Order*, in G. Teubner(Ed.), *Global Law Without a State* 45–79 (1997).
- 106 See Harvey *supra* note 88, at 223.
- 107 See B. Chimni, *Permanent Sovereignty over Natural Resources: Toward a Radical Interpretation*, 38 *Indian Journal of International Law* 208–217, at 216 (1998).
- 108 See M. Hardt and K. Weeks, (Ed.), *The Jameson Reader* 167 (2000). 26 B.S. CHIMNI
- 109 See B. Chimni, *The Geopolitics of Refugee Studies: A View from the South*, 1:4 *Journal of Refugee Studies* 350–374 (1998) and First Harrell-Bond Lecture *Globalization, Humanitarianism and the Erosion of Refugee Protection*, 13:3 *Journal of Refugee Studies* 243–262 (2000).

11/24/2012

Synthesis and characterization of polythiophene with liquid crystalline azobenzene as side chainsSeyed Hossein Hosseini^{1*}, Masoomesh Shirazi Madani², and Seyed Mahdi Musavi³¹Department of Chemistry, Faculty of Science, Islamic Azad University, Islamshahr branch, Tehran-Iran²Department of Chemistry, Faculty of Science and Engineering, Islamic Azad University, Saveh branch, Saveh-Iran³Department of chemistry, faculty of science, Islamic Azad University, Shahr-e-Ray Branch, Tehran, Iran***Corresponding Author:** Seyed Hossein Hosseini, Department of Chemistry, Faculty of Science, Islamic Azad University, Islamshahr branch, Tehran-Iran; Email: shhosseini@iaau.ac.ir, Tel./Fax: +98-21-77312543, (+989121374816).**Abstract:** In this study a series of azobenzene-functionalized liquid crystalline (LC) polythiophene derivatives:

poly{2-[N-ethyl-N-[4-[4-(nitrophenyl)azo]phenyl]amino]ethyl-3-thiophene acetate}, Poly(Th3AA-RedI), poly{2-[N-ethyl-N-[4-[4-(nitrophenyl)azo]-phenyl]amino]ethyl-3-thiophene acetate-co-thiophene}, Poly(Th3AA-RedI-co-Th), poly{2-[N-ethyl-N-[4-[4-(nitrophenyl)azo]-phenyl]amino]ethyl-3-thiophene acetate-co-pyrrole}, Poly(Th3AA-RedI-co-py) were synthesized. Novel 3-substituted thiophene with liquid crystalline side chain (Th3AA-RedI) was synthesized by the direct reaction of thiophene -3-acetic acid with 2-[N-ethyl-N-[4-[4-(nitrophenyl)azo]-phenyl]amino]ethanol (RedI). Chemical polymerization of (Th3AA-RedI), and its copolymerization with thiophene and pyrrole were carried out, by using ferric perchlorate as oxidation agent. The composition, structure and thermal property of these LC polythiophene derivatives were fully characterized by FTIR, ¹H, ¹³C-NMR and UV-Visible spectroscopic methods, and its LC behavior and photoresponsive property were also investigated by polarized optical microscope and differential scanning calorimeter (DSC). The results show that Poly(Th3AA-RedI) exhibited the smecticC (S_c) and nematic (N) liquid crystalline behavior. Conclusion shifted phase transition temperatures of the poly(Th3AA-RedI) in the heating process are as follows: C→S_c (108°C), S_c→N (200°C) and N→I (261°C). Electrical conductivity of polymer [poly(Th3AA-RedI)] and of two its copolymers [poly(Th3AA-RedI-co-Th) and poly(Th3AA-RedI-co-Py)] , has been studied by four probe methods and produced 3.6×10⁻⁶, 4.9×10⁻³, and 7.5×10⁻³ Scm⁻¹ conductivities, respectively.

[Seyed Hossein Hosseini, Masoomesh Shirazi Madani, and Seyed Mahdi Musavi. **Synthesis and characterization of polythiophene with liquid crystalline azobenzene as side chains.** *Life Sci J* 2012;9(4):5050-5064]. (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 755

Key word: Liquid crystalline polymers, Polythiophene, Conducting polymers, optical materials, Electrical conductivity

1. Introduction

Conjugated polymers are well-known for their excellent electrical conductivities in oxidized (doped) state. The recent development of processable conducting polymers has opened the way for large-scale industrial applications. Conjugated polymers have been used widely in many areas such as rechargeable batteries [1,2], electrochromic devices [3], diodes and sensors [4-6]. Among these classes of polymers, polyaniline, polypyrrole, polythiophene, etc. have been studied extensively because of their favorable processibility and relative stability [7-9]. Polythiophene derivatives have been used widely as conducting materials. In comparison with other conjugated polymers, polythiophenes are relatively easy to be functionalized, and the attachment of substituted through β -carbons has relatively little impact on electronic properties of the conjugated backbone. Therefore, synthesis of three-substituted azobenzene-functionalized polythiophenes has attracted much interest both from synthetic considerations as well as from material science. polythiophenes with azobenzene groups in three-position will not only have better processibility and stability, but also may possess novel electrical, electrochemical and optical properties. Thus, the combination of polythiophene backbone with photoactive azobenzene groups can provide a new approach to develop other novel materials with unique electronic and optical properties [10]. Various type of liquid crystalline (LC) conjugated polymers have been currently synthesized to cultivate fruitful molecular electronics. Polythiophene derivative with LC side chain is one of the most intriguing polymers, because its profound electrical and optical properties are expected to be controlled using molecular orientation of LC side chain [11,12]. In the previous works, we reported liquid crystalline polymer based N-substituted pyrrol [13]. This polymer exhibit liquid crystalline and electrically conductivity properties, as well. In this paper, polythiophene was selected as main chain skeleton. The side chain polythiophene contains mesogenic group which shows liquid crystalline property. The 3-substituted of the thiophene ring was prepared and their liquid crystalline and thermal properties investigated. Figure 1 shows side chain polythiophene. So, a series of novel LC azobenzene-functionalized polythiophene synthesized with the aims at preparation of liquid crystalline thiophene derivatives for photonic applications. The synthesis, polythiophene derivatives were fully discussed. Molecular structure of the LC

polythiophene is illustrated in Figure 2, where LC group is introduced in to 3-position of the thiophene unite. The polymer consists of main chain, flexible methylene spacer, linking group and tailing group, as shown in Figure 2.

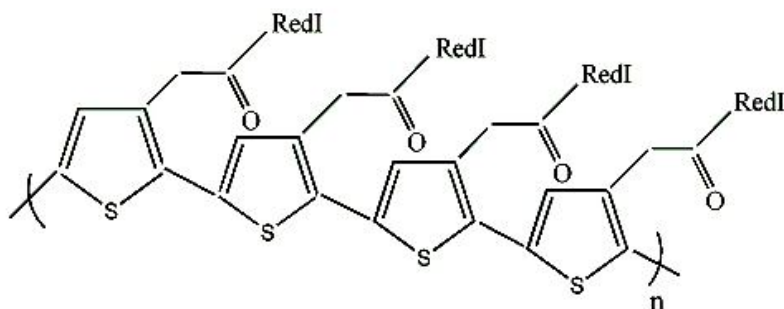


Figure 1: Side chain polythiophene

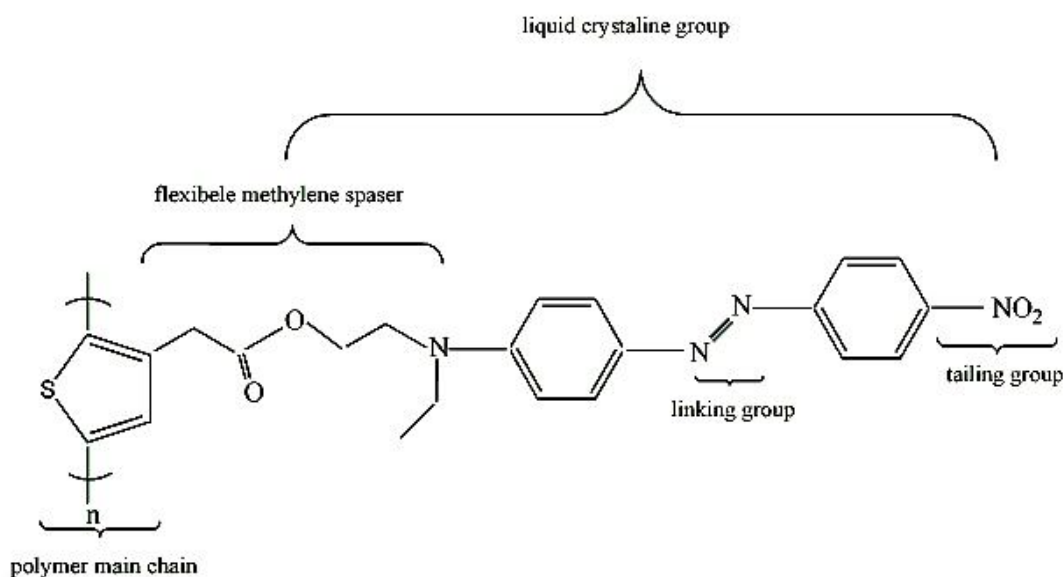


Figure 2: Molecular structure of liquid crystalline polythiophene derivative

2. Experimental

2.1 Physical measurements

^1H , ^{13}C -NMR spectra were recorded at 250MHz on a BRUKER, NMR data are reported in the following order: chemical shift (ppm), spin multiplicity (s= singlet, d= doublet, t= triplet, q= quartet, m= multiplet), and integration. Electrical conductivity were measured with a four-probe device (home made). Differential Scanning Calorimeter (DSC) analyses were performed at $5\text{ }^\circ\text{C min}^{-1}$ on a TA instruments using STA 625 DSC. FT-IR spectra were recorded on a 8101-M-Shimadzu and BRUKER-IF-66.5 spectrometer. Vibration transition frequencies are reported in wave number (cm^{-1}). The UV-Visible spectra were obtained using an UV-Vis recording spectrophotometer (Perkin-Elmer Lambda 15).

2.2. Materials

Thiophene-3-acetic acid (Fluka), thiophene (Merck) and pyrrole (Fluka, 96%) were distilled prior to use. Tetrahydrofuran (Merck),

petroleum ether and ethyl acetate were distilled and dried with molecular sieves (4A°) prior to use. 4-nitroaniline (Merck, 98%), dicyclohexyl carbodiimide (DCC) (Merck, 98%), 4-(dimethylamino) pyridine (DMAP) (Merck, 99%), 2-(N-ethyl aniline) ethanol (Merck, 99%), sodium nitrite (NaNO_2) (Merck, 99%), methanol (Merck) and the other materials used in this work were purchased from Merck chemicals and purified, or prepared according to literature methods.

2.3. Preparation of 2-[N-ethyl-N-[4-(4-nitrophenyl)azo]-phenyl]amino ethyl (RedI)

7 g (0.05mol) of 4-nitroaniline was dissolved in a solution of 25 ml of concentrated hydrochloric acid and 150 ml of water. The mixture was cooled to $0\text{ }^\circ\text{C}$ in an ice-water bath, then a solution of 3.6 g (0.05mol) of sodium nitrite in 15 ml of water was added dropwise. The resultant solution of neutralized salt was stirred for 30 min at $0\text{--}3\text{ }^\circ\text{C}$. Another solution of 5 g (0.03 mol) of N-ethyl-N-hydroxy ethyl aniline dissolved in 10 ml of

hydrochloric acid (10%) was stirred for 5 min at 0 °C. The above solution of neutralized salt was added into this solution within 30 min. Allow the mixture to stand for 20 min and then was neutralized with added slowly and with stirring 10 percent NaOH solution. Reddish crystals filtered on a Buchner funnel and recrystallized with 2-propanol. Compound 1 was obtained as crimson crystals. Yield 9 g-85%, mp: 170-173 °C. UV (THF): λ_{\max} = 470 nm (0.95 intensity). FT-IR (KBr pellets, ν in cm^{-1}): 3434 (ν_{OH}), 3200 ($\nu_{\text{C-H}}$, Ar), 2950 ($\nu_{\text{C-H}}$, Al), 1599 ($\nu_{\text{N=N}}$), 1515, 1341 (ν_{NO_2}), 1450 ($\nu_{\text{C=C}}$), 1141 ($\nu_{\text{C-O}}$), 800-850 ($\nu_{\text{C-H}}$, OOP) cm^{-1} . $^1\text{H-NMR}$ (CDCl_3): δ 1.26 (3H, t), 1.75 (1H, s), 3.56 (2H, q), 3.62 (2H, t), 3.90 (2H, t), 6.81 (2H, d), 7.88 (2H, d), 7.92 (4H, d), 8.32 (2H, d) ppm. $^{13}\text{CNMR}$ (CDCl_3): δ 12.1, 46.4, 52.8, 60.1, 112.3, 122.5, 124.7, 126.6, 143.8, 147.2, 151.6, 157.2 ppm.

2.4. Preparation of {2-[N-ethyl-N-[4-[(4-nitrophenyl)azo]-phenyl] amino] ethyl-3-thiophene acetate}, (Th3AA-RedI)

A total 1 g (0.012 mol) of thiophene -3-acetic acid and 1.884 g (0.006 mol) of RedI (crystallized in isopropyl alcohol) were dissolved in 50 ml of dry THF. Then 1.279 g (0.0062 mol) of N-N-dicyclohexyl carbodiimide (DCC) and 0.109 g (0.9 mmol) of 4-(dimethylamino) pyridine (DMAP) were added to the vigorously stirred solution. The stirring was continued for 5 h. The mixture was then filtered, and the solvent was removed by rotary evaporator under vacuum. The product was purified by column chromatography (silica gel, petroleum ether: ethyl acetate = 2:2, v/v), followed by recrystallized from petroleum ether/ethyl acetate to yield red crystals (Compound 2 was obtained as red crystals). Yield: 55%, UV (THF); λ_{\max} = 446 nm (0.26 intensity), 253 nm (2.35 intensity), 212 nm (3.26 intensity). FT-IR (KBr pellets, ν in cm^{-1}): 3100 ($\nu_{\text{C-H}}$, Ar), 2910 ($\nu_{\text{C-H}}$, Al), 1625 ($\nu_{\text{C=O}}$), 1601 ($\nu_{\text{N=N}}$), 1515, 1340 (ν_{NO_2}), 1627, 1455 ($\nu_{\text{C=C}}$), 1140 ($\nu_{\text{C-O}}$), 859 ($\nu_{\text{C-H}}$, OOP) cm^{-1} . $^1\text{H-NMR}$ (d^6 -DMSO): δ 1.24 (3H, t), 3.47 (2H, q), 3.66 (2H, t), 3.79 (2H, s), 4.33 (2H, t), 6.79 (2H, d), 7.01-7.30 (4H thiophene, m), 7.87 (2H, d), 8.33 (2H, d), ppm. $^{13}\text{CNMR}$ (d^6 -DMSO): δ 12.2, 35.7, 45.5, 48.6, 61.8, 111.4, , 122.6, 123.1, 124.6, 126, 126.2, 128.4, 143.8, 147.3, 151, 156.7, 171 ppm.

2.5. Preparation of Poly{2-[N-ethyl-N-[4-[(4-nitrophenyl)azo]-phenyl] amino] ethyl-3-thiophene acetate}, Poly(Th3AA-RedI)

Polymerization was carried out as follows: The 0.5 g (0.1 mmol) of monomer (Th3AA-RedI)

in 25 ml THF was added dropwise to a suspension 0.1062 g, (0.3 mmol) of $\text{Fe}(\text{ClO}_4)_3$ in 20 ml of THF under nitrogen atmosphere. The mixture was stirred at 50 °C temperature for 24 h. The polymerization mixture was added dropwise into 100 ml of methanol. The precipitates were filtrated, dissolved in 5 ml of THF, and reprecipitated into 100 ml of methanol. This procedure was repeated three time until the unreacted monomers were completely removed. Finally, the polymer was dried under vacuum at 25 °C to constant weight. (Compound 3 was obtained). UV (THF): λ_{\max} = 446 nm (0.25 intensity), 297 nm (0.54 intensity), 253 nm (2.74 intensity), 211 nm (3.94 intensity). FT-IR (KBr pellets, ν in cm^{-1}): 3100 ($\nu_{\text{C-H}}$, Ar), 2929 ($\nu_{\text{C-H}}$, Al), 1732 ($\nu_{\text{C=O}}$), 1627 ($\nu_{\text{N=N}}$), 1516, 1388 (ν_{NO_2}), 1134 ($\nu_{\text{C-O}}$) cm^{-1} , 823 ($\nu_{\text{C-H}}$, OOP) cm^{-1} . $^1\text{H-NMR}$ (d^6 -DMSO): δ 1.25 (3H, t), 3.61 (2H, q), 3.47 (2H, q), 3.67 (2H, t), 3.79 (2H, s), 4.35 (2H, t), 6.80 (2H, d), 7.01-7.30 (4H thiophene, m), 7.87-7.94 (4H, m), 8.31-8.34 (2H, d) ppm. $^{13}\text{CNMR}$ (d^6 -DMSO): δ 12.2, 35.7, 45.6, 48.7, 61.8, 111.4, 122.6, 123.1, 124.7, 125.9, 126, 128.4, 143.8, 147.4, 151.2, 156.7, 171 ppm.

2.6. Preparation of Poly{2-[N-ethyl-N-[4-[(4-nitrophenyl)azo]-phenyl] amino] ethyl-3-thiophene acetate-co- thiophene }, Poly(Th3AA-RedI-co-Th)

The typical synthesis procedures utilized can be described as follows: The 0.1 g (0.22 mmol) of monomer (Th3AA-RedI) and 0.0092 g (0.1mmol) of monomer thiophene in 10 ml of THF was added dropwise to a suspension 0.233 g (0.65 mmol) of $\text{Fe}(\text{ClO}_4)_3$ in 10 ml of THF under nitrogen atmosphere. The mixture was stirred at 50 °C temperature for 24 h. The copolymer in solution was precipitated by addition of excess methanol. The precipitation was extracted using boiling absolute ethanol. The precipitate was dried under vacuum. FT-IR (KBr pellets, ν in cm^{-1}): 2920 ($\nu_{\text{C-H}}$, Al), 1713 ($\nu_{\text{C=O}}$), 1600 ($\nu_{\text{N=N}}$), 1516, 1338 (ν_{NO_2}), 1463 ($\nu_{\text{C=C}}$), 1133 ($\nu_{\text{C-O}}$) cm^{-1} . $^1\text{H-NMR}$ (d^6 -DMSO): δ 1-1.22 (broad), 3.38 (broad), 6.7-8.32 (broad).

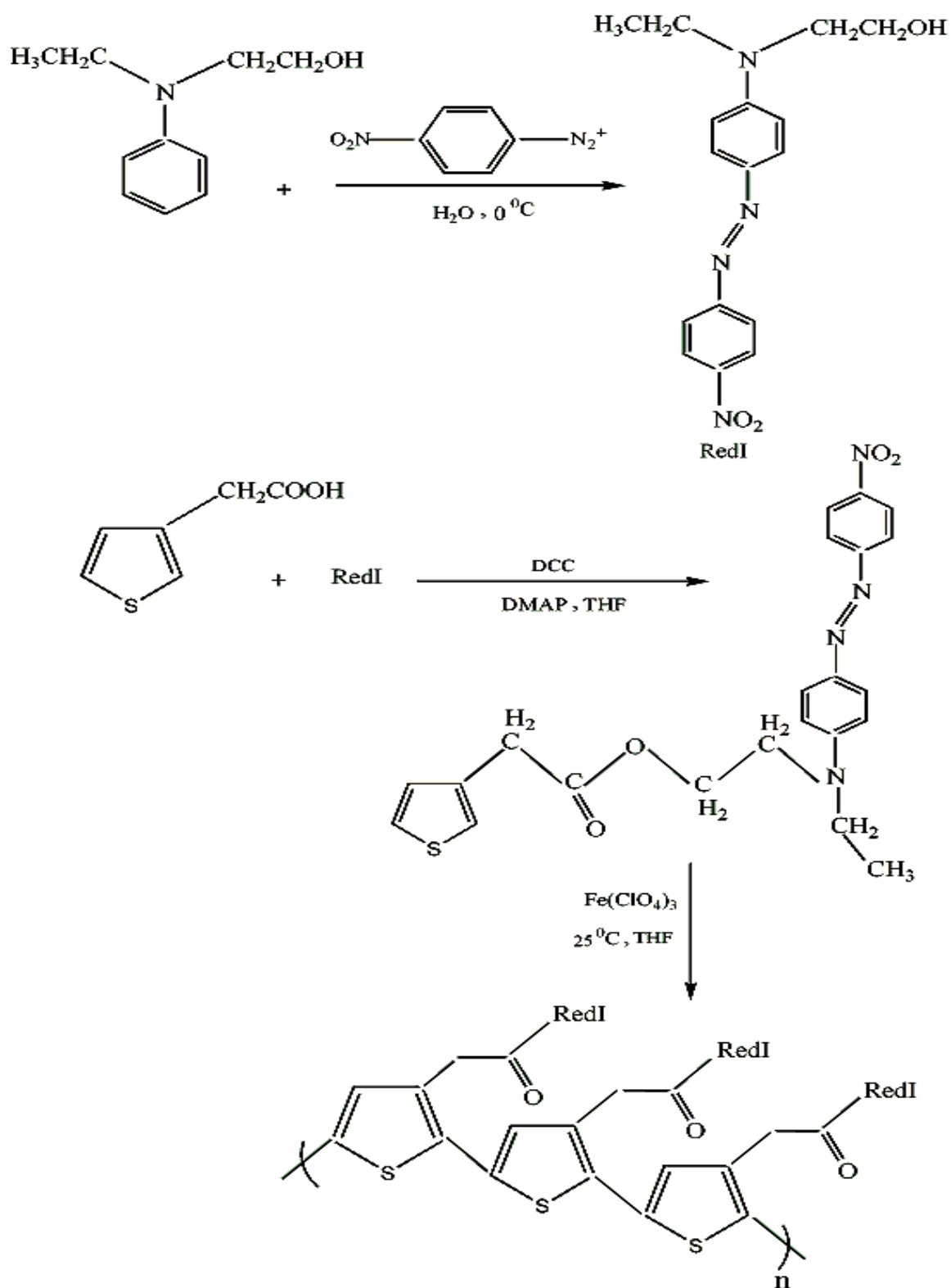
2.7. Preparation of Poly{2-[N-ethyl-N-[4-[(4-nitrophenyl)azo]-phenyl] amino] ethyl-3-thiophene acetate-co- pyrrole }, Poly(Th3AA-RedI-co-Py)

Poly(Th3AA-RedI-co-Py) was synthesized using the same synthetic procedures as for Poly(Th3AA-RedI-co-Th). The (Th3AA-RedI) monomer (0.1 g, 0.22mmol) and pyrrole (0.0074 g, 0.1 mmol) in anhydrous THF (10 mL) was added dropwise to a suspension of $\text{Fe}(\text{ClO}_4)_3$ (0.233 g, 0.65 mmol) in THF (10

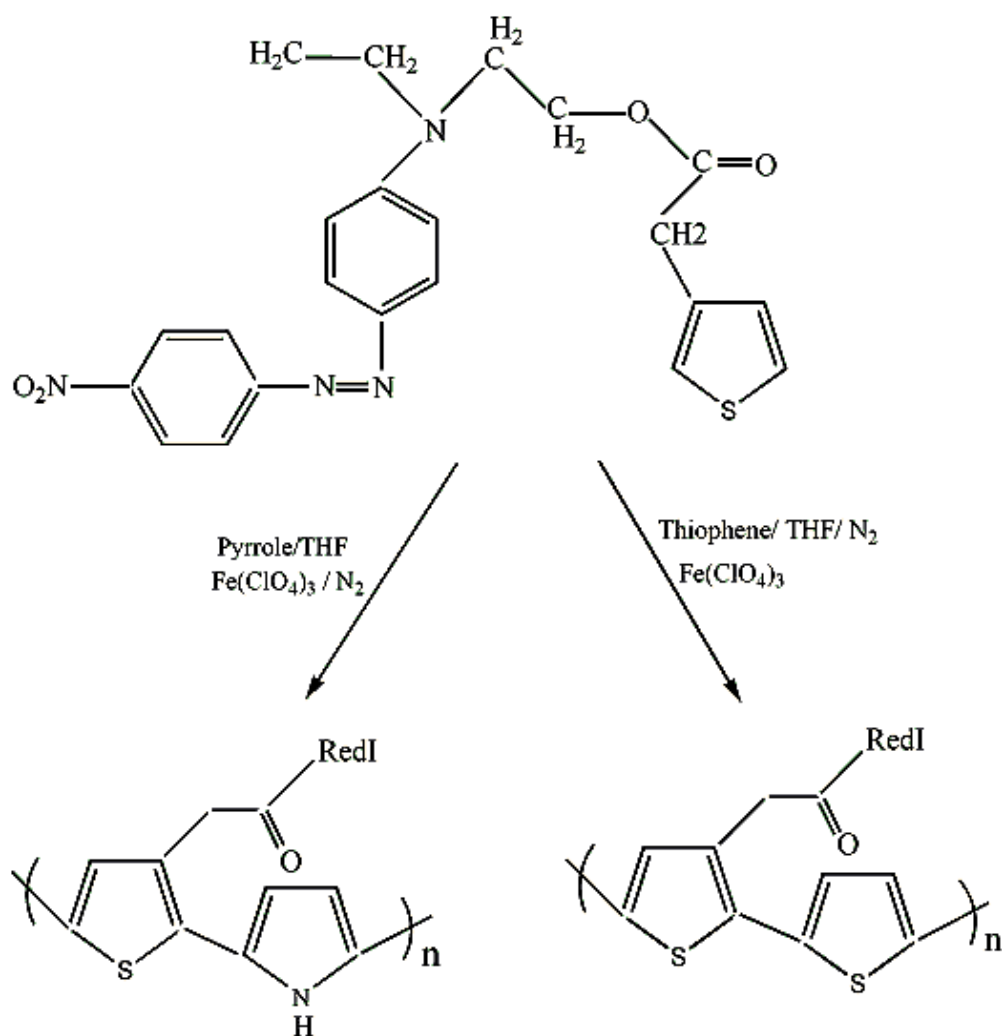
ml) under nitrogen. The mixture was stirred at 50⁰C temperature for 24 h. The polymer in solution was precipitate by addition of excess methanol. The precipitation was extracted using boiling absolute ethanol. The precipitate was dried under vacuum. FT-IR (KBr pellets, ν in cm^{-1}), ν : 3400 ($\nu_{\text{N-H}}$, Py), 3181 ($\nu_{\text{C-H}}$, Ar), 2931 ($\nu_{\text{C-H}}$, Al), 1699 ($\nu_{\text{C=O}}$), 1600 ($\nu_{\text{N=N}}$), 1516,1433 (ν_{NO_2}), 1244 ($\nu_{\text{C-O}}$), 828 ($\nu_{\text{C-H}}$, OOP) cm^{-1} .

3. Results and discussion

All synthetic routes of RedI, Th3AA-RedI and poly(Th3AA-RedI) showed in Scheme I. Therefore, schematic copolymerization of Th3AA-RedI with thiophene and pyrrole has been shown in Scheme II.



Scheme I: Schematic reactions for route synthesis of poly(Th3AA-RedI)



Scheme II: Schematic reactions for copolymerization of poly(Th3AA-RedI) with pyrrole and thiophene

3.1. Structural characterization

In order to obtain polymers with higher molecular weights, the polymerization and copolymerization were carried out at 50 °C temperature with dropwise addition of monomers. This polymer was found to be soluble in chloroform, THF and methylene chloride, but two copolymers synthesized by chemical oxidative copolymerization using

FeCl_3 or $\text{Fe}(\text{ClO}_4)_3$ that are not soluble in common organic solvents. Figure 3, illustrates the FT-IR spectra of poly(Th3AA-RedI). The peaks about 3100 and 2910 cm^{-1} related to C-H (aromatic) and C-H (aliphatic) stretching vibrations respectively. The peaks at around 1625 cm^{-1} and 1140 cm^{-1} are due to the carbonyl (C=O) stretching vibration and C-O-C Stretching vibration respectively.

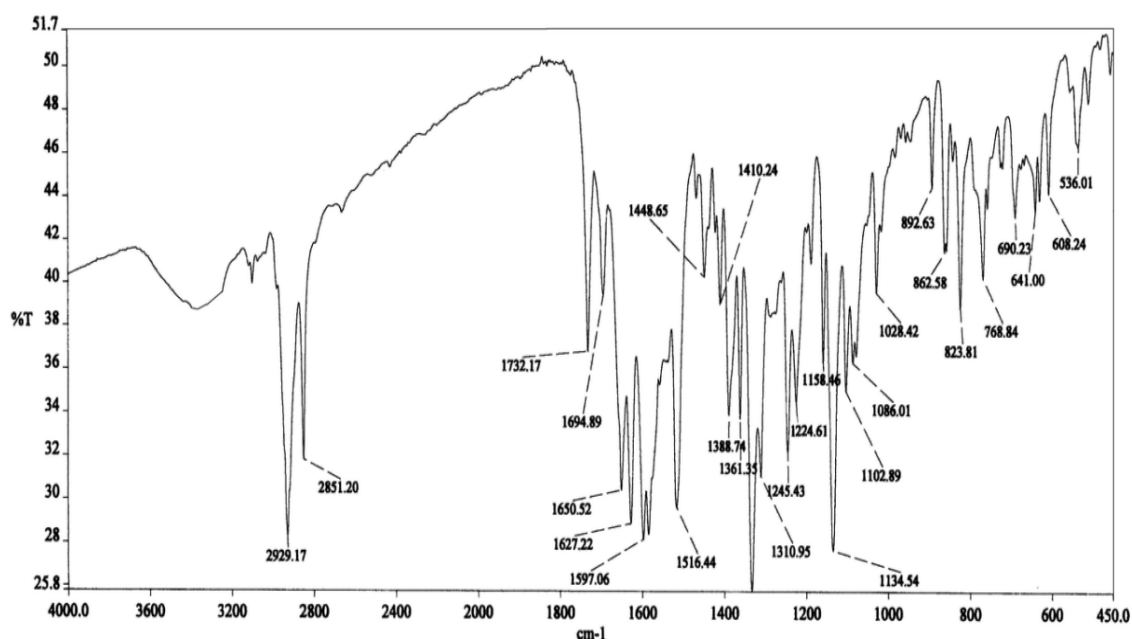


Figure 3: FT-IR Spectrum of poly(Th3AA-RedI)

Figure 4 shows the $^1\text{H-NMR}$ spectrum of poly(Th3AA-RedI). On the basis of comparing with the spectrum of monomer, we can assign the following peaks for poly(Th3AA-RedI): 1.24 (- CH_3), 3.12 (DMSO), 3.47 (- $\text{CH}_2\text{-CH}_3$), 3.66 (- $\text{CH}_2\text{-N}$), 3.79 (- $\text{CH}_2\text{-COOH}$), 4.33 (- $\text{O-CH}_2\text{-}$), 6.79, 7.87-7.93 and 8.3-8.33 ppm (protons of phenylene groups). The lines refer to the aromatic protons of the thiophene ring that are located at 7.01-7.30 ppm. The oxidative polymerization for β -substituted thiophene monomer with $\text{Fe}(\text{ClO}_4)_3$ always

leads to two different types of couplings: head-to-tail and head-to-head. Thus, the α -methylene protons directly attached to the thiophene ring (β -position) and can be incorporated into a polymer chain with the above two diads. The two peaks located at 1.3-1.9 ppm arise from the methylene protons between the ester group and the thiophene ring, showing that poly(Th3AA-RedI) has a stereo random chain structure with almost equal distribution of head-to-tail and head-to-head linkages along the polymer chain.

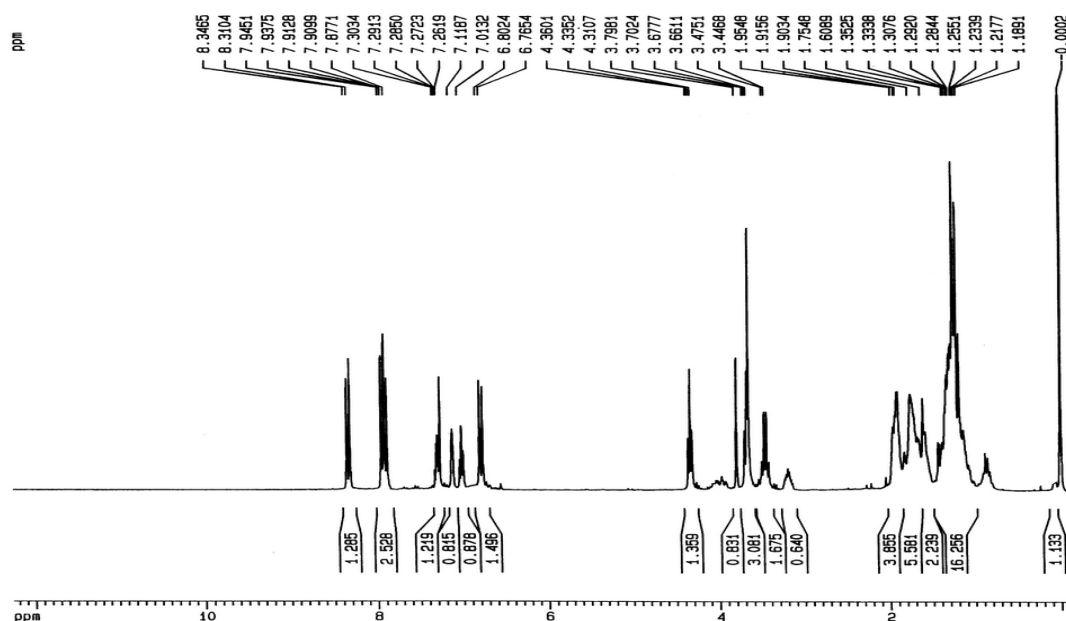


Figure 4: FT¹H-NMR Spectrum of poly(Th3AA-RedI)

The ¹³C-NMR spectrum of the poly(Th3AA-RedI) is shown in Figure 5. Using INEPT-pulse sequence, we were able to distinguish the proton bonded carbons from all other carbons present in the molecule. On the basis of a comparison with the spectra of poly(Th3AA-RedI), the following assignments are proposed: The line at the lowest field (171.5ppm) corresponds to the carbon of the ester group. The lines at 156.7, 151, 147.3, 143.8, 126.2,

124.6, 122.6 and 111.4 ppm are assigned to the aromatic carbon in the RedI moiety. The remaining four lines at 123.1, 126, 128.4 ppm originate from the carbons of the thiophene ring. In the aliphatic part, the lines of low intensity at 12.2, 35.7, 45.5, 48.6 and 61.8 ppm correspond to the RedI substituent. The peaks located at 76.5-77.5 ppm arise from the ⁶d-DMSO solvent.

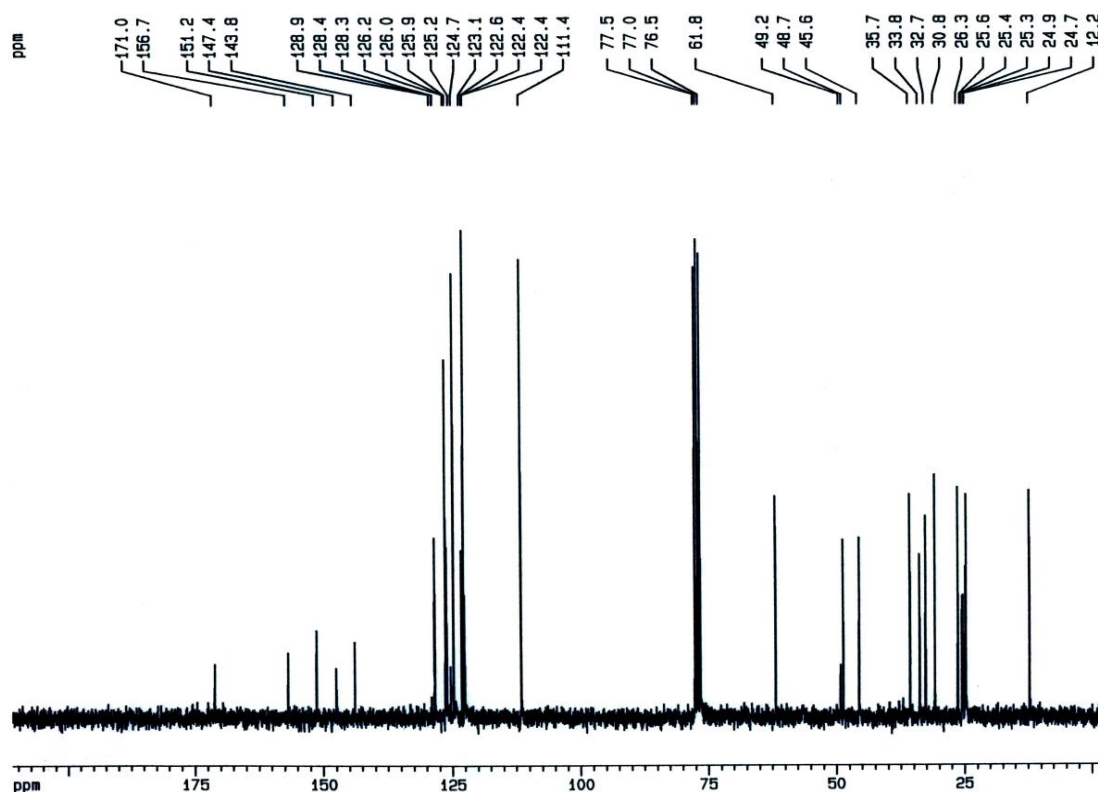


Figure 5: FT¹³C-NMR Spectrum of poly(Th3AA-RedI)

Figure 6, shows ¹H-NMR spectrum of the copolymer poly(Th3AA-RedI-co-Th) in (⁶d-DMSO) solvent. In this spectrum, peaks of aliphatic protons (-CH₃), (CH₂-COOH-) and (-CH₂-CH₃) observed in 1 to 2.2 ppm. Peak of protons (-CH₂-N) AND (-O-CH₂-) are not observed in spectra, because of overlapping with peak of DMSO and water around 2.21 and 3.3 ppm, respectively. Protons of aromatic ring and thiophene are characterized between 6.7 to 8.32 ppm. Of course peaks of aromatic area are not clear precisely because they are

blocked copolymer, but it is appeared in the area related to aromatic compounds. Copolymer has a low solubility; so ¹H-NMR is not clear. The great adherence from peak is resulted of the greater involvement of thiophene monomers than Th3AA-RedI monomer in polymeric chain. The peaks in aromatic region confirm performance of copolymerization. We were not able to investigate UV-Visible and ¹³CNMR spectra of poly(Th3AA-RedI-co-Th) and poly(Th3AA-RedI-co-Py) because of low solubility of them.

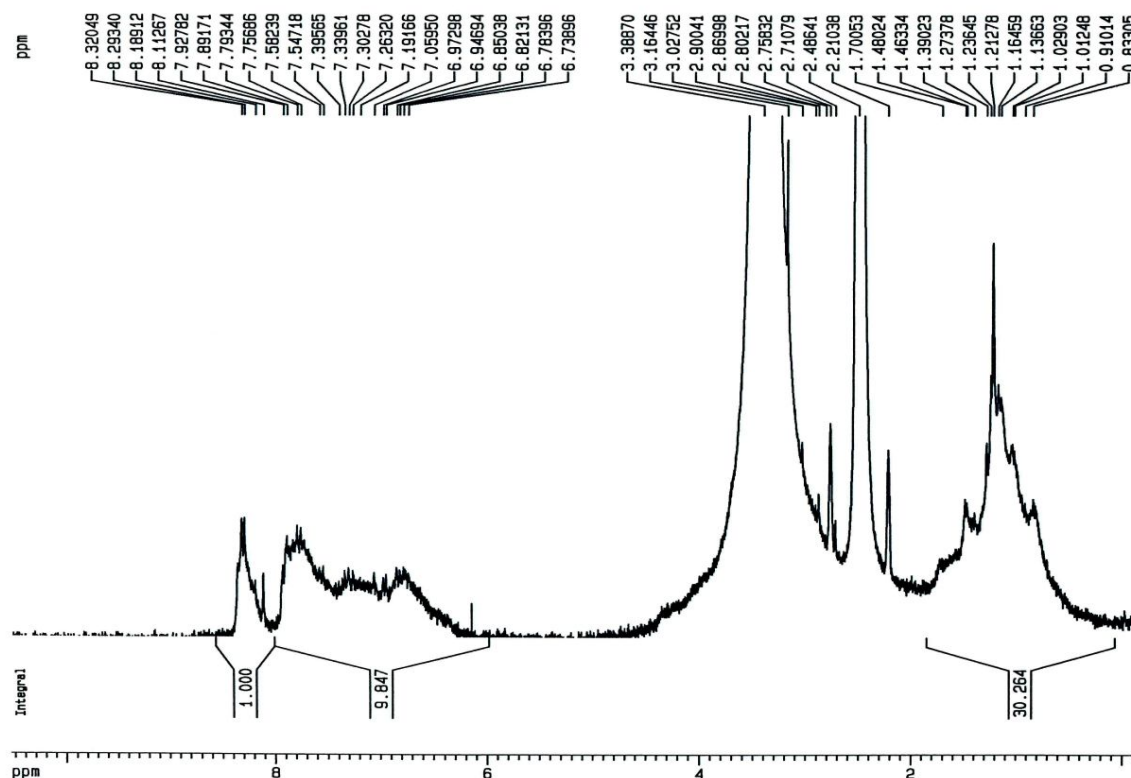


Figure 6: FT¹H-NMR Spectrum of poly(Th3AA-RedI-Co-Th)

3.2. Liquid crystalline and thermal properties

Liquid crystallinity and thermal analysis of the polymer were conducted by optical absorption, optical polarizing microscope, differential scanning calorimeter (DSC). Phase transition temperatures were determined by DSC measurement. All DSC runs in this research were made under a nitrogen atmosphere with a heating rate of 5⁰C/min. DSC thermograms of RedI in heating and cooling process are showed in Figures 7. It shows thermogram an endothermic peak at 173⁰C which is related to

the melting process of RedI and also a transformation of crystalline phase to isotropic state. Therefore, crystalline phase of this compound is changed directly to isotropic liquid as a result of temperature effect. In cooling process no peak is observed probably because the sample decomposition occurs at higher temperature or it does not have clear LC behavior. By heating the sample again no peak is observed, this confirms probable sample decomposition.

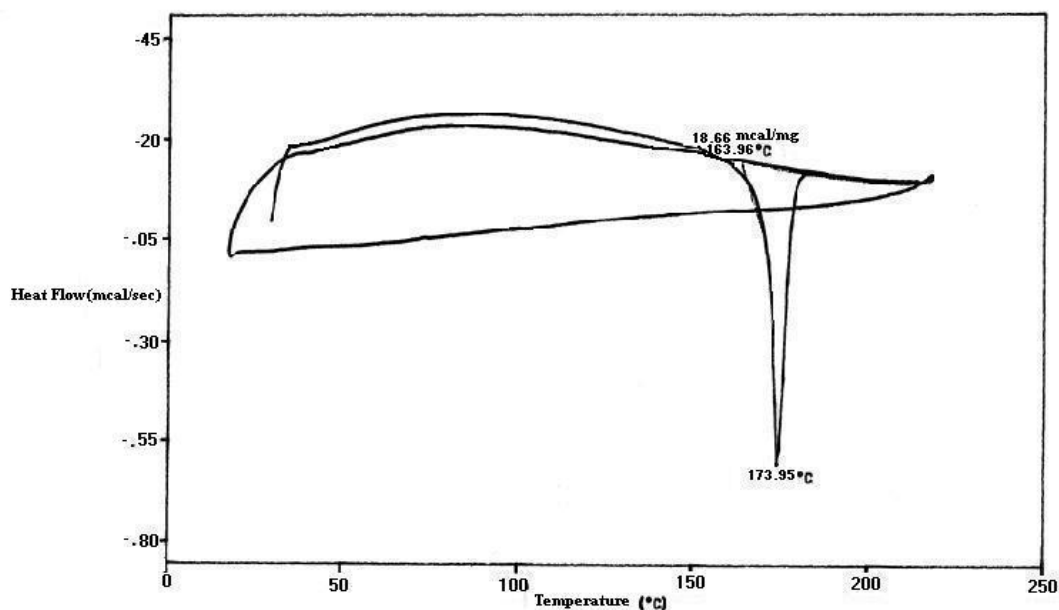


Figure 7: DSC thermogram of RedI, heating and cooling with rate of 5 °C/min

Transition temperatures for (Th3AA-RedI) were obtained using DSC which shows in Figure 8. DSC thermogram of (Th3AA-RedI) showed two endothermic peaks. The first endothermic peak at 112.93 °C is an indication of changing of crystalline phase to smectic C

liquid crystalline state ($C \rightarrow S_C$). The second peak at 177.30°C is related to the changing of smectic C liquid crystalline mesophase to isotropic state ($S_C \rightarrow I$). In the first transition, the stability of liquid crystalline mesophase is about 64.37°C.

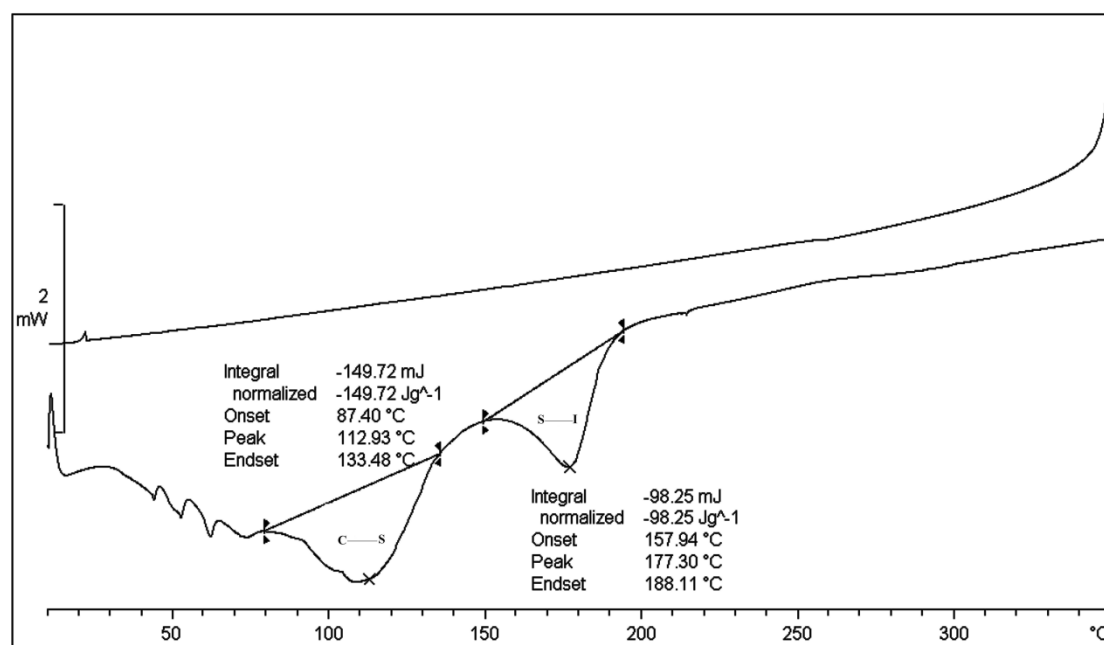


Figure 8: DSC thermogram of (Th3AA-RedI) with rate of 5 °C/min

The transition temperatures for poly(Th3AA-RedI) were obtained using DSC which shows in Figure 9. DSC thermogram of poly(Th3AA-RedI) shows 3 glass transition about 108, 200, 261°C. The first endothermic peak at 108.15°C is an indication of changing of crystalline

phase to smectic C liquid crystalline state ($C \rightarrow S_C$). The second peak at 200.39°C is related to the changing of smectic C liquid crystalline mesophase to nematic state ($S_C \rightarrow N$). The last observed endothermic peak in this curve is about 261.29°C that is related

to transition phase of nematic liquid crystalline to isotropic liquid (N→I). In the first and the second transition, the stability liquid

crystalline mesophases are about 92.24°C and 61°C respectively.

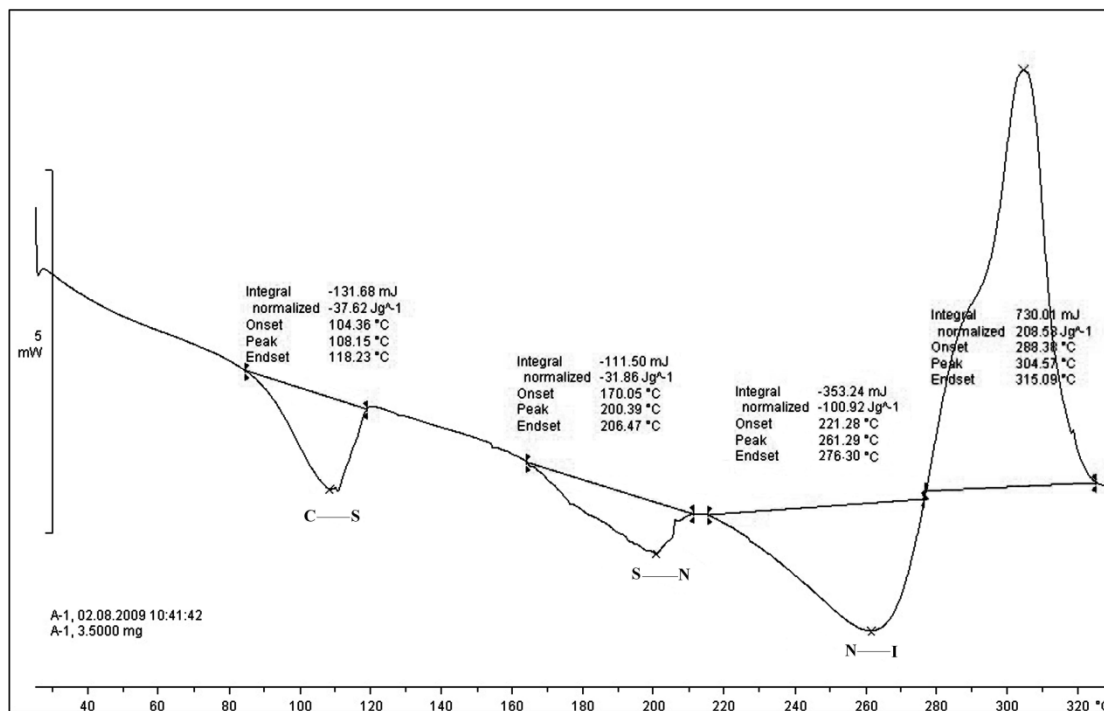


Figure 9: DSC thermogram of poly(Th3AA-RedI) with rate of 5 °C/min

The images of polarizing optical microscope of poly(Th3AA-RedI) demonstrate the smectic C, nematic and isotropic liquid crystalline state in the ranges 118°C and 206°C and 261°C temperature respectively. This indicates the

poly(Th3AA-RedI) is a monotropic compound. Typical crystalline, smectic C, nematic texture and isotropic state of poly(Th3AA-RedI) are shown in Figure10(a-c).

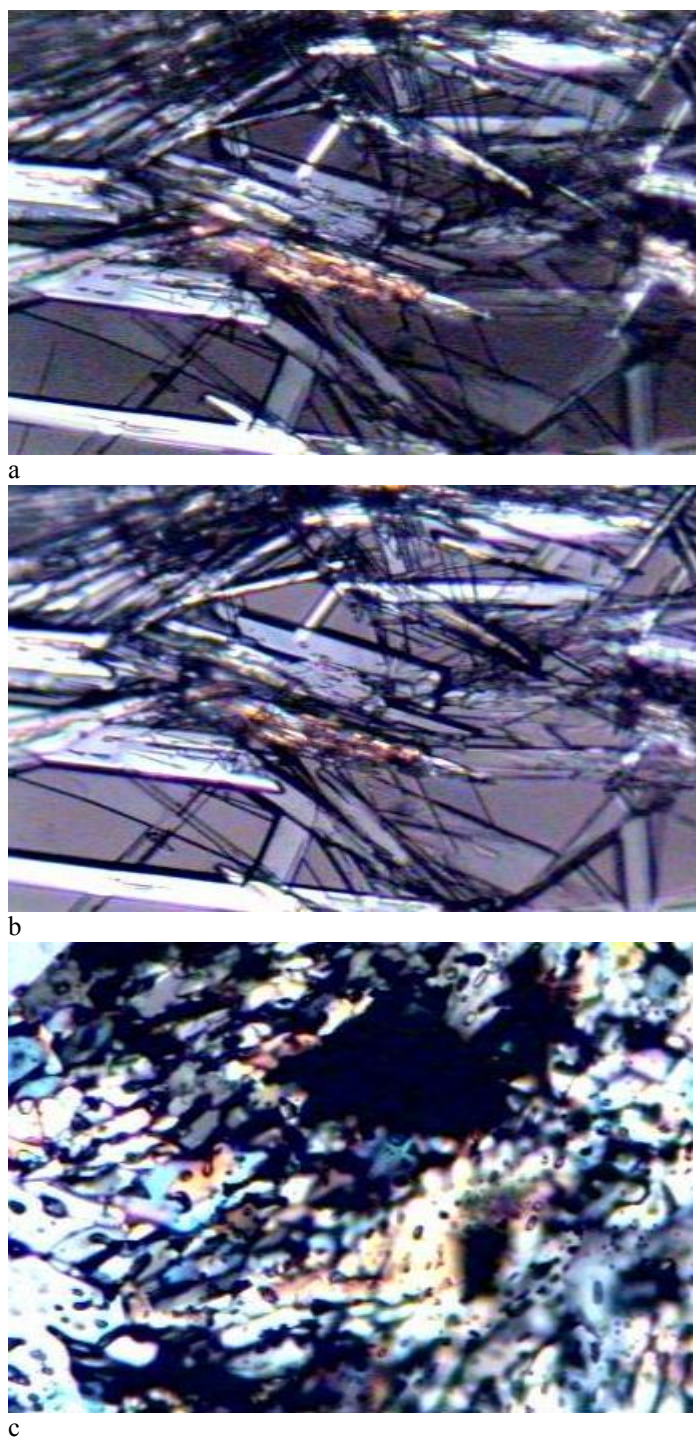


Figure 10: Cross-polarized optical micrograph of the polymer sample, smectic C phases a) 108-170⁰C, b) 200-221⁰C, c) 261-276⁰C.

4. Conclusion

In this paper, we have described the preparation and investigation of liquid crystalline polythiophene with azobenzene group in side chain. The results indicate that this azobenzene functionalized polythiophene derivatives have wide mesophase temperature range and good photoactivity. DSC thermogram of poly(Th3AA-RedI) showed 3

semi glass transition and three endothermic peaks. The endothermic peaks are indicated of changing of (C→S_C), (S_C→N) and (N→I). The images of polarizing optical microscope of poly(Th3AA-RedI) demonstrated the smectic C, nematic and isotropic liquid crystalline states. Chemical, structural, thermal and morphological studies indicated that high quality polymer film can be obtained. As-

formed polymer film was thoroughly soluble in polar solvent such as THF.

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Investigation of the Effects of Extension Factors on Improving Water Resources Management in Tehran Province

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Abstract: The purpose of this research is to identify the effect of extension factors on improving the management of agricultural water resources in Tehran Province agricultural sector. This is an applied research in terms of its objective, a field research in terms of the degree of control it exerts on variables, and a descriptive (non-experimental) research in terms of its method of gathering information. Therefore, it could be termed a “descriptive-correlational” research. The statistical population for this research was Tehran Province water farmers (45652 persons), and the statistical sample size was calculated as 243 from the Cochran Formula. Due to the uneven distribution of farmers in the 14 counties of Tehran Province, in the first step only 5 counties were selected: Shemiranat on the north, Varamin on the south, Firouzkouh on the east, Shahriar on the west, and Tehran in the center of the province. Then, in the second step, in proportion to each county’s farmer population percentage in the whole statistical population, the selected sample sizes for each county were determined as fractions of the total sample size (243 persons). The randomly selected farmers in each county were consequently interviewed and the required information was obtained from them through questionnaires. The stability of the scale used for the present research was confirmed by a Cronbach’s alpha value of greater than 0.70, and the validity of the questionnaires was ascertained through seeking the opinion of academic advisors. Ultimately, the obtained data was analyzed by using the SPSS software. The obtained correlation results point to the fact that there exists a significant relationship between the “water resources management improvement” variable and the following variables: the number of times farmers participate in training-extension courses, the quality of the organized educational- extension courses, the number of times farmers seek advice at the local agricultural extension service, the performance of the local agricultural extension service in the areas where farmers work, the farmers’ education level, the farmers’ workforce, the farmers’ annual income, the degree of participation exhibited by each farmer in cooperating with other farmers for better management of water resources, the total land area owned by each farmer, and the number of plots of land allocated to each farmer. According to the results obtained from the Regression Method, the following seven variables which together explicated 77.5 percent of variations of the dependent variable, were identified as the effective extension factors in improving water resources management.

[Shaghayegh Khalili, Ali Badragheh and Mahdi Jurablu. **Investigation of the Effects of Extension Factors on Improving Water Resources Management in Tehran Province.** *Life Sci J* 2012;9(4):5065-5074]. (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 756

Key word: water resources management improvement, educational- extension activities, optimum water consumption, Tehran Province

Introduction

Although most of the earth's surface is covered with water, only 2.5 percent of its available water is fresh. Moreover, due to their being in the form of glaciers and permanent snow on mountains, large parts of the existing fresh water could not be utilized (Asgari, 1999). In addition, renewable water resources are on the decline, not only in dry arid areas, but also in areas with large amounts of annual rainfall (Panda et al., 2004). One of the important factors pinpointed as responsible for deterioration of water quality is population growth and concentration. This factor is among the greatest stress factors on water resources in dry areas (Mortazavi et al., 2011). In 1990, about twenty countries with an annual water consumption of less than 1000 cubic meter per capita were faced with water shortages. It is estimated that by 2020, 30 to 35 countries will have come to face the same problem, and by 2025, one third of the developing countries, mainly in the arid and semi-arid regions of the African Continent, will have been affected by water shortage (IWMI, 1999). As a developing country situated in the arid and semi-arid region of the globe, Iran is also confronted with the fundamental problem of water shortage (Foroughi et al., 2006; Shabani et al., 2006) since annual precipitations accumulated as surface water in rivers and canals form its only source of water (Karpisheh, 2011). Therefore, preservation of this vital resource and optimum utilization thereof would be among the greatest challenges the country would have to come to terms with in the present century (Shabani et al., 2006). Iran, having an annual rainfall equal to one third of the world average, below-average renewable water resources (equal to only 36 percent of the world average), and one percent of the world population, would be taking its fare share in overcoming water shortage. Consuming 94% of available water resources, the agricultural sector plays a crucial role in promoting optimum and productive methods for transportation and utilization of water (Shayanfar, 2003). However, it is observed that, due to farmers' insufficient knowledge about optimum methods of water consumption in agriculture and the subsequent inappropriate ways of utilizing water by them, there has been a steep fall in production, efficiency, and income levels in the agricultural sector, causing disillusionment among farmers and preventing further advances in the country's drive towards development (Ranganijahromi and

Mohammadi, 2007). To address this problem, in this study we present management of agricultural water as a systematic approach for controlling water consumption, which would bring about suitable techniques for meeting irrigation and drainage needs on farms (Forest, 2002). Management of water resources to supply water efficiently for human needs as well as to reduce the damage caused by irregular consumption, is a complicated subject which will become more significant in the coming years with the growth of population and demand (Shahidasht and Abbasnejad, 2011). In fact, improving the management of agricultural water, aimed at achieving the environmental, economic, and social goals of sustainable agriculture, is an important step in optimum consumption of water and efficient increase of irrigation as well as in agricultural production.

The fundamental questions that could be asked here would be: "What factors affect such an important and vital issue as water management improvement?", "To what extent can educational-extension factors affect the way water resources are managed?"

Undoubtedly, different factors influence the management of water resources, and once these factors have been identified, we can use them correctly in order to bring about positive improvements in the control of water resources. Taking up the level of farmers' knowledge, insight, and skills through arrangement of educational-extension activities by organizations in charge of agriculture would be a positive step in the betterment of water management. Such educational-extension programs on optimum management of water resources can greatly help to alleviate the water shortage problem. Of course, this would need comprehensive knowledge of the nature of these programs and activities. That is why the present research was conducted with the purpose of identifying the effects of extension factors on improving water resources management in Tehran Province. Today, many reports are aimed at water resources management, but there are few studies that directly investigate the agricultural extension factors affecting water resources management improvement. For example, the research conducted by Ehsani and Khaledi (2003), Zehtabian (2005), and Heidari et al. (2005), focuses on the role of training in the betterment of agricultural water management. Results obtained from such research show that

farmers are in dire need of learning modern methods and techniques for optimum water consumption and appropriate farming patterns as well as irrigation systems, and that farmers expect the trainers to help them in improving water consumption through holding classes and providing agricultural extension material in the form of publications, brochures, etc (Mohammadi et al., 2007). Other studies show that the most important reason for low productivity and irrigation deficiency is lack of technical knowledge and agricultural extension in teaching farmers how to apply water management optimally (Keshavarz and Sadeghzadeh, 2000; Ehsani and Khaledi, 2003; Pourzand, 2003; Afshar, 2004; Hasheminia, 2004; Mohammadinikpour and Parastar, 2006). Obviously, promoting farmers' knowledge would, among other things, lead to appropriate and timely use by farmers of new technologies for the purpose of achieving a favorable level of production (Omani and Chizari, 2002). For this reason, experience and knowledge of farming could be the best way of planning for optimum management of water as well as the training programs involved (Kaupila and Pelsue, 2003). In fact, a fundamental yet simple approach for optimum water management is to make use of the experiences gained by farmers themselves (Steven et al., 2003). For this reason, examining farmers' level of technical knowledge and the factors influencing it would be of particular interest. Karami (1999) believes farmers have different levels of technical knowledge and that their degree of putting this knowledge into practice depends on numerous factors including the support and the tools they require. There is no doubt that observance of the principles of optimum management would require the necessary training associated with it. In other words, through educational means, the effective approaches for correct management can be made available to farmers. The results of Paul's (1998) work show that agricultural extension services and non-governmental organizations play a role in farmers' improved performance in coping with natural disasters. Zareidastgerde et al. (2007) also refer to the importance of education, research, and promotion in raising awareness and introduction of modern science and technologies to farmers, which would result in betterment of management of water used in agriculture. Heidari et al. (2006) have also pointed to the importance of taking up farmers' level of knowledge for better managing the water used in farming. Preira et al.(2002) believe

farmers' increased knowledge would result in optimum management of water resources used in farming. In his investigation in Kenya, Rees (2000) announced that between 40 and 70 percent of the farmers under study had recognized the training received from state agricultural extension services to be the most important source of know-how transfer to them. In Desalegn et al. study (2006), education and capacity-building were introduced as key elements in the development of skills and know-how, and the right tool for optimum management of water resources. They enumerate training, sustainable use of resources, development and application of economic systems as essential elements for integrated optimum management of water resources. Amirkhani et al. (2010) also showed that lack of know-how and generally poor education of farmers on implementing optimum water management methods, were responsible for low productivity and inefficient water consumption.

As could be seen from the above studies, educational/training and extension services are effective factors on the improvement of water resources management. For this reason, such activities cannot be ignored if management of water resources is to be improved, and that is why research should be conducted to investigate the role and significance of these activities.

Materials and Methods

This is an applied research in terms of its objective, a field research in terms of the degree of control exerted by it on variables, and a descriptive (non-experimental) research in terms of its method of gathering information. Moreover, since it investigates the relationship among different variables, this research describes a correlation. Therefore, the best way of describing the present research would be to call it a descriptive-correlated study. The dependent variable is the degree of improvement in management of water resources used for agriculture, and is measured through implementation of effective mechanisms by farmers for bringing about this improvement. In other words, the more the farmers use such mechanisms, the better water resources could be managed. To measure the dependent variable, 35 mechanisms were used in the form of a Likert Spectrum scale. Independent variables consist of extension factors that influence the improvement of water resources management including: number of times farmers participate in educational-

extension courses (ratio variable), number of times farmers seek advice at local agricultural extension services (ratio variable), farmers' use of modern irrigation technologies (nominal variable), farmers' use of optimum farming patterns (nominal variable), watching educational films (nominal variable), farmers' visiting model farms (nominal variable), farmers' reading extension literature (nominal variable), farmers' reading extension brochures (nominal variable), farmers' using educational posters (nominal variable), and performance of the local agricultural mobilization centers regarding optimum management of water resources (interval variable). Eleven mechanisms were used in the form of the Likert Spectrum to measure the performance of local agricultural mobilization centers. The statistical population for this research consisted of 45652 water farmers in Tehran Province. The statistical sample size was calculated as 243 from the Cochran Formula.

Tehran Province where Iran's capital, Tehran, is situated lies between the northern and central part of Iran. Due to the uneven distribution of farmers in this province, at the outset of the study, 5 out of the overall 14 counties were chosen as follows: Shemiranat on the north, Varamin on the south, Firouzkouh on the east, Shahriar on the west, and Tehran in the center of the Province. Then, in the second step, in proportion to each county's farmer population percentage in the whole statistical population, the number of selected samples for each county was determined as a fraction of the total sample size (243 persons). Then, randomly selected farmers in each county were interviewed and the required information was obtained from them through questionnaires. The stability of the scale used for the present research was confirmed by a Cronbach's alpha value of greater than 0.70, and the validity of the questionnaires was ascertained through seeking the opinion of academic advisors. Ultimately, the obtained data was analyzed by using the SPSS software.

Results

1. Descriptive Statistical Results

The descriptive statistical results concerning personal particulars of the farmers showed the average age of the farmers to be 43 years old and the age group of the majority of farmers (35.8 %) to be between 50 and 60 years old. Their average

working experience was 20 years with a 32% majority aged between 10 and 20 years old. A 31.7% majority had secondary school education. The mean dimension for farmers' households was 5.30 persons and a 49.8% majority consisted of households with 6 or more persons. The mean farming workforce was 3.77 with a 48.2 % majority having fewer than 3 working persons. The average annual income for a farmer was 7.805 million tomans (1 toman=10 rials. Rial is the official monetary unit of Iran), with a 32.5% majority earning between 9 and 12 million tomans a year. The mean total cultivated area per farmer was 2.555 hectares with a 46.9% majority being in possession of less than 2 hectares of farmland. The mean number of farmed land plots was 4.94 per farmer with a 41.6% majority having 6 or more plots for farming. The farmers were mostly small landowners (42.4%) or had acquired ownership of their own land and water rights (51.8%). The water for irrigation of their land was supplied through a combination of several sources (35%) and a 48.2 % majority transferred water via earth canals to their farmland. The 48.2% majority used traditional irrigation techniques. The majority of traditional farmers (53.4%) implemented the flood irrigation system, and the majority of farmers (69%) implementing pressurized irrigation techniques used the spray irrigation system. The degree of social participation demonstrated by most farmers (32.9%) with respect to better water management for agriculture was low: a 32% majority had never taken part in training courses related to water management, and 39.6% had never sought advice at agricultural extension centers. Other obtained results about the farmers under study are as follows: 69.6% had never taken part in the Farm Day ceremonies, 58.4% had never seen educational films on water management, 76.1% had never visited model farms, 75.3% and 73.7% had never read extension literature and brochures respectively, and 81.1% and 70.4% of the farmers had not utilized the optimum farming patterns and the new irrigation systems recommended by agricultural experts respectively.

2. Inferential Statistics Results

2.1) Relationship between Water Management Improvement and other Variables

In this section, the relationship between water resources management improvement variable, the ordinal variable, and the ratio variable was

investigated through the Spearman's and the Pearson's correlation tests, respectively. The results are shown in Table 1.

Table 1: Relationship between Water Management Improvement and other Variables

Primary Variable	Secondary Variables	Test	r	Sig
Degree of Improvement in Management of Water Resources (P)	Number of Participation in Agricultural Extension-Training Courses (A)	Pearson	0.493**	0.001
	Quality of the Organized Agricultural Extension Courses (B)	Spearman	0.618**	0.000
	Number of Occasions Farmer Sought Advice at the Agricultural Extension Services (C)	Pearson	0.169*	0.041
	Performance of Agricultural Extension Sector on Managing Water Resources Optimally (D)	Pearson	0.713**	0.000
	Degree of Participation Demonstrated by Farmers on Improved Management of Water Resourced (E)	Spearman	0.723**	0.000

*Significant at the one percent level **Significant at the five percent level

It could be seen that there is a significant relationship between the variable P, "Degree of Improvement in Management of Water Resources", and the variables A, B, D, and E (see Table 1) with a 99% probability, and there is a significant relationship between P and C with a 95% probability. In other words, the more the number of occurrences for the variables A to E, the more the degree of improvement in water resources management.

2.2) Comparison of Mean Values obtained for Degree of Improvement in Management of Water Resources in Different Farming Groups

The Independent Two-Sided T-Test was used to compare the Degree of Improvement in Management of Water Resources in two different groups of farmers. The results are shown in Table 2.

Table 2: Comparison of the Degree of Water Resources Management in Different Two-Sided T-Test Groups

Dependent Variable	No.	Categorizing Variable	Groups	Mean Value	Standard Deviation	t	Sig
Degree of Improvement in Management of Water Resources	1	Use of Modern Irrigation Technologies	Y	112.71	29.43	6.87**	0.000
			N	56.63	12.76		
	2	Use of Optimum Farming Patterns	Y	91.52	21.34	2.35*	0.040
			N	77.87	15.94		
	3	Use of New Irrigation Systems Introduced by Persons In Charge	Y	118.88	31.31	6.11**	0.000
			N	58.54	12.40		
	4	Participation in Farm Day Ceremonies	Y	86.44	18.47	1.17	0.127
			N	82.96	18.05		
	5	Watching Educational Films	Y	118.82	34.84	7.70**	0.000
			N	50.51	11.73		
	6	Visiting Model Farms	Y	108.11	32.68	5.94**	0.001
			N	61.20	17.57		
	7	Using Agricultural extension Literature	Y	96.59	20.90	2.69*	0.024
			N	72.83	13.56		
	8	Using Agricultural extensional Brochures	Y	93.21	19.87	2.44*	0.031
			N	76.11	15.15		
	9	Using Educational Posters	Y	85.03	18.23	0.97	0.234
			N	84.32	16.32		

*Significant at the one percent level **Significant at the five percent level Y=yes N=no

According to the obtained results, the mean difference obtained for Degree of Improvement in Management of Water Resources is significant with a 99 percent probability in groups 1, 3, and 5, and with a 95 percent probability in groups 2, 7, and 8. Also, this difference is not significant in groups 4 and 9. This means that, as compared to farmers who did not use these resources, farmers using modern irrigation technologies, optimum farming patterns, new irrigation systems introduced by the persons in charge, extension literature and extension brochures, implemented to a greater extent the effective mechanisms for improving water resources management, so that the degree of water resources management improvement was significantly higher in these groups. Moreover, the mean improvement in the degree of water resources management was higher

in a significant manner among farmers who had seen films on the subject or visited the model farms, as compared to farmers who had not participated in such activities.

2.3) Investigation of the Effective Extension Factors for Improving Water Resources Management

In this section, the simultaneous effects of extension variables on the degree of water resources management improvement were studied by making use of multiple regression and stepwise methods. As could be seen in Table 3, the results indicate that 7 variables (X1 to X7) were entered into the equation, for which the coefficients of determination (R^2) were obtained. Collectively, these variables could explain 77.5% of the dependent variable's variations. The positive standard coefficients (β) obtained for analyzed

variables indicate that a change equal to one standard deviation in each of these variables would produce a corresponding change in management improvement equal to 0.789, 0.613, 0.567, 0.402,

0.237, 0.187, and 0.115 of the standard deviation, respectively.

Table 3: Effect of Variables on Water Resources Management Improvement

Variable Name	Coefficient of Determination (R ²)	"B" Coefficients	Standard Error	Standard Coefficients (β)	Statistic "t"
C: Constant Coefficient	---	12.966	3.285	---	19.76**
X1: performance of the local agricultural extension service	0.446	18.327	6.445	0.789	5.76*
X2: quality of the organized educational-agricultural extension courses	0.560	1.578	0.778	0.613	3.33**
X3: participation exhibited by each farmer in cooperating with other farmers for better management of water resources	0.659	1.076	0.650	0.567	2.48**
X4: use of modern irrigation technologies by farmers	0.704	2.654	1.239	0.402	2.57**
Number of Participation in agricultural extension - Training Courses	0.736	0.790	0.236	0.237	1.67*
X6: Watching Educational Films about Water Consumption Management	0.757	3.401	1.880	0.187	1.50*
X7: Number of Times Farmer Sought Advice at the local Agricultural Extension Service	0.775	1.107	0.991	0.115	1.32*
F=45.176**	Df= 7	R=0.809	R ² =0.775		

*Significant at the one percent level **Significant at the five percent level

With due regard to what was said before and the information given in Table 3, the linear equation from the regression analysis is obtained as:

$$Y = 12.996 + 18.327 X_1 + 1.578 X_2 + 1.076 X_3 + 2.654 X_4 + 0.790 X_5 + 3.401 X_6 + 1.107 X_7$$

(Eq. 1)

Discussion

Many factors are effective on the way water resources are managed. That is why much research has been aimed at identifying these factors in order to better manage water consumption in the agricultural sector. However, so far few studies in Iran have been directed at investigating the agricultural extension factors that can result in improved management of water resources. In this article, an effort is made to identify the effective factors that can improve water resources management in Tehran Province agricultural sector. Performance of the agricultural extension centers for water management in the agricultural organizations was recognized as the most effective factor on better management of water. This is no surprise since better extension activities in any field would lead to improvement and finding of better solutions for problems, and water management is no exception. A successful

agricultural extension service for water management in any region should do the following to help farmers to optimally manage their water consumption: introduce advanced technologies for irrigation and optimum farming models, organize educational-extension courses, provide educational posters, publish agricultural extension literature, brochures, etc., observe Farm Day, distribute educational films on water management, and establish model farms. The second important factor in improving water management was the quality of the organized educational-extension courses. The obtained results showed that the higher the quality of these courses, the better farmers can manage water consumption. This result also offers no surprise since the quality of these courses would act as a guarantee for raising awareness among and introduce knowledge to the farmers, and for this reason, this is classified as a significant test. The third important factor in improving water management is the level of participation shown by individual farmers for improving water management schemes as a social activity. This factor would also be logically expected. Group participation in utilization and management of water resources in arid areas has been and will be one of the reasons why these

areas can withstand the harsh conditions associated with water shortage. Encouraging farmers to participate as groups in the following activities can improve management of water resources: dredging canals, utilizing water from canals as well as maintaining the canals, paying their share for motor-driven pumping of water from adjacent wells, buying pipes for common water transfer paths, asking for the advice of those farmers who are already utilizing modern irrigation systems through establishment of cooperative companies, supplying funds for digging aqueducts (ghanats) as well as solving technical problems thereof, dredging of ghanats, arriving at agreement and group resolution with regard to the right of way in water canals, wells, and fillings (ridges), installing systems for drawing water from rivers, digging catch basins and diversion canals for optimum utilization of rain and flood water as well as maintaining these structures, prevention of water pollution in rivers and stagnant waters, reducing the length of water canals to a minimum, purchasing of polyethylene pipes for reducing water loss, controlling the growth of weeds in canals, preventing irresponsible draining of industrial and agricultural sewage into irrigation canals, integration and leveling of land, recycling agricultural waste, and many other similar cooperative activities. The fourth important factor in improving water resources management was application by farmers of modern irrigation techniques. The ICID (International Committee on Irrigation and Drainage) evaluates as 30% the efficiency of irrigation in Iran (Ashgartousi and Mohammadinikpour, 1995), while the efficiency of modern pressurized irrigation systems is more than 70% which is a marked improvement on traditional irrigation systems (Mousavi, 2005). If the current trend of population increase as well as the critical decrease of already diminishing water resources continues, in the near future, the mere feeding of the Iranian population would be a huge challenge. Therefore, it would be essential to improve water consumption efficiency in farms via replacing traditional irrigation methods with modern irrigation systems (e.g., spray method, drip method, etc.). The fifth important factor in water management improvement was increased farmers' participation in educational-extension courses, i.e., the more the farmers participate, the better they can manage their water resources. This is another logical conclusion in this article. Naturally, these classes would increase the farmers' knowledge and

skill for utilizing mechanisms aimed at increasing water consumption efficiency. The significance of this relationship is indicative of the positive role agricultural extension activities play in improving water resources management. The sixth important factor in the betterment of water management was the watching of educational films by farmers. This is a useful and yet inexpensive way of encouraging farmers to manage water more efficiently. It would be better if farmers watched such films in groups and in the presence of an expert (educator), so that they ask their questions on the spot. Another way, of course, is to make CD's available to farmers for watching as they wish. Finally, the seventh (and the last) effective factor in improving water management was the number of times farmers would seek advice (with regard to water resources management) at their local agricultural extension services. Naturally, such sessions would be beneficial only if: 1) experienced and knowledgeable experts are present in such centers to help farmers, and 2) These experts expend sufficient time and effort in solving the farmers' problems. Obviously, the farmers would be reluctant to go to these centers again if they do not receive appropriate answers to their demands.

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The effect of virtual banner advertising on the Internet training products shopping

(Islamic Azad University of Zanajan)

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Abstract: Business which is the foundation of economic life undoubtedly needs the audience and consumer. In recent years which are known as communication era, a new form of the life for the people has been shaped. Internet means the worldwide network of multiple computers which are connected together. Assigned to the nineties with the applications of private sector has become commercial, and then entering through the network has deep impact on how business gets done. There are many audiences in cyberspace, but these audiences' opportunities are very small. It is difficult to make them for a few moments to understand what we do. Internet is one of the most used media that is faster than traditional media and Internet advertising banners have the most effective role in increasing advertising video capabilities. This paper examines the factors that affect the virtual banners that will increase the uptake of paid audiences. These include the outward form of advertising banners, a fascinating mess, graphics and animation and other visual effects, reduce costs and access the banner, allowing precise targeting of customers. The statistical society of this research is Islamic Azad University of Zanjan, which are selected using stratified random sampling and field of data collection method is through a questionnaire. Variables validity was calculated through reliability of the content validity by using Cronbach's alpha. The findings show direct positive relationship between the factors that impact on the advertising banners and purchase training products is increasing.

[Mehrdad Alipour, Seyed Mahdi Moniri, Afsane Taheri, Seyed Vahid Ataei. **The effect of virtual banner advertising on the Internet training products shopping(Islamic Azad University of Zanajan)**. Life Sci J 2012;9(4):5075-5081]. (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 757

Key words: Internet, advertising, virtual banners, Internet advertising, Internet shopping

Introduction: In today's world which is the world of costs and benefits, advertising are required to work in a suitable way to be correct while effectiveness of an institution with the costs expended for the benefit, however, long-term outcome on given the importance of performance effects in the advertising, promotional media rankings used in the organization has a special place and prevent inappropriate spending on advertising. False advertising can actually reduce a company's sales. One of the biggest challenges in Internet marketing is trying to attract and capture the audience. This caused a whole new advertising industry on the web. Internet advertising has referred to the Internet as a communication channel and device on the web environment in which the effective ways to attract audiences is the usage of virtual banners. Internet users in Iran increasingly are growing. Need for advertise in the media

depends on having a reasonable number of contacts in the media and a media will have an acceptable number of audiences when the business model and function is specified and increase the site traffic. Generally any promotional activities has two main purposes in the first is that any advertising is done to create and deliver the message. Second the aim of promoting is production sales. E-Commerce disappeared all trade barriers and problems that for a long time have been in the way of the old conventional method of sale. As the geographic restrictions which hereby from every corner of the world users can buy your services and products through your site and no need to have stores all around the world. The most important and most difficult issue of e-commerce sites are E-COMMERCE programs. This program can be money makers and earn income for the site if it is

selected correct and if it is the wrong choice will result in losses.

Theoretical Principles of study

Internet can be very wide and high media, but relatively few companies have been able to use it successfully in order to operate their own propaganda purposes. Internet attraction is primarily because of its direct style that individually can communicate to consumers. E-commerce refers to any transaction in which the goods or services dealing take place through the Internet or lead to import and export of goods or services. Since 1970, when large companies provide a private network among themselves to exchange information between the partners and suppliers, E-commerce has been emerged. This became known as EDI electronic data interchange. The following list will give a summary of the attractions of e-commerce Low transaction cost, high volume purchase in a transaction, being adopted with business cycles.

Types of e-commerce

C2B or CONSUMER-TO-BUSINESS, the Internet has made it possible for consumers to purchase their goods directly in a large scale without the need to a seller.

C2C or CONSUMER TO CONSUMER Internet access is provided in the context that both sides of the transaction can trade and be a consumer.

G2G or GOVERNMENT-TO-GOVERNMENT this service is used for contracts between the two countries in various areas.

B2A or BUSINESS TO ADMINISTRATION this business includes all commercial/ financial transactions companies and government organizations.

C2A ⇨ CONSUMER TO ADMINISTRATION

Following the growth of B2A, B2C Governments are likely to expand the field of electronic transactions to some fields such as collecting taxes on income and every public assistance between the Government and people.

B2B or BUSINESS-TO-BUSINESS provides you some opportunities to reduce problems and costs related to the relationship with suppliers.

B2C or BUSINESS TO CONSUMER Internet will provide many opportunities for consumers that can develop their buying range.

Internet Marketing

Since 1991 which the first website appeared Internet has changed marketing and the business. Research shows that over a billion Internet users are constantly and this number is to increase. This has affected both customers treatment that companies way for marketing. Internet marketing is the result of applying information technology in traditional marketing. Traditional marketing focuses on the concept of exchange (Harris 2003). We can say that electronic marketing which is formed from combining of marketing and information technology has advantages than traditional marketing. The following capabilities which come from applying information technology and computer networks support this idea (Darbi, 2003). Internet has changed core of marketing. In past bargaining between seller and buyer, or to participate in auctions determine prices But information and communication technology has led to access of customers to a competitive and real-time information. It is necessary for Internet marketing to provide a plan for Internet trade and its implementation. In Internet marketing categorizing consumers is very important. Some parts of Internet marketing are related to services which offer from companies' website. Internet helps us to be in touch with customers and answer their requirements. To improve Internet marketing, traffic of website which occurs by users and some other factors should be under control. We have to be aware of the quality of customers' accessibility to website. Internet marketing is a solution to increase effectiveness of work without any extra costs. Benefits of Internet marketing are:

1. Ability to change in time of Indices
2. To target specific audiences.
- 3 different marketing channels
4. Change the user to the customer without delay.

Definition of Internet Marketing "Looking for marketing purposes by the application of digital technologies". To establish marketing strategies, interaction and integration of regular and internet channels is essential. For this purpose we should pay attention to marketing based on target market and offer added value for internet marketing It is essential to know that the current level and status of

Internet users for different services and the factors that cause people take advantage of these services actively. Some parts of analysis is having an estimate of the situation of customer behavior in the Internet space. Two important aspects in internet marketing, primarily is marketing mix to customers and secondly Internet branding that is considering how on-line marketing channels are used to support the brands.

Approaches to implementing relationship Electronic marketing:

The following steps can be used to implement e-CRM:

Step 1: Attraction of current and new customers to the site

Step 2: motivation for visitors to process and collecting customer's information for maintaining Contact

Step 3: Maintain a dialogue using communication on line tools.

Step 4: Maintain a dialogue with non- linear communication tools

As existence of indicators to assess and improvement in CRM There are similar characteristics in e-CRM and can calculate customer's loyalty levels.

Electronic markets

A market is a network of interactions and relationships, in which products, services and payments are, exchanged (Scott, 2001). When the market is electronic, the business center was not a physical building rather it is an interactive web-based place which business takes shape one of the important impacts of information technology in the economy, its impact on the structure and competitiveness of the market. A market structure refers to its features which influence on behavior and performance characteristics of companies that are active in the industry. Electronic markets make new digital distribution channels that provide the immediate delivery of digital products with no financial cost and time lose. New electronic channels that are formed around the Internet, will lead. For e-business, companies must have business relationships with market components by using computer interaction and established in forms of b2b or b2c Formation.

Internet advertising

Internet advertising refers to use of internet as a channel and communication tool for advertising in

the Web environment (Gao and others 2002). Internet advertising for the first time and as a banner was showed on October 27, 1994, and in the hot wire 3 website. Jupiter communication that is one of the most prestigious institutions in providing Internet Statistics says Internet advertising spending in 2000, 2001, 2002 and 2003 was respectively 5/3, 7/3, 9/5 and 11/9 billion dollars. Internet advertising includes various aspects that following is a brief reference to them (Gao and others 2002).

1. Business model refers to a strategic plan and business idea on how to obtain money for a business.
2. Business model based on the content the main efforts of web masters should be focused on providing interesting information to increase site traffic.
3. This model is based on various online services in a variety of services for online publishers
4. This model provides ability to search among the various sites and also provide the model to classify those sites based on its content, services to those who are in search of a particular topic or subject.
5. Model-based advertising services. Companies in this group are those who wish to advertise on the Internet, offering the services. These services include designing ads and helping to find a suitable location for the ad
6. Model-based advertising network, companies in the group exposed areas of Internet Publishers and advertisers for buying.

System infrastructure is one of the essential parts of the Internet advertising. Advanced technologies play an important role in the development of Internet advertising. Technologies used in this area include Internet presenting technology (such as SVG and Flash), 22 client technologies (such as HTML Java and JavaScript), Intermediary Technology 23 (such as Java and J2E), and communication protocols. The relatively Inclusive Internet in Iran has been used since 1376 and increasingly in recent years the number of users has increased too. Despite the growing number of Persian sites, but the number of Internet advertising on these sites is very low and negligible. This has caused Arising of financial problems because one of the most important sources of revenue for Web sites in the world is the revenue derived from

advertising. Financial problems of Iranian sites cause closure of many of them after a while, and it means the loss of job opportunities for some. Internet advertising still has not found a suitable place in the basket (portfolio) companies, advertising- Which in many cases can be as a consultant to advertisers, and will provide services to them. After a decade of the emergence of internet advertising phenomenon, different methods and models for Internet advertising has been developed and used that one of the most widely used form of Internet advertising are banners. Virtual Banner (BANNER) consists of a small graphic image and usually rectangular which is connected to the other website and has several dimensions but the average length is 460 pixels (2) and the width is 60 pixels (NOVAK AND HOFFMAN, 1996). Banners because of low cost and design are the most common forms of internet advertising. (Liang et al. 2004). Generally banners are in two forms, the fixed banner which ads are in form of an image in fixed size and the dynamic Banners which use animation technology in designing and manufacture. Another type of Banners is interactive banners that allow two-way communication between users and advertisers. Banners were the first form of advertising, which were widely used in Internet And now are the best known and most widely used forms of Internet advertising (MOHAMMED ET AL, 2001, P.386) Banners are usually in the format (3GIF), and are built on top of Web pages. User by clicking on a banner transmitted to the page which gives more description about it or directly to the advertiser's company website. Banners are different and have different types and they can be categorized as follows:

- A) Fixed banners:** These banners are usually provided in GIF format, and contain images and texts that are fixed and do not move. Because of this point of view that these banners are not interesting for visitors, was less used, but now research has shown that some users prefer this type of banners and their use has increased recently (MINNICK AND MINNICK, 2001).
- B) Moving banners (animated):** These derive from a combination of fixed and several banners by using of special software designed like GIF Builder and the similar to animated cartoons have property of variability. Usually size of these banners is bigger than fixed one. The advantages of this type of banners that you can use them to design more sophisticated advertising messages and they are more

interesting to users. From these , but due to high volume and large size reduce the speed of loading web pages (MINNICK AND MINNICK, 2001)

C) Interactive banners (with enriched media):

Banners of this type use multimedia technologies (such as audio, video and animation) to deliver advertising messages. Their main purpose is attraction of target audience. Enriched media banners not only provide rich media banners with animation, sound and image but also by inviting users to interact with advertisers gives more information about the desired product or service offer. In this type by using a variety of software and technology features and functions are added to banners derive ability to interact in a so certain quality (PASTORE, 2001).For example There are banners which for the first show few options for user queries (e.g., male or female) And if any of the options selected by the user, certain advertisements displayed. In fact, animated banners are more advanced type of interactive banners and have more features. Despite of the difficulties and higher costs for them, but based on a research, This type is more effective than other types (MORGAN, 2001) therefore Some companies prefer to use FIASH more. Shock Wave is the most common software for designing the interactive banners. Recently proceedings have been carried out for effectiveness of banners. According to the estimates, click rates by members on banners have been 10% in 1994. In recent years there have been approximately 3% and sometimes below 1 percent. (Blakeley 1998, Flynn 1999, Chen 2000). Some of the reasons for the reduction are: too much advertisement in the internet (users' attraction in advertising) and also reduction of researches and users' wandering in the internet. This is why; advertising agencies have been trying to increase the rate through using the interactive banners with interesting and entertaining features (Kranhold 1999). Banners are still most used type of internet advertising and its number will increase in internet each day. There is other explanation of internal advertising as below: showing the names and trademarks, advertising slogans and images on popular websites, in a way that is helpful for achieving the advertising goals. The active members in providing and delivering the advertisements include: advertising companies, internet publishers, organization advertisers and manufacturing companies.

Research methods

"Y" internet purchasing has been used according to the index theories for measuring increased purchasing. That is based on Rinses Liker range

which is the most common forms of ordinal variables, responses will answer through one of the five metrics "completely agree, and agree, I don't know, disagree, completely disagree,". (Brayfield and Rothe 1951, Miller 1977:368-379). Recent research has been tried to use the sampling according to inability to interview the entire community. Indeed, we select the small size of the community and do the study on it, then generalize its result to the entire community. In this study the statistical society includes all the Azad Zanjan University students who are grouped on the different features such as "the method requirement, nature of data, type of gathering them and structure of statistical community. So it has been used, in this study, possible sampling to select the number of equal groups and random sampling in proportion to each group. The presented numbers are estimated since the exact number of people covered has not been announced by authorities. Finally, determination of sample size are estimated through using the Cochran with 95%, 99% confidence intervals. Current research is a kind of applied research that its method is survey method. Hence, interviews or written questionnaires techniques are the best in gathering the data and information in order to measure the influence of advertising banners on increasing the university students desire to purchase. Questionnaire reliability test has been

done through the Cornbrash's alpha test. According to the appendix tables, the value of this static is over 70%, so it has been used two important income validity in this study as below:

1. **Face validity:** research is to identify valid indicators or reagent, through jury, in terms overview agreement of experts about a case related with index.

In order to use this same standard questionnaire in this study, as a tool to assess and collect, designed questionnaires have been used after reviewing by professors and weather experts and eliminating of defects.

2. **Constructed validity:** it is made of the relationship between scales with theoretical framework in order to identify it, is there relationship between research tools or concepts and theoretical assumptions?

Received questionnaires are encoded after getting the data and according to its nature, structure and hypotheses form, then data is reflected in Data Sheet. Now received information is ready to be processed by computer.

STATISTIC:

VALUE	D f	Pearson Chi-Square	Likelihood Ratio	Linear-by-Linear Association	Asymp. Sig. (2-sided)
HYPHOSIS					
HYPO1	16	409.071 ^a	475.061	172.410	.000
HYPO2	16	509.372 ^a	565.479	195.654	.000
HYPO3	16	958.071 ^a	798.292	205.486	.000
HYPO4	16	1011.225 ^a	906.528	353.127	.000

Causal Analysis (multivariate- hypothesis test)

1. Through banner ads will increase the purchasing.

Discussion and conclusion

Conclusion includes the final stage of the research process. Indeed, according to the findings of this study can be said:

Research hypotheses

Hypotheses number 1: it seems there is a relationship between virtual banner advertising and increased purchasing.

The result of testing this hypothesis confirms it, the relationship between advertising through the virtual banners with increased purchasing (H1)

Hypotheses number 2: it seems there is a relationship between reductions of the advantages of being through the internet access costs with increased purchasing.

The result of testing this hypothesis confirms it, the relationship between reductions of the advantages of buying through the internet access costs with increased purchasing. (H1)

Hypotheses number 3: it seems there is a relationship between accurate targeting customers of internet advertising banners and increased purchasing.

The result of testing this hypothesis confirms it, the relationship between accurate targeting customers of internet advertising banners.

Hypotheses number 4: It seems there is a relationship between attract the audiences through the graphics and animation and the other visual effects and increased purchasing.

The result of testing this hypothesis confirms it, the relationship between attracts the audiences through the graphics and animation and the other visual effects and increased purchasing.

We live in a century in which there is the huge development in media and we can't expect there is no influence on people. Media revolution is considered as human being revolution. In industrial century, media was one-sided but now it is bilateral and interactive. It provides people with opportunity to use it in order to their benefits. Advertising through the banners, based on international statistics, is 47% of online advertising. The total number of ads was 8/2 million dollars in this year which is referred to the importance of advertising banners. There are some conditions:

1. The appearance of virtual advertising banners: These ads should attract the audiences in short term. It should convey its message whether is located in the up, down, or middle of the page. Why the short message has more affection.
2. Selecting the short and attractive messages for virtual advertising banners: smooth and beautiful prose, it means to choose a word and image for advertising to deliver the messages beautifully.
3. Graphic and animation: composition of color and light and background music has significant effect on the audience's attention and virtual banners success.
4. Targeting the advertising to get sure they guide properly the delivering the message to people: the goal of these ads is this to

deliver the messages to people who have the same interests, job, specialty, sport ,.... This group can be divided through the different sites. Sale proposal can be adjusted in a way to consistent with their characters and interests then the good conclusion appear.

5. Assign part of overall strategy to advertising banners: Advertising will have the best result if it uses different media to convey its messages.
6. Testing some groups with the cheap virtual ads: the cost of advertising banner is not significant but it is important for advertising. If you don't have sufficient funds you can use online advertising,

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Volume 9, Number 4, (Cumulative No.31) Part 33 December 25, 2012 ISSN:1097-8135

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