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RESEARCH ARTICLE

Qualitative Distribution of Phytoplankton along the Salinity Gradient from River - Ocean continuum, Southwest coast of India.

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ABSTRACT

Qualitative distribution of phytoplankton was studied along the salinity gradient from river (Nethravati) through estuary (Nethravati) to coastal waters (off Mangalore) for a period of 16 months from October 2012 to January 2014. Salinity varied from 0.03 psu to 0.51 psu in riverine waters, whereas in tidal influenced river waters, it ranged between 0.03 psu and 19.85 psu. In estuarine and coastal waters, it ranged from 0.04 to 34.59 psu and 9.12 to 35.30 psu respectively. Salinity appears to play an important role in the succession of phytoplankton along its gradient from river to ocean. A total of 106 genera belonging to five phytoplankton divisions viz., Chrysophyta (47), Cyanophyta (19), Chlorophyta (31), Rhodophyta (1) and Pyrophyta (8) were recorded during the study period.

Key words: Phytoplankton, Salinity, River, Estuary, Coastal waters.

INTRODUCTION

Salinity is a dynamic indicator of the nature of the exchange system. It is the indicator of freshwater incursion into estuary and coastal waters during monsoon season and it has a profound influence in determining the composition and distribution of phytoplankton along its gradient by exerting osmotic stress on the plankton.The phytoplankton succession along the salinity gradient has generally been ascribed to the fact that most phytoplankton species are stenohaline and suffer osmotic stress upon exposure to salinity changes (Bisson and Kirst, 1995). Marine

phytoplankton are adapted to high salinity and freshwater species to low salinity, some of them have evolved at an intermediate salinity (Devassy and Goes, 1988; Muylaert*et al*., 2009) or are resistant to salinity fluctuations and thus can survive in brackish (estuarine) waters.

Phytoplankton are major primary producers in the aquatic realm, from which the energy is transferred to higher organisms through food chain and are responsible for almost half of the global 'net primary production'. The density and diversity of phytoplankton are biological indicators for evaluating water quality and the degree of eutrophication. Phytoplankton serve as the base of pelagic food webs and play a major role in the global cycling of carbon, nitrogen, phosphorus and other elements and in the regulation of earth's climate. Their abundance and community structure in an ecosystem directly impact higher trophic levels and key biogeochemical cycles. It is an extremely diverse, polyphyletic group that includes both prokaryotic and eukaryotic forms. Several fundamental processes such as photosynthesis, growth, resource acquisition, and grazer avoidance to a large extent, define ecological niche of phytoplankton. The success of phytoplankton depends on how efficiently they acquire resources, transform them into growth, and avoid being eaten. Resource competition is one of the key ecological processes that control species composition, diversity, and succession of phytoplankton communities. Their abundance and distribution have important effects on carbon fixation rates and on transfer of energy in food webs. Phytoplankton communities are multifaceted in terms of their diversity and dynamics. As a source of organic carbon and energy for higher trophic levels, they ultimately determine the success of fisheries.

In general, tropical or subtropical assemblages display high species richness, with somewhat lower numerical abundances compared to temperate waters. Warm waters are also known to be less viscus than cold water, favouring species with a larger surface to volume ratio (Tunin-Ley *et al*., 2007).Phytoplankton are very susceptible to changes in the environment, and large variations in phytoplankton species composition are often a reflection of significant alteration in ambient conditions within an ecosystem. Continual documentation of phytoplankton dynamics, along with relevant environmental variables can offer important information on water quality changes. Such an approach can signal any drastic changes occurring within an aquatic ecosystem and also provide evidence to the causes of changes. Thus understanding of phytoplankton dynamics is central to the understanding of, how aquatic ecosystems work, and how they respond to environmental stresses imposed by natural and anthropogenic activities.

MATERIALS AND METHODS

A total of six stations were selected covering almost the whole salinity gradient from river to ocean continuum i.e. two stations along the Nethravati river, two in the Nethravati estuarine region and two stations in coastal waters of Arabian Sea, off Mangalore. The stations 1 and 2 representing freshwater ecosystem were fixed at Panemangalore (S_1), Farangipet (S_2) along the Nethravatiriver, of these S_2istidal influenced river station.The stations 3 and 4 represents estuarine ecosystem, of these, station 3 (S_3) represents upper stretch of the estuary (estuarine head region) at Adyar, whereas station 4 (S_4) (Lat. 12º. 50^1. 747^{11} North & Long. 74º. 49^1. 685^{11} East av. depth 4.5 m) represents(estuarine mouth region) the confluent point of Nethravati river with the Arabian Sea. The station 5 (S_5) (Lat. 12º. 50^1. 699^{11} North & Long. 74º. 48^1. 940^{11} East av. depth 7.0 m) and station 6 (S_6) (Lat. 12º. 50^1. 605^{11} North, Long. 74º. 47^1. 948^{11} East av. depth 10.0 m) were fixed in the coastal waters, off Mangalore, representing coastal ocean ecosystem (Fig. 1).

Sampling was carried out on monthly basis from all the sampling stations during the period from October 2012 to January 2014, but no collection could be made during southwest monsoon season (June – September) due to rough weather conditions of the sea at S_4, S_5 and S_6 stations. Vertical haul of phytoplankton samples were collected using Heron-Trantorplankton net (60 µm mesh size), samples were then preserved in 4% formalin for further analysis. The subsamples of plankton were used for identification to genera level by referring to the standard literature (Smith, 1950; Davis, 1955; Tomas, 1996; Bellinger and Sigee, 2010). For salinity analyses, surface water sample was collected

using a clean plastic bucket whilst subsurface by using Nansen's reversing water sampler then were carried to the laboratory under low temperature (+4ºC) in clean plastic bottles. The salinity was analysed using standard procedure (Strickland and Parsons, 1972), and expressed in psu.

RESULTS AND DISCUSSION

A total of 106 genera of phytoplankton belonging to five divisions viz., chrysophyta (47), chlorophyta (31), cyanophyta (19), pyrophyta (8) and rhodophyta (1) were recorded during the investigation period (Table 2).

The present investigation revealed the presence of a salinity gradient from riverine to estuarine and up to coastal waters. The monthly variations in the salinity during the investigation period are graphically represented in Fig. 3. The major groups (divisions) of phytoplankton encompassing the community structure of these stations is summarized in Table 1 and depicted graphically in Fig. 2. The phytoplankton genera encountered under each station along the salinity gradient is represented in Table 2.

The salinity of river water varied from 0.03 to 19.85 psu (at S_1 varied from 0.03 psu to 0.51 psu, whilst at S_2, it varied from 0.03 psu to 19.85 psu). The community structure of phytoplankton was composed of four divisions of phytoplankton belonging to chrysophyta, cyanophyta, chlorophyta and rhodophyta. The dominant group was chlorophyta followed by chrysophyta and cyanophyta. Rhodophyta was ill represented, while pyrophyta was not encountered in the plankton collection.

In estuarine waters salinity ranged from 0.04 psu to 34.59 psu (at S_3 varied from 0.04 to 25.62 psu, whereas at S_4, it varied from 4.87 to 34.59 psu). The community structure of phytoplankton was composed of five divisions of phytoplankton belonging to chrysophyta, cyanophyta, chlorophyta, rhodophyta and pyrophyta. The chrysophyta emerged as the dominant group followed by chlorophyta and cyanophyta. Rhodophyta was ill represented and recorded only in station 3 (S_3), which is nearer to riverine zone, while pyrophyta was observed only in station 4 (S_4), which is nearer to coastal water zone.

In coastal waters salinity fluctuated between 9.12 psu and 35.30 psu (at S_5 it varied between 9.12 and 34.99 psu, while at S_6 it fluctuated between 19.99 and 35.30 psu). The community structure of phytoplankton consisted of four divisions of phytoplankton belonging to chrysophyta, cyanophyta, chlorophyta and pyrophyta. The chrysophyta emerged as the only dominant group of phytoplankton, while cyanophyta and chlorophyta were ill represented. The pyrophyta were moderately represented in the coastal water zone.

From the above account, it can be ascertained that the chrysophyta appear to be the successful group established under varying levels of salinity gradient (Table 1). Highest number of genera was encountered in coastal water zone and reduction in genera was observed with reference to drop in salinity towards the riverine zone. With regard to chlorophyta and cyanophyta, the dominance was noticed in low saline riverine zone and was ill represented along high salinity gradient towards coastal water zone. The rhodophyta, though it was ill represented in low saline riverine zone but did not represent the community in high saline coastal water zone. Similarly, pyrophyta showed more preference to high saline coastal water zone and was not represented in the low saline riverine zone.

The genera that were observed in both riverine and estuarine waters includes, Dinobryon, Gomphonema, Pinnularia, Surirella,Thalassiothrix, Tribonema(Chrysophyta), Anabaena, Aphanizomenon, Aphanocapsa, Aphanothece, Coelosphaerium, Gomphosphaeria, Lyngbya, Marssoniella, Microcystis, Nostoc, Oscillatoria, Phormidium, Spirulina, Stigonema(Cyanophyta),Actinastrum, Basicladia, Cladophora, Closterium, Desmidium, Dichotomosiphon, Hydrodictyon, Kirchneriella, Microthamnion, Mougoetia, Pandorina, Pleurotaenium, Prasinocladus, Scenedesmus,

Sirogonium, Sphaerocystis, Spirogyra, Spirotaenia, Stigeoclonium, Triploceros, Ulothrix, Zygnema(Chlorophyta),Lemanea(Rhodophyta) (Table 3).

The genera that were observed in both estuarine and coastal waters includes, Bacillaria, Bacteriastrum, Bellerochea, Biddulphia, Chaetoceros, Climacodium, Cyclotella, Ditylum, Eucampia, Guinardia, Helicotheca, Lampriscus, Lauderia, Leptocylindrus, Proboscia, Pseudo-nitzschia, Rhizosolenia, Skeletonema, Triceratium(Chrysophyta), Trichodesmium (Cyanophyta), Akashiwo, Ceratium, Dinophysis, Lingulodinium, Noctiluca, Preperidinium, Protoperidinium (Pyrophyta) (Table 3).

The genera that were noticed exclusively in estuarine waters include Dictyocha, Cerataulina, Synedra (Chrysophyta), Gleocapsa (Cyanophyta) (Table 3).

The genera that were noticed exclusively in coastal waters include Hemiaulus, Pseudosolenia, Stephanopyxis (Chrysophyta) and Cladopyxis (Pyrophyta) (Table 3).

Mathivananet al. (2007) reported the dominance of cyanophyceae and chlorophyceae over diatoms in Cauvery river waters. Shashishekharet al. (2008) reported the dominance of chlorophyceae over diatoms and blue-green algae in river waters of Bhadra. Annalakshmi and Amsath (2012) investigating on the waters of river Cauvery and its tributary Arasalar, reported the dominance of chlorophyceae among phytoplankton community in river Cauvery, whereas cyanophyceae in river Arasalar.Panigrahy and Patra (2013) in river waters of Mahanadi,reported the dominance of chlorophyceae over that of bacillariophyceaeand cyanophyceae. The investigations by Goergeet al. (2012) revealed the dominance of bacillariophyceae over that of chlorophyceae, cyanophyceaeand dinophyceae in Tapi estuarine waters, while Parabet al. (2013) have reported the dominance of diatoms in Mandovi estuary. Investigating on the coastal waters of Kulai, Verlencaret al. (2006) observed the dominance of centrale diatoms such as Rhizosolenia, Leptocylindrus, Chaetoceros, Thalassiosiraand Coscinodiscus spp.

CONCLUSION

In the present study, with respect to number of genera representing each division of phytoplankton a discernable trend was observed along the salinity gradient. Under very low saline riverine conditions, chlorophyta was the dominant division followed by chrysophyta. While, moving towards the estuarine head region (S_3), the number of genera representing the chrysophytaincreased andequalized the chlorophyta.Further towards coastal water stations,chrysophytaincreased at a rapid phase, thereby showed a preferential dominance in these stations over that of chlorophyta. The preferential dominance of cyanophyta was observed towards the riverine stations, which got significantly reduced towards coastal waters. Rhodophyta presence was observed up to estuarine head region (S_3) while, pyrophyta made its presence only in coastal water influenced stations.Thereby, salinity showed an important influence on the dynamics of phytoplankton in the present investigation.

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Table 1.Spatial variation in number of genera representing different phytoplankton divisions

Stations / Division of Phytoplankton	Riverine Zone (Salinity range: 0.03 - 19.85 psu)		Estuarine Zone(Salinity range: 0.04 - 34.59 psu)		Coastal water Zone(Salinity range: 9.12 - 35.30 psu)	
	S_1	S_2	S_3	S_4	S_5	S_6
Chrysophyta	18	19	23	35	34	34
Cyanophyta	15	16	18	5	2	2
Chlorophyta	28	28	23	4	1	1
Rhodophyta	1	1	1	nil	nil	nil
Pyrophyta	nil	nil	nil	7	8	8

Table2.Qualitative distribution of phytoplankton genera at different stations

Stations / Genera	S_1	S_2	S_3	S_4	S_5	S_6
CHRYSOPHYTA						
Asterionella spp.	+	-	+	+	+	+
Bacillaria spp.	-	-	+	+	+	+
Bacteriastrum spp.	-	-	-	+	+	+
Bellerochea spp.	-	-	-	+	+	+
Biddulphia spp.	-	-	-	+	+	+
Campylodiscus spp.	+	+	+	+	+	+
Cerataulina spp.	-	-	-	+	-	-
Chaetoceros spp.	-	-	+	+	+	+
Climacodium spp.	-	-	-	+	+	+
Coscinodiscus spp.	+	+	+	+	+	+
Cyclotella spp.	-	-	+	+	+	+
Cymbella spp.	-	+	-	-	-	-
Dictyocha spp.	-	-	+	+	-	-
Dinobryon spp.	+	+	+	-	-	-
Diploneis spp.	-	+	-	-	-	-
Ditylum spp.	-	-	-	+	+	+
Eucampia spp.	-	-	-	+	+	+
Fragilaria spp.	+	+	+	+	+	+
Gomphonema spp.	+	+	+	-	-	-
Guinardia spp.	-	-	-	+	+	+
Gyrosigma spp.	+	+	+	+	+	+
Helicotheca spp.	-	-	-	+	+	+
Hemiaulus spp.	-	-	-	-	+	+
Lampriscus spp.	-	-	-	+	+	+
Lauderia spp.	-	-	-	+	+	+

Leptocylindrus spp.	-	-	-	+	+	+
Lithodesmium spp.	-	-	-	+	-	-
Melosira spp.	+	+	+	+	+	+
Navicula spp.	+	+	+	+	+	+
Nitzschia spp.	+	+	+	+	+	+
Pinnularia spp.	+	+	+	-	-	-
Planktoniella spp.	+	+	-	+	+	+
Pleurosigma spp.	+	+	+	+	+	+
Proboscia spp.	-	-	-	+	+	+
Pseudo-nitzschia spp.	-	-	-	+	+	+
Pseudosolenia spp.	-	-	-	-	+	+
Rhizosolenia spp.	-	-	-	+	+	+
Skeletonema spp.	-	-	-	+	+	+
Stephanopyxis spp.	-	-	-	-	+	+
Surirella spp.	+	+	+	-	-	-
Synedra spp.	-	-	+	-	-	-
Tabellaria spp.	+	+	+	-	+	+
Thalassionema spp.	+	-	+	+	+	+
Thalassiothrix spp.	+	+	+	+	-	-
Tribonema spp.	+	+	+	+	-	-
Triceratium spp.	-	-	+	+	+	+
Uroglenopsis spp.	-	+	-	-	-	-
CYANOPHYTA						
Anabaena spp.	+	+	+	-	-	-
Aphanizomenon spp.	+	+	+	-	-	-
Aphanocapsa spp.	+	+	+	-	-	-
Aphanothece spp.	+	+	+	-	-	-
Coelosphaerium spp.	+	+	+	-	-	-
Gleocapsa spp.	-	-	+	-	-	-

Gomphosphaeriaspp	+	+	+	-	-	-
Heterohormogonium spp.	-	-	+	-	-	-
Lyngbya spp.	+	+	+	-	-	-
Marssoniella spp.	+	+	+	-	-	-
Merismopedia spp.	+	+	+	+	+	+
Microcystis spp.	+	+	+	-	-	-
Nostoc spp.	-	+	+	-	-	-
Oscillatoria spp.	+	+	+	+	-	-
Phormidium spp.	+	+	+	+	-	-
Raphidiopsis spp.	+	+	-	-	-	-
Spirulina spp.	+	+	+	+	-	-
Stigonema spp.	+	+	+	-	-	-
Trichodesmium spp.	-	-	+	+	+	+
CHLOROPHYTA						
Actinastrum spp.	-	+	+	-	-	-
Basicladia spp.	+	+	+	-	-	-
Bulbochaete spp.	+	+	-	-	-	-
Chlorella spp.	+	+	-	-	-	-
Cladophora spp.	+	+	+	-	-	-
Closterium spp.	+	+	+	-	-	-
Cosmarium spp.	+	+	-	-	-	-
Desmidium spp.	+	+	+	-	-	-
Dichotomosiphon spp.	+	+	+	-	-	-
Gonatozygon spp.	-	+	-	-	-	-
Hydrodictyon spp.	+	+	+	-	-	-
Kirchneriella spp.	+	-	+	-	-	-
Micrasterias spp.	+	+	-	-	-	-
Microthamnion spp.	+	+	+	-	-	-
Mougeotia spp.	+	+	+	+	-	-
Pandorina spp.	+	-	+	-	-	-

Pediastrum spp.	+	+	+	+	+	+
Pithophora spp.	+	+	-	-	-	-
Pleurotaenium spp.	+	+	+	-	-	-
Prasinocladus spp.	-	+	+	-	-	-
Radiofilum spp.	+	+	-	-	-	-
Scenedesmus spp.	+	+	+	-	-	-
Sirogonium spp.	+	-	+	-	-	-
Sphaerocystis spp.	+	+	+	-	-	-
Spirogyra spp.	+	+	+	+	-	-
Spirotaenia spp.	+	+	+	-	-	-
Staurastrum spp.	+	+	-	-	-	-
Stigeoclonium spp.	+	+	+	+	-	-
Triploceros spp.	+	+	+	-	-	-
Ulothrix spp.	+	+	+	-	-	-
Zygnema spp.	+	+	+	-	-	-
RHODOPHYTA						
Lemanea spp.	+	+	+	-	-	-
PYROPHYTA						
Akashiwo spp.	-	-	-	+	+	+
Ceratium spp.	-	-	-	+	+	+
Cladopyxis spp.	-	-	-	-	+	+
Dinophysis spp.	-	-	-	+	+	+
Lingulodinium spp.	-	-	-	+	+	+
Noctiluca spp.	-	-	-	+	+	+
Preperidinium spp.	-	-	-	+	+	+
Protoperidinium spp.	-	-	-	+	+	+

Note: '**+**' indicates presence; '-' indicates absence

`Table 3.Qualitative distribution of phytoplankton genera indifferentwater bodies based on salinity gradient

Type of water / Genera	**River waters** (Salinity range: 0.03 - 19.85 psu)	**Estuarine waters** (Salinity range: 0.04 - 34.59 psu)	**Coastal waters** (Salinity range: 9.12 - 35.30 psu)
CHRYSOPHYTA			
Asterionella spp.	+	+	+
Bacillaria spp.	-	+	+
Bacteriastrum spp.	-	+	+
Bellerochea spp.	-	+	+
Biddulphia spp.	-	+	+
Campylodiscus spp.	+	+	+
Cerataulina spp.	-	+	-
Chaetoceros spp.	-	+	+
Climacodium spp.	-	+	+
Coscinodiscus spp.	+	+	+
Cyclotella spp.	-	+	+
Cymbella spp.	+	-	-
Dictyocha spp.	-	+	-
Dinobryon spp.	+	+	-
Diploneis spp.	+	-	-
Ditylum spp.	-	+	+
Eucampia spp.	-	+	+
Fragilaria spp.	+	+	+
Gomphonema spp.	+	-	-
Guinardia spp.	-	+	+
Gyrosigma spp.	+	+	+
Helicotheca spp.	-	+	+
Hemiaulus spp.	-	-	+
Lampriscus spp.	-	+	+

Lauderia spp.	-	+	+
Leptocylindrus spp.	-	+	+
Lithodesmium spp.	-	+	-
Melosira spp.	+	+	+
Navicula spp.	+	+	+
Nitzschia spp.	+	+	+
Pinnularia spp.	+	+	-
Planktoniella spp.	+	+	+
Pleurosigma spp.	+	+	+
Proboscia spp.	-	+	+
Pseudo-nitzschia spp.	-	+	+
Pseudosolenia spp.	-	-	+
Rhizosolenia spp.	-	+	+
Skeletonema spp.	-	+	+
Stephanopyxis spp.	-	-	+
Surirella spp.	+	+	-
Synedra spp.	-	+	-
Tabellaria spp.	+	+	+
Thalassionema spp.	+	+	+
Thalassiothrix spp.	+	+	-
Tribonema spp.	+	+	-
Triceratium spp.	-	+	+
Uroglenopsis spp.	+	-	-
CYANOPHYTA			
Anabaena spp.	+	+	-
Aphanizomenon spp.	+	+	-
Aphanocapsa spp.	+	+	-
Aphanothece spp.	+	+	-
Coelosphaerium spp.	+	+	-

Gleocapsa spp.	-	+	-
Gomphosphaeriaspp	+	+	-
Heterohormogonium spp.	-	+	-
Lyngbya spp.	+	+	-
Marssoniella spp.	+	+	-
Merismopedia spp.	+	+	+
Microcystis spp.	+	+	-
Nostoc spp.	+	+	-
Oscillatoria spp.	+	+	-
Phormidium spp.	+	+	-
Raphidiopsis spp.	+	-	-
Spirulina spp.	+	+	-
Stigonema spp.	+	+	-
Trichodesmium spp.	-	+	+
CHLOROPHYTA			
Actinastrum spp.	+	+	-
Basicladia spp.	+	+	-
Bulbochaete spp.	+	-	-
Chlorella spp.	+	-	-
Cladophora spp.	+	+	-
Closterium spp.	+	+	-
Cosmarium spp.	+	-	-
Desmidium spp.	+	+	-
Dichotomosiphon spp.	+	+	-
Gonatozygon spp.	+	-	-
Hydrodictyon spp.	+	+	-
Kirchneriella spp.	+	+	-
Micrasterias spp.	+	-	-
Microthamnion spp.	+	+	-
Mougeotia spp.	+	+	-

Pandorina spp.	+	+	-
Pediastrum spp.	+	+	+
Pithophora spp.	+	-	-
Pleurotaenium spp.	+	+	-
Prasinocladus spp.	+	+	-
Radiofilum spp.	+	-	-
Scenedesmus spp.	+	+	-
Sirogonium spp.	+	+	-
Sphaerocystis spp.	+	+	-
Spirogyra spp.	+	+	-
Spirotaenia spp.	+	+	-
Staurastrum spp.	+	-	-
Stigeoclonium spp.	+	+	-
Triploceros spp.	+	+	-
Ulothrix spp.	+	+	-
Zygnema spp.	+	+	-
RHODOPHYTA			
Lemanea spp.	+	+	-
PYROPHYTA			
Akashiwo spp.	-	+	+
Ceratium spp.	-	+	+
Cladopyxis spp.	-	-	+
Dinophysis spp.	-	+	+
Lingulodinium spp.	-	+	+
Noctiluca spp.	-	+	+
Preperidinium spp.	-	+	+
Protoperidinium spp.	-	+	+

Note: '**+**' indicates presence; '-' indicates absence

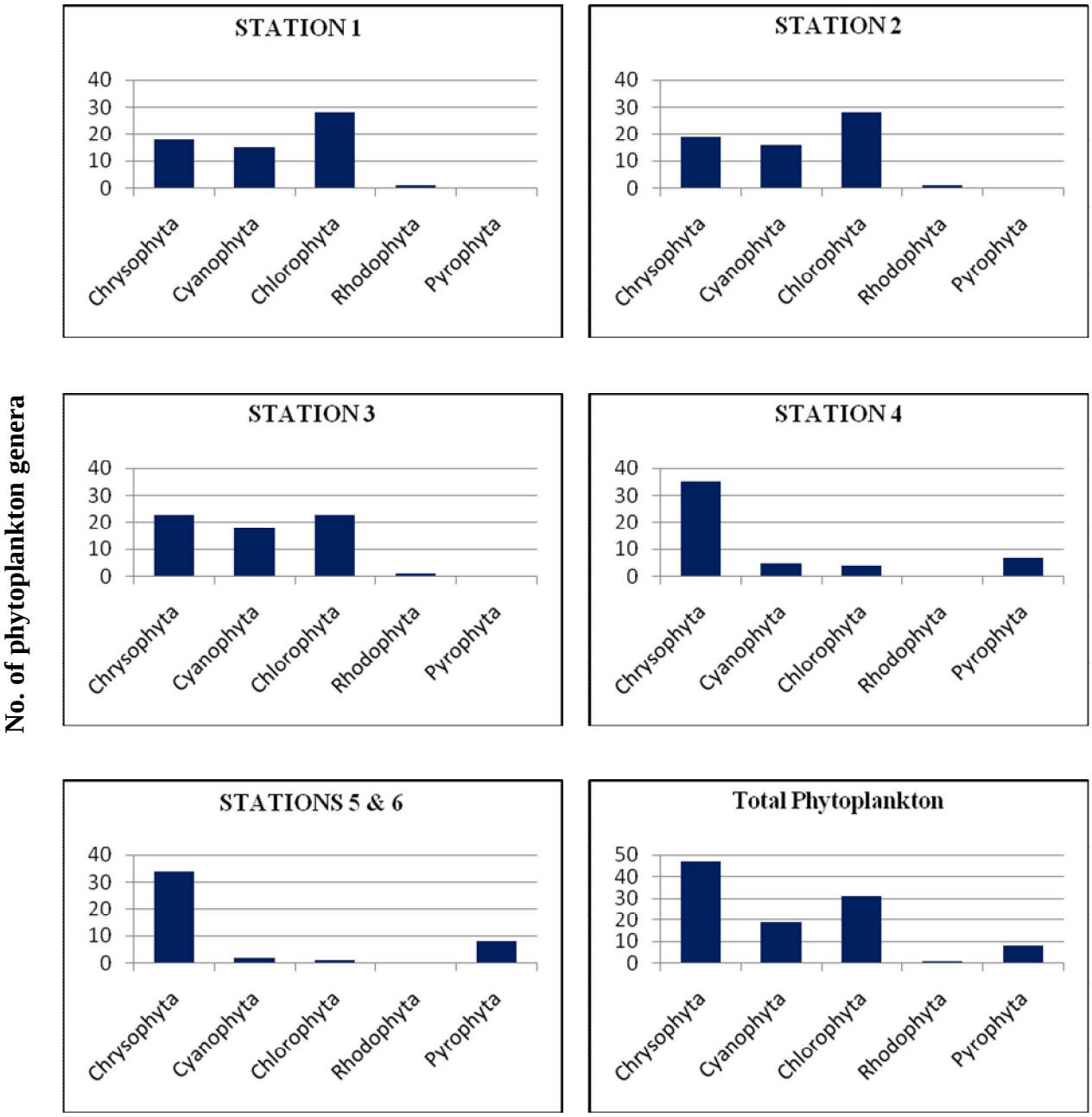

Fig. 2Division wise distribution of phytoplankton generaat different stations

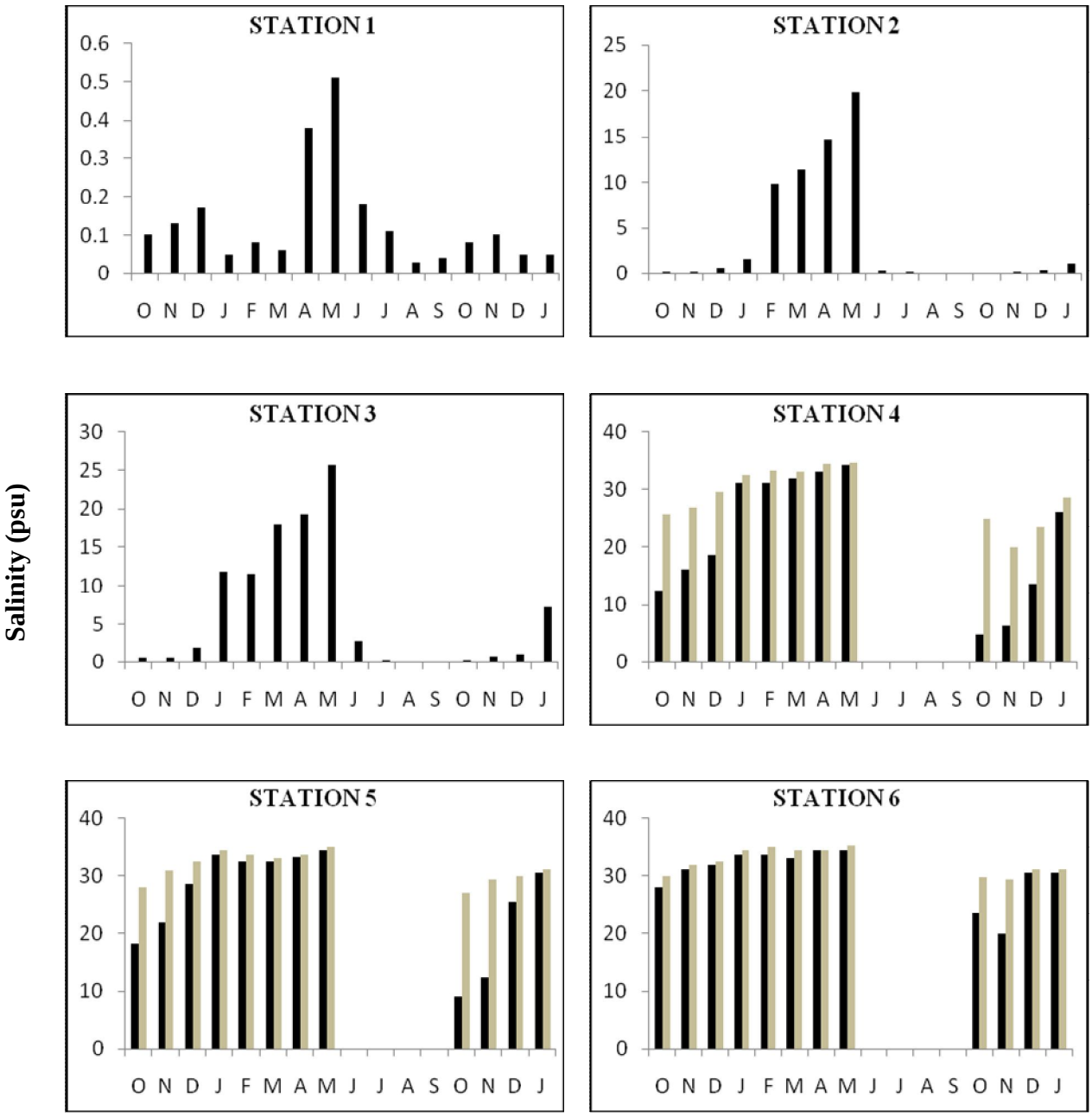

Fig. 3 Monthly variations in salinity (psu) at different stations.

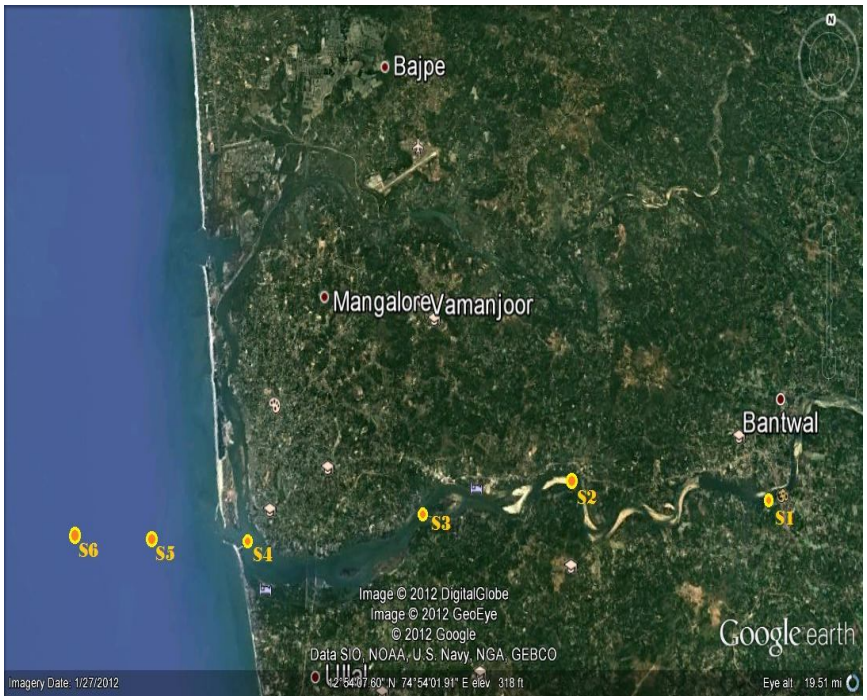

Fig.1. Map showing the location of sampling stations

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RESEARCH ARTICLE

Neural network prediction on sardine landings using satellite derived ocean parameters Chlorophyll-a (SeaWiFS), SST and PAR

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ABSTRACT

Fourteen Artificiel Neural Network (ANN) models were developed to predict 12 month ahead monthly sardine landings was analyzed for Bay of Bengal, Tamil Nadu (Nagapattinam dt) coast, India, considering all sardine (14 species) catches with previous 144 months as inputs to the models. This Neural Network Models developed with Time Series of ocean colour parameters such as Chlorophyll-a (Chl-a), Sea Surface Temperature (SST) and Photosynthetically Active Radiation (PAR) as input in Time Series as dependent variable for the target of sardine catch time series in the study area as Seasonal (12 lag) and Non-Seasonal models for this study. The output from seasonal and Non-Seasonal models were compared and the seasonal model was out performed Non-Seasonal models in prediction. The NNM **LTS_MER_SAR_SST_S** model (R^2 between the predicted and observed landings is about 0.9032) performed well when compare to other Seasonal, Non-Seasonal Univariate and Multivariate Neural Network models. This study demonstrates that the ocean colour parameters Chlorophyll-a (Chl-a), Sea Surface Temperature (SST) and Photosynthetically Active Radiation can be used in the study area on sardine landing prediction. In general, seasonal ANN exhibits good performance in prediction of sardine catch landings when compare to Non-Seasonal ANN architecture.

Key words: Chlorophyll-a, Sea Surface Temperature, Photosynthetically Active Radiation. and Neural Network.

INTRODUCTION

Pelagic fishes normally contributes 55% of total Indian marine fish production out of which the dominant fish commonly named as sardines (Sardinella longiceps +13 other Sardine species) contributes about 32% of the total pelagic marine fish production in India, is available in Tamil nadu coastal waters, which is one the most biologically productive region in the world (CMFRI annual report 2010-11). Normally fish landings are nonlinear in nature and this paper trying to forecast the monthly sardine catches of Nagapatnam district, may give effective management of sardine stock in the study area. This study also trying to fill the gap of underutilized Remote sensing parameter Photosynthetically Active Radiation (PAR) influence on sardine monthly prediction and their exploitation and assessment in Bay of Bengal through Artificial Neural Networks along with sardine landings. The traditional Auto – Regressive Integrated Moving Average (ARIMA p, d ,q) models basically from Box- Jenkinson (1976) methodology, normally used for obtaining wide variety fisheries Time series predictions. Monthly landings are generally nonlinear , which is not predicted effectively by ARIMA models, but it is efficient in modeling Linear phenomena in describing and predicting the fisheries time series of with a wide variety of species (Saila.S.B, et.al 1980), Hae-Hoon Park (1998), Stergiou KI (1996), Stergiou KI, Christou ED (1996)).

MATERIALS AND METHODS

Study area

The study area Nagapatnam coastal district (Blue in color) in Tamil Nadu, eastern part in Bay of Bengal covering a coast line length of 190 km. Figure.01 explains the schematic representation of Nagapatnam district falls in the latitudinal and longitudinal extensions between 10°46′1.2″N and 79°49′58.8″E on the Eastern part of Bay of Bengal. The movement of fishermen and the seaside limit (1000 m isobaths) for the extraction of Sea Surface Temperature, Chlorophyll-a and Photosynthetically Active Radiation in bay of Bengal also shown in the figure 01. (Yellow in color). The minimum and maximum temperature are 20 C and 34 C. This district comprises of five coastal taluks that is Nagapattinam, Sirkazhi, Tarangampadi, Mayiladuturai and Vedaranniyam.

Artificial Neural Networks

There are so many different ways to forecast nonlinear phenomena, among them Neural Networks is the best efficient method to get forecast information from a nonlinear time series (Lin sun et.al 2009). There by the applications of neural networks to landings time series forecasting have become very popular over the last few years, since most of the landings time series are in nonlinear pattern. Neural networks are simple nonlinear computing units and just imitating human neural system has an input layer, a hidden layer and an output layer. Layers in between input and output layers are generally called as hidden layers and commonly referred as neurons. When data is loaded in the ANN (Artificial Neural Network), it must be preprocessed from its numeric range into the numeric range that the ANN can deal with efficiently to improve the efficiency of the learning results (Kim and Lee, 2004).

Fishery data

The Nagapatnam District, south east coast of India, taken as study area For this study and the sardine landing data from 1998 to 2009 were obtained from the CMFRI database. The data were collected by qualified and well-trained technical staff of CMFRI by following stratified multi-stage random sampling technique in which the oil sardine and other sardine landings were recorded by covering landing centre along the Nagapatnam coast. The catch data for the year 2010 were collected in entire Nagapatnam coastal area physically as in-situ data included in this time series for modeling testing purpose.

Satellite data.

Chlorophyll-a concentration

The primary function of Chlorophyll-a is photosynthesis of marine algae in the ocean, which is the main food for sardine larvae and that availability of food during the critical developmental period of sardine larvae determines the year class of sardine population is important for sardine availability in Bay of Bengal. So Chlorophyll-a in Bay of Bengal is considered in the prediction models in this study. SeaWiFS level 3 standard binned images archived by the Ocean Biology Processing Group (OBPG) were used to estimate sea-surface chlorophyll-a concentrations. These data were obtained from the http://oceancolor.gsfc.nasa.gov/cgi/l3. We used Global Area Coverage (GAC) monthly composite SeaWiFS images with a spatial resolution of about 9 km_9 km for the period from January 1998 to December 2010.

Sea Surface Temperature (SST)

In sardine life cycle Sea Surface Temperature is an important factor which leads the sardine activity levels to increase or decrease, makes sardines move into certain areas, and influences feeding and reproductive activity. Temperature data are of interest to those who wish to catch fish or study them. Since the oil sardine is a tropical fish we need to understand how temperature affects fish behavior. So Sea Surface Temperature also considered as one of the main environmental factor in the sardine landing prediction which is normally preferring temperature range of 27° to 29°C (Chidambaram, 1950). The NOAA pathfinder data presented in ftp://podaac.jpl.nasa.gov/allData/avhrr/L3/pathfinder_v5/monthly/ data were used to study SST for the same period having the same spatial resolution along with chlorophyll data.

Photosynthetically Active Radiation (PAR).

Photosynthetically Active Radiation (PAR) is the amount of light available for photosynthesis, which is defined as the quantum energy flux from the Sun light in the 400 to 700 nanometer wavelength range. Since the sardines are herbivores Photosynthetically Active Radiation Also considered as one of the biophysical parameter. PAR changes seasonally and varies depending on the latitude and time of day. This data set consists of algorithm estimates of global Photosynthetically Active Radiation (PAR) reaching the surface obtained by the Sea-viewing Wide Field-of-view Sensor (SeaWiFS), in orbit on the OrbView-2 (formerly SeaStar) platform. SeaWiFS data products are processed and distributed by the Ocean Biology Processing Group (OBPG). For this study SeaWiFS Level 3 monthly Binned data files are downloaded from the FTP site at http://oceancolor.gsfc.nasa.gov/cgi/l3 having 9 km spatial resolution.

Image processing

All monthly mean Sea WiF Photosynthetically Active Radiation images were downloaded and processed in BEAM software. Before that a 1000 meter isobath of Tamil nadu region in Bay of Bengal was digitized in ARC GIS environment. This isobath shape file again bifurcated into district polygons of all Tamil nadu coast to extract monthly mean information for Photosynthetically Active Radiation (PAR). These polygons are imported into BEAM software along with monthly mean images of PAR parameter to get the month wise time series of all 12 polygons (coastal districts) for 13 years from 1998 to 2010.

Methodology

The time series of Nagapatnam district sardines monthly landings were normalized from zero to one by simply dividing the real value by the maximum of the appropriate set because of their nonlinearity. The time series belongs

to Photosynthetically Active Radiation (PAR) is kept as such, since they are having only seasonal influences on it. The in-situ sardine landing time series collected for the year 2010 January to December in all the landing centers of Nagapatnam district. The spatially averaged PAR value extracted from images of Thiruvallur District to Ramanathapuram District. The sardine landings time series modeled in Matlab (R2012a) Neural Networks to get the prediction values for the year 2010 and compared with the insitu catch data. In this NN function the PAR parameter up to 1998- 2009 as input against the year 2010 as target to model to predict the sardine monthly catch for the year 2010 to Nagapatnam area.

Methods of evaluation.

Several measures of accuracy were calculated in the calibration between model output and observed value. A measure of correlation between the observations and the predictions is the coefficient of correlation (R). The proportion of the total variance in the observed data that can be explained by the model was described by the coefficient of determination (R2). The estimators to quantify the errors in the same units of the variance were the square root of the mean square error (RMSE), and the mean absolute error (MAE). On the other hand other measures of variance were the Coefficient of Efficiency (E2) (Nash and Sutcliffe, 1970; Kitanidis and Bras, 1980), the Average Relative Variance (ARV) (Grin o. R. 1992), and the percent standard error of prediction (SEP) (Ventura et al., 1995) also analyzed for sensitivity analysis in this study. The E2 and AVR were used to see how the models explain the total variance of the data and represent the proportion of variation of the observed data considered for sardine forecasting modeling. The SEP allows the comparison of the forecast from different models and different problems because of its dimensionless. For a perfect performance, the values of R^2 and E^2 should be close to one and these of SEP and ARV close to zero. The optimal model is selected when RMSE and MAE are minimized. The above estimators are given by:

$$R = \frac{n\sum Y_i \hat{Y}_i - (\sum Y_i)(\sum \hat{Y}_i)}{\sqrt{n(\sum Y_i^2) - (\sum Y_i)^2}\sqrt{n(\sum \hat{Y}_i^2) - (\sum \hat{Y}_i)^2}} \quad (1)$$

$$E - 1.0 - \frac{\sum_i^n |Y_i - \hat{Y}_i|^2}{\sum_i^n |Y_i - \bar{Y}_i|^2} \quad (2)$$

$$ARV = 1.0 - E^2 \quad (3)$$

$$RMSE = \sqrt{\frac{\sum_{i-1}^n |Y_i \ \hat{Y}_i|^2}{n}} \quad (4)$$

$$MAE - \frac{\sum_{i=1}^n |Y_i - \hat{Y}_i|}{n} \quad (5)$$

$$MAPE = \frac{100}{n} \times \sum_{i=1}^{n} \left| \frac{Y_i - \hat{Y}_i}{Y_i} \right| \quad (6)$$

$$SEP = \frac{100}{\overline{Y_i}} RMSE \quad (7)$$

Where Y_i is the observed value, $\hat{Y}_i$ is the forecasted value to Y_i, and n is the number of the observations of the validation set. $\overline{Y_i}$ is average mean value of the target.

RESULTS AND DISCUSSION

In this paper, time series data, (1998 to 2010) of SST, CHL and PAR for thirteen years is considered as environmental input variables for NNM to predict the Sardine and Mackerel landing in the study area.

From Figure 2. it is important to notice that the monthly mean temperature in Bay of Bengal for the peak Sardine and Mackerel landing period (March-August) was in between from 26.0 to 29.57°C. The chlorophyll concentration during the peak landing period is between 0.8 to 1.5 mg/m^3. The PAR value was also high in the months of March to August, where the landing was high for Sardine. The temperature and CHL relation in the peak summer (April and June) indicates that the temperature increment gives the CHL decrement and it is inferred that both are inversely related to each other in Bay of Bengal to some extent. Figure. 3. shows that landings of Sardine is high during the period March-August .The Government of Tamil Nadu has declared that the month of May (i.e. actually from April 15th to May 30th) is a closed season for fishing. However, since non-mechanised vessels and mechanised vessel (<10hp) are allowed during the period for fishing. Chidambaram (1950) observed that a temperature of 26^0 C to 28^0 C is favourable for the inshore migration of the Sardine and with the rise of temperature above 29^0 C during March-May period, they disappear to deeper waters. He also related the specific gravity of water, which goes above 1.023 during March-May months also the reason for the disappearance of the shoals. Nair (1959) felt that both the shoreward migration of spawners during the monsoon as well as their outward migration to deeper waters during the post-monsoon months are for spawning purpose. Antony Raja (1967), found three phases of feeding habits for Sardines, the first from May to August, characterised by diatoms, the second from September to November, dominated by dinoflagellates and the third from December to April which was essentially a miscellaneous one made up of diatoms, infusorians, copepods, larval bivalves and heliozoans. For Mackerel, observations made at Mandapam on the south east coast of India indicated the possibility of two spawning periods, one during October-November and the other major spawning during May-June (CMFRI Annual Rept., 1957). The inference drawn by Bhimachar and George (1952) that food could be a major factor governing these migrations is contended by Sekharan (1965). He also felt that without studying the plankton available in the offshore waters the shoreward migration should not be linked with the food factor.

Long time series (merged) neural network analysis

LTS (Merged) Sardine Neural Network Analysis

Table 1. summarize the LTS (Merged) NNM sensitivity analysis on Sardine landings for Nagapattinam coast of Tamil Nadu for both Seasonal and Non-Seasonal models. The TS on Sardine landings shows the period of March, April, June and July with highest landings and the months from August to February showing lowest landings. For the year 2010, the lowest landing recorded in the month of May, because of closed season from April 15 to May 30 implemented by Tamil Nadu state. This 2010 landing details of Sardine and Mackerel seem to confirm the migratory nature of oil Sardine and Mackerel in the study area, as it has already discussed in the chapter 5.1. Coming to the results of NNM fit between the environmental variables and to the observed Sardine landings, Seasonal models

gives better prediction than the non seasonal NNM. In seasonal all the Multivariate NNM combinations are performed well, when compared to Non-Seasonal NN analysis. The Non-Seasonal and Seasonal individual SST NN models are performed well, when targeting with the Sardine landings with a high Coefficient of Determination (R^2) values of 0.57 and 0.82 respectively. The other two environmental factors CHL and PAR, despite being statistically significant in Seasonal NN analysis, showed negative Correlation on prediction in Non-Seasonal models. This negative Correlation, influences when it is combinely performing with other environmental variables particularly SST. The detailed analysis on NNM for Non-Seasonal and Seasonal are explained in the coming sections.

LTS (Merged) Sardine Non Seasonal Models

From the sardine monthly time series, it is clear that the target observed value for the year 2010 the month June is having the highest landing value for Sardine and the May month is showing very low landing. The Figure 4. explains the NNM performance graphically model wise and month wise. In LTS NN Sardine Non-Seasonal models the month of June is having high prediction variation except in LTS_MER_SAR_SST_NS model. Similarly, the March month, the second high landing profile month also resulted with more variation in all the Sardine Non-Seasonal models. Among them the model LTS_MER_SAR_SC_NS predicted well with small variation, when compared to all other non-seasonal models. Additionally the LTS_MER_SAR_SC_NS model is giving overestimation in November and April months. Further, the model LTS_MER_SAR_SST_NS showing more variation in the months of February and March interms of under estimation, but this model's performance was first among the Non-Seasonal models and ranked EIGHTH in the entire fourteen models. The predictive capability of LTS_MER_SAR_SST_NS is explained here with its sensitivity results i.e. R^2= 0.57 , % SEP= 82.22 , E= 0.4410 and MAPE =342.94 % . Again this model LTS_MER_SAR_SST_NS shows more variation as overestimation in the month of December, But, even after its variations the model's performance was impressive when compared with the remaining two other environmental variable's individual performance with the observed Sardine landings. The Non-Seasonal CHL's individual and its combination performance with other two variables are giving negative correlation with the observed landing except in LTS_MER_SAR_SC_NS and LTS_MER_SAR_CSP_NS models. This infers that when CHL combinely performed with SST and PAR in NS models and takes the model's performance into, further more variation and less accuracy, when compared to its individual NN Non-Seasonal model performance. Next to the month of May low catch landings are observed in the months of October, November, December and January but less variations are observed in these months in all Non-Seasonal models except LTS_MER_SAR_CHL_NS. So performance of Non-Seasonal Neural Network analysis in this study are having good correlation with low catch winter season months.

LTS (Merged) Sardine Seasonal Models

Figure 5. shows the LTS merged NN seasonal Sardine model's sensitivity analysis for all combinations. In general all the models performed well, when compare to NN Non-Seasonal model analysis. In Non-Seasonal models winter months low landing predictions gives the better performance. In the same way, seasonal NN models also have predicted well in their seasonal orientation with winter months low landing observed values. In seasonal NNM, four major variations have been observed in the months of February, June, September and November. Almost all models are underestimating the June month prediction. The model LTS_MER_SAR_SP_S, overestimate in the month of February and the model LTS_MER_SAR_SC_S overestimate in the month of September and November. In seasonal, lowest observed landing month' s (May) value was closely predicted by all the seasonal models with its observed value and the highest landing month's (June) prediction also matched well with 70% of its observed landing values. These results showed that high prediction capacity of seasonal NNM with satellite environmental variables, even though the fish catch landings are having strong nonlinear relationship.

As a whole fewer variations are observed in the months of October, December and January, which indicates that Seasonal models prediction, was always better than that of Non-Seasonal models. Hence, seasonal models are best

fit for low landing winter season and high landing monsoon period Sardine landings in the study area. Among the models, seasonal LTS_MER_SAR_SST_S model is ranked first, (arrived from their Coefficient of Determination) among models and the sensitivity results shows that, R^2=0.8158, % SEP=53.67, E=0.7618 and MAPE = 24.73, SST is the most significant environment variable included in this model for Sardines. Model LTS_MER_SAR_CSP_S is ranked second and having the sensitivity results of R^2=0.8120, % SEP=49.41.67, E=0.7981 and MAPE = 71.08 %. Normally R^2 and E should be nearer to one and the % SEP & MAPE should be as low as possible and nearer to zero. The SST and CSP seasonal models are having very small difference in R^2. The CSP model is having less % SEP value when compared to SST , but the MAPE was 71 % in CSP , where as the SST is having only 24.73 % of MAPE. Hence, the variance is very less from the mean observed value in SST. Therefore, among two the SST model is considered as the best.

CONCLUSION

Previous reports shown that Neural Networks prediction have been performed well for nonlinear Univariate fisheries data when compare to traditional ARIMA in both seasonal and Non-Seasonal data. H. Raman et.al. (1995). In this study the seasonal Neural Network models as a whole is giving good correlation and stood first eight positions out of sixteen models. However The seasonal model performed well when compare to multivariate Non-Seasonal models. The results from LTS_MER_SAR_SST_S on the sardine fish landings have shown 90% correlation and a minimum MAE of 0.0010 between observed and estimated sardine landings in Nagapatnam district. The model LTS_MER_SAR_CSP_S is having good correlation next to LTS_MER_SAR_SST_S, but having more MAPE variation in it. Same time Chlorophyll-a and its combination's performances are coming after all Sea Surface Temperature models performance. This gives the sardines in the study area are closed associated with temperature not with Chlorophyll-a in Bay of Bengal . However more research required to get deep understanding of the extent and nature of the relationships between environmental variables and sardine landings in the study area. With respect to the performance on amount (high and low) of landing and its prediction, seasonal Multivariate models giving high correlation and less variance. Winter months are modelled better in both Non-Seasonal and Seasonal models. The Non-Seasonal model trying to performs well only when the landings are high and perform well in the low landing winter seasons. To understand the complexities and seasonal nonlinearities, further studies are requires on the nature of uncertainity associated with the food and feeding habits of sardine, and the physiological changes which influence the ocean environment.

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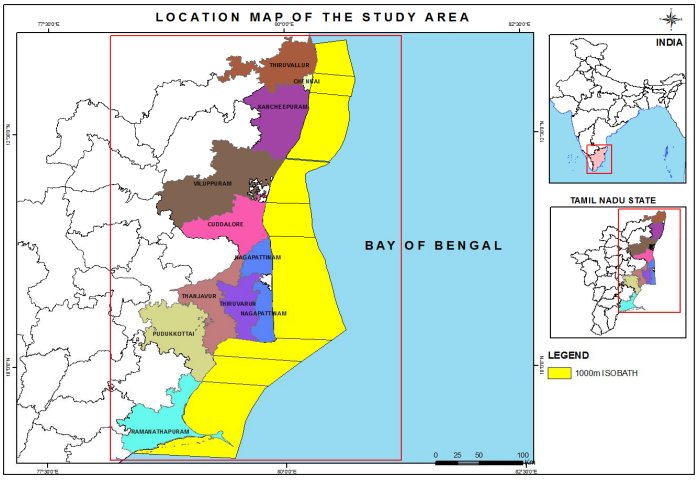

Figure 1. Study Area Details Of Nagapatnam District in Bay of Bengal

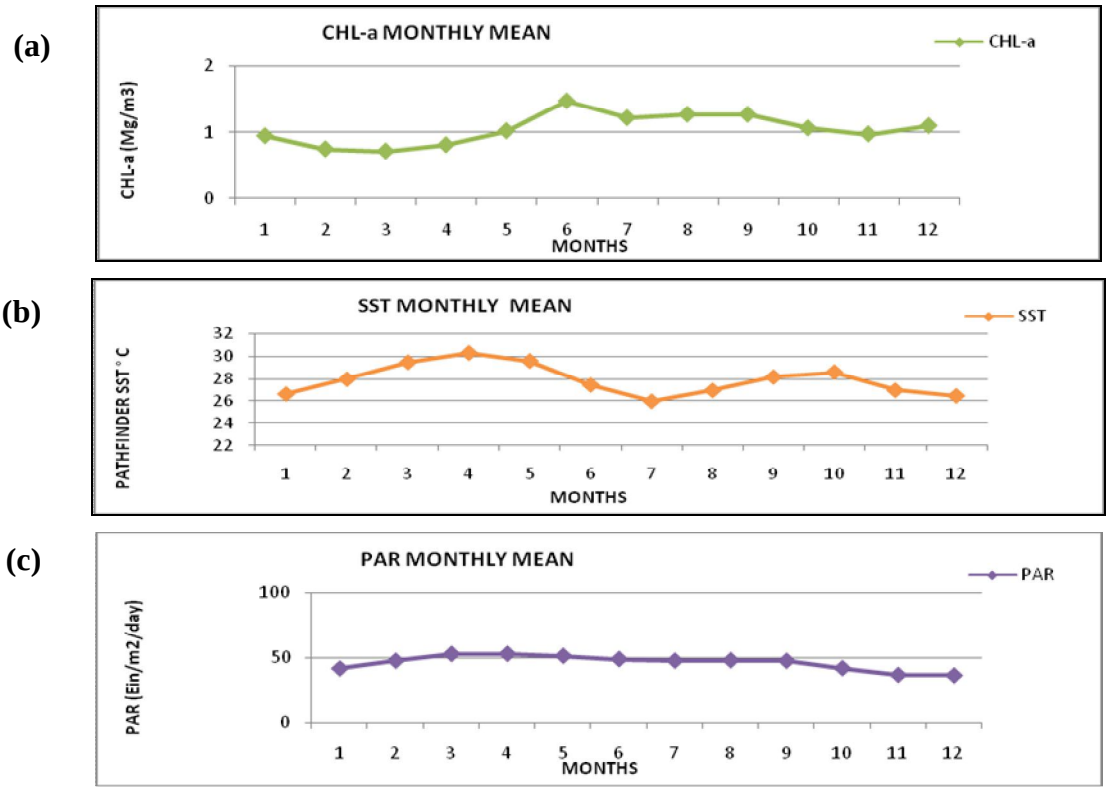

Figure 2. Monthly Mean value (1998-2010) of CHL (a), SST (b) and PAR (c)

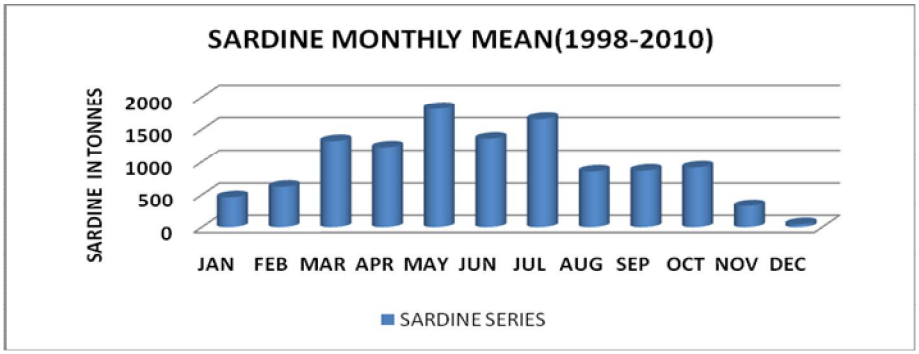

Figure 3. Monthly average variability (1998-2010) of Sardine landings.

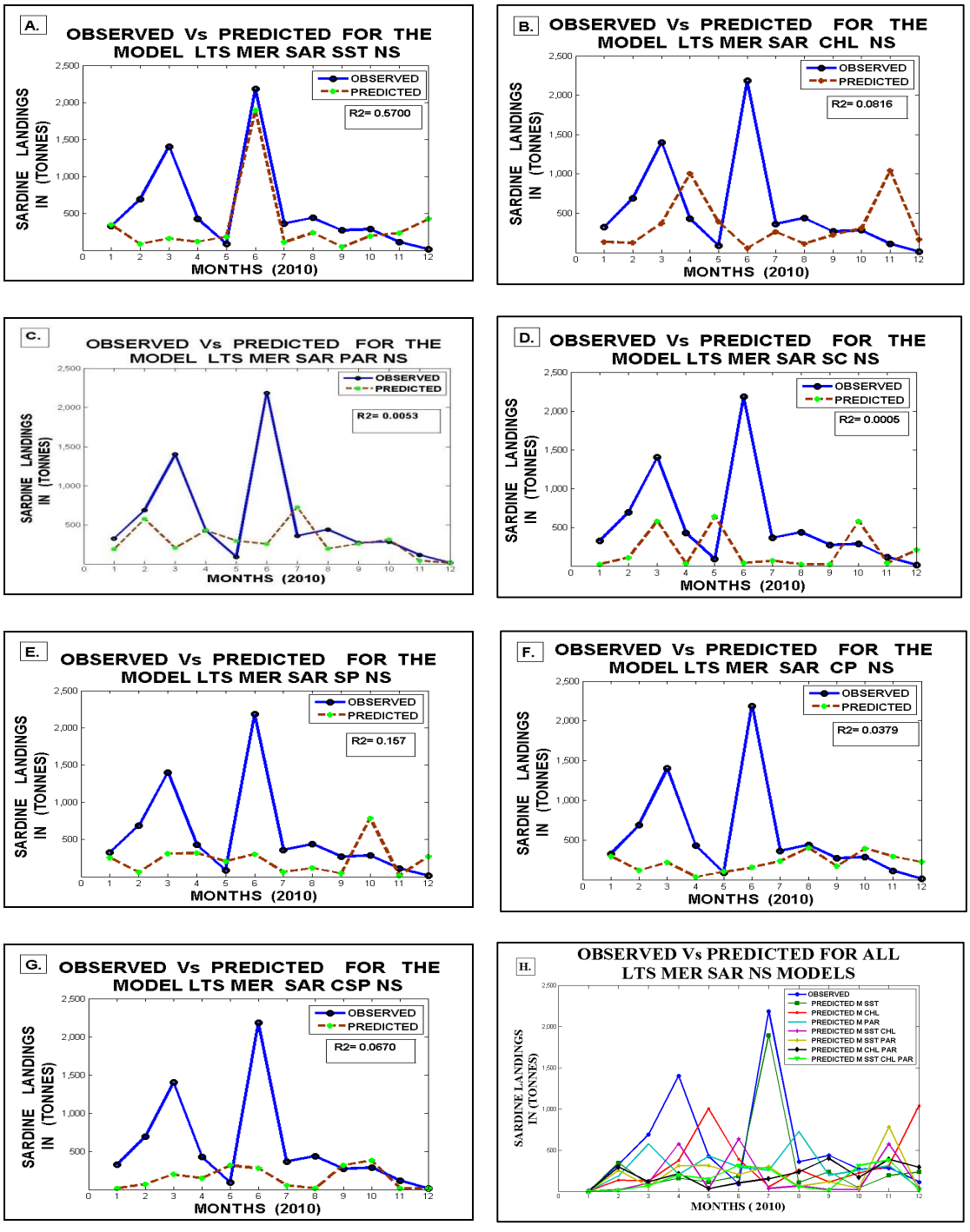

Figure 4.LTS (Merged) Sardine Non Seasonal combinations fit for all model combinations

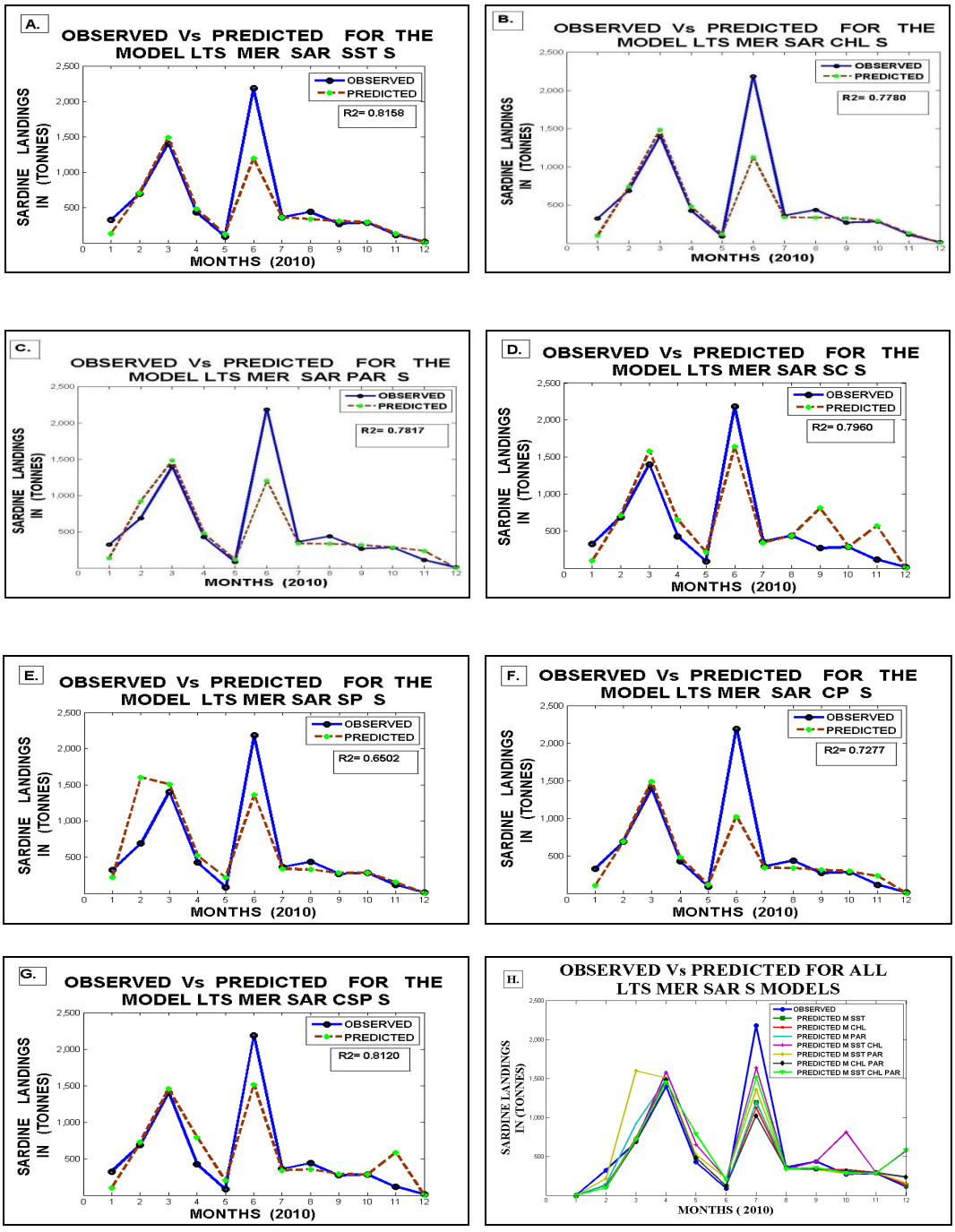

Figure 5.LTS (Merged) Sardine Seasonal fit for all model combinations

Table 1.Summary of LTS (Merged) Sardine Neural Network analysis

	LTS (Merged) SARDINE NEURAL NETWORK ANALYSIS												
S.No	**DESCRIPTION**	**R**	**R2**	**MSE**	**RMSE**	**MAE**	**MAPE**	**E**	**ARV**	**SEP**	**MODEL**	**EPOCH**	**Rank**
1.	LTS_MER_SAR_SST_NS	0.7550	0.5700	0.0024	0.0486	0.0347	342.94	0.4410	0.559	82.22	1:20:15:1	5000	8
2.	LTS_MER_SAR_SST_S	0.9032	0.8158	0.0010	0.0317	0.0139	24.73	0.7618	0.238	53.67	01:03:01	500	1
3.	LTS_MER_SAR_CHL_NS	-0.2857	0.0816	0.0071	0.0844	0.0571	251.47	-0.6843	1.684	142.73	1:20:15:1	5000	9
4.	LTS_MER_SAR_CHL_S	0.8820	0.7780	0.0012	0.0341	0.0154	25.47	0.7252	0.275	57.65	01:03:01	500	5
5.	LTS_MER_SAR_PAR_NS	0.0728	0.0053	0.0053	0.0725	0.0387	58.80	-0.2421	1.242	122.57	1:20:15;1	5000	13
6.	LTS_MER_SAR_PAR_S	0.8841	0.7817	0.0011	0.0325	0.0169	35.10	0.7498	0.250	55.01	01:03:01	500	4
7.	LTS_MER_SAR_SC_NS	-0.0230	0.0005	0.0064	0.0802	0.0568	257.73	-0.5192	1.519	135.55	2:15:15:1	5000	14
8.	LTS_MER_SAR_SC_S	0.8922	0.7960	0.0009	0.0303	0.0212	83.38	0.7819	0.218	51.363	02:03:01	300	3
9.	LTS_MER_SAR_SP_NS	0.1253	0.0157	0.0055	0.0745	0.0503	255.84	-0.3112	1.311	125.93	2:15:15:1	5000	12
10.	LTS_MER_SAR_SP_S	0.8063	0.6502	0.0015	0.0391	0.0213	44.19	0.6393	0.361	66.05	02:03:01	300	7
11.	LTS_MER_SAR_CP_NS	-0.1946	0.0379	0.0059	0.0770	0.0448	200.51	-0.4011	1.401	130.18	2:15:15:1	5000	11
12.	LTS_MER_SAR_CP_S	0.8531	0.7277	0.0014	0.0373	0.0167	33.53	0.6705	0.329	63.13	02:03:01	300	6
13.	LTS_MER_SAR_CSP_NS	0.2589	0.0670	0.0058	0.0761	0.0495	83.74	-0.3704	1.370	128.74	03:15:01	5000	10
14.	LTS_MER_SAR_CSP_S	0.9011	0.8120	0.0009	0.0292	0.0186	71.08	0.7981	0.202	49.41	03:03:01	225	2
SAR-Sardine, S-Seasonal, NS-Non-Seasonal, MER-Merged, SC -SST & CHL, SP-SST & PAR, CP- CHL & PAR, CSP -CHL, SST & PAR													

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RESEARCH ARTICLE

Identifying and Prioritizing Factors Affecting Implementation of Strategic Plans Using Ahp Technique (Case Study: Persian Gulf Petrochemical Company)

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ABSTRACT

Current research aims at identifying and prioritizing the factors affecting the implementation of strategic plans. Research method is descriptive and it is analytical survey. Instead of using statistical methods and questionnaires this research, AHP pairwise comparisons are used. Five experts who were experiences in terms of organizational position, education, etc. in Persian Gulf Petrochemical Company were used as experts and decision makers. Computational stages of the research are classified into two parts; first, identification and selection of the most important factors affecting implementation of strategic plans and then prioritizing these factors. Factors were identified and selected based on library studies and interviews with experts, and they were classified. The initialclassification included 8 main factors: 1. determining strategy and objectives, 2. resource allocation, 3. organizational structure, 4. organizational culture, 5. communication and information, 6. competitive pressure, 7. Management, 8. control and technology. Findings for the second research question regarding prioritizing factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company showed priorities include: 1. Organizational culture, 2. Communication and information, 3. Organizational structure, 4. Management, 5. Competitive pressure, 6. Resource allocation, 7. Control and technology, 8. Determining strategy and objectives.

Key words: Implementation, managers, planning, strategic plans

INTRODUCTION

Aim of strategic planning process is formulating competitive strategies. the main part in formulation of strategies is proper selection of strategies, since no organization has infinite resources and implementing wrong strategy may conflict the company in a trouble which as no return path (Acur and Englyst, 2006; Searcy, 2004).

Strategy is a comprehensive plan for practice and action which specifies major orientations of the organization and provides guidelines for resource allocation in the path of achievement of long-term organizational objectives. Selection of suitable strategy is a complicated and even risky task, since every strategy directs the organization to a specific competitive environment. Strategy of the organization specifies that how the organization wants to create value for shareholders, customers, and citizens. Prior to developing strategies, managers should analyze dynamicity of the competitive market in the respective industry as well as the organization's resources and capabilities and gain clear understanding about them (LeeandSai On Ko, 2000).

Strategies can be defined from at least two views: 1. the organization tends to do what, 2. what the organization would do at last. In the first view, strategy is a comprehensive plan for defining and achieving objectives of the organization and implementing its mission and strategy formulation should be done within a process. In the second view, strategy is the pattern for organization'sresponses to its environment over the time (Ip and Koo, 2004; Lee et al., 2000).

Kordnaeech et al. (2010) studied formulation and implementation of strategic plans in Customs of Islamic Republic of Iran. To this end, they provided matrix of strengths, weaknesses, opportunities and threats (SWOT) for formulation of strategy and then used internal and external matrix with nine and hour boxes. Finally, Quantitative Strategic Planning Matrix (QSPM) was proposed for investigation the customs organization. Status of petrochemicals in Islamic Republic of Iran's 1404 outlook vision and basic capability of the energy in our country, centrality of energy economy in development of the land, 97 years of survival for oil reserves, sustaining gas reserves for several hundreds of years and particular geo-economic, geopolitical, and geostrategic position of Iran necessitate playing more appropriate role in regional management of energy. Describing this role and position requires some grounds and leverages. Proper implementation of projects in oil, gas, and petrochemical industries and integrated project design and management is considered as a main strategy. Implementation of strategic plans is one of the foundations for successful implementation of projects in petrochemical industries. Petrochemical industry as one of the greatest and major sectors of the country needs application of modern management tools in order to have strategic planning. Deficit in strategic axes in petrochemical company in terms of financial affairs, customer, internal processes and development and learning are determined which is used for translating strategies and specifying goals and performance measures and the way of performing processes.

Role of strategic planning in today organizations is clear to all. Strategic planning is an organized attempt for implementing major strategies of the organization and its application is necessary for realization of the organizational goals. Strategic planning identifies opportunities, threats, strengths, and weaknesses through environmental studies so that more realistic goals are set and implemented through which. Application of strategic planning by the managers can bring about positive outcomes for the organizations in long term.

Due to its nature, petrochemicals are able to force economic development and mobility by developing many industries. Also, this industry needs to be fed by many other industries in order to sustain its activities, thus such mutual interaction in the form of communications will have significant impact on the country's economy. The issue of strategic plans is one of the issues which have been topic for many studies and it can guarantee implementation of the organization's goals and its development and progress. New conditions in the global economy have caused formation of contradictory economic goals and expectations in the organization (Vadiee, 2009). Implementation of

strategic plans identifies environmental opportunities and threats and internal strengths and weaknesses by investigating external and internal environment of the organization, and considering the organization's mission, they set goals for the organization, and in order to achieve these goals, choose strategies from strategic options which eliminate weaknesses by relying on strengths and utilizing opportunities, and avoid threats. If strategic plans are implemented properly, it leads to success of the organization in the competition. In electronic information and communication era, every organization at any size faces rapid changes and it should plan and manage its activities in such a way that it can succeed in the changing and highly competitive market and can survive. Considering concept of strategic plan implementation, it requires utilization of this kind of planning.

Implementation of strategic plans causes that organization matches its activities and services to meet changing needs of the environment. Such planning not only provides framework for improvement of the plans, but also proposes framework for restructuring plans, management, and cooperation and for evaluating organizational progress.

Regarding research works used in different parts of the petrochemicals, one reality is that many of these works have not been selected within a macro planning framework and it has caused research options are not directed with a comprehensive view within the day needs of the petrochemicals industries. Thus, conducting research in strategic plan and its affecting factors in these companies seems necessary.

Various papers have been written up to now regarding strategic planning and many research works have been allocated. In this section, domestic and foreign research works are reviewed. Rahmani (2012) studied barriers to implementation ofstrategy in Golestan Tax Organization. Using statistical analysis and sign test, 35 main barriers were identified out of 47 initialbarriers. Then, barriers were ranked using Friedman test. Eliminating these barriers reduces failure probability in strategy implementation. ManafSaberi (2013) studied impact of strategic planning implementation on performance of employees in social security organization's hospitals. His findings showed: 1. Considering obtained results from Spearman test, in comparison of components of strategic planning and performance of employees (effectiveness), sig level is 0.022, which is smaller than 0.05. Thus, there is significant relationship between strategic planning and performance of employees (effectiveness). 2. Considering results of Kruskal-Wallis test, sig level between strategic planning and quality improvement is smaller than 0.05, and there is significant relationship between strategic planning and quality improvement. 3. Considering results of Mann-Whitney and Wilcoxon test for finding relationship between strategic planning and performance of employees, sig level is smaller than 0.05 (0.043) suggesting relationship between strategic planning and performance of employees (effectiveness). Haghighi (2009) studied factors affecting strategic planning process in National Iranian Gas Company. Impact of five factors including senior management participation in the strategic planning process, senior management awareness of knowledge and importance of strategic planning, team participation of employees in the strategic planning process, change management in the strategic planning process and accurate environmental assessment in success of strategic planning in National Iranian Gas Company was supported. Rahimnia (2011) investigated elements of strategic planning for providing conceptual and practical model for small industrial companies. Findings showed 70 percent of the companies under study had coherent plans. Unlike previous studies, this study found no significant linear relationship between strength of strategic planning and environmental change. Arabi and Khodadadi (2007) studied process and models of strategic planning implementation at three stages including formulation, implementation, and control. This is a descriptive research and following description of models of strategic planning implementation, 8 factors were considered as important in implementing strategic planning: 1. Strategy and goal setting, 2. Resource allocation, 3. Organizational structure, 4. Organizational culture, 5. Communication and information, 6. Process, 7. Management, 8. Control and technology.

Current research aims at determining priority of factors affecting implementation of strategic plans. Thus, following specifying research subject and defining it, theoretical foundations and models are studied and domestic and foreign studies are reviewed. In the next stage, based on the literature, structured interview with the experts of petrochemical industry is used. According to the model proposed by Arabi and Khodadadi (2007), following components were

selected as factors affecting implementation of strategic plans: 1. Strategy and goal setting, 2. Resource allocation, 3. Organizational structure, 4. Organizational culture, 5. Communication and information, 6. Competitive pressure, 7. Management, 8. Control and technology. Considering above facts regarding importance of strategic plans, current research aims at finding answer for this question: What are factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company using AHP technique?

MATERIALS AND METHODS

Research method in this work can be examined in several views. In terms of purpose, it is applied research, because it is conducted in order to find rapid solution for problems so that barriers can be eliminated through systematic planning or they can be prevented. On the other hand, this research is descriptive and analytical survey in terms of research nature. In order to collect data in this work, library studies, interview, and questionnaire as AHP pair-wise comparisons were used. Instead of using statistical methods and questionnaires this research, AHP pairwise comparisons are used. Five experts who were experiences in terms of organizational position, education, etc. in Persian Gulf Petrochemical Company were used as experts and decision makers. Face and contentvalidity was used for determining validity of the questionnaire. Following designing and developing the questionnaire, ideas of the experts and professors were taken and following modifications, face validity and content validity will be supported. In order to examine reliability of the questionnaire, common questionnaires like Likert scale were not used, rather AHP pair-wise comparisons was used. Inconsistency rate of the questionnaire was smaller than 0.1 (0.001) and reliability of the questionnaire was confirmed.

λ_{max}=1.036

I.I=(- λ_{max}-n)/(n-1)

I.R. = I.I/(I.I.R_{6*6}) = 0.001

In this research, firstly main factors affecting implementation of strategic plans are identified and selected and then they are prioritized. Factors were identified based on library studies and interview with the experts and initial selection and classification was done.

Following specifying final factors for description, MADM model, AHP, was formulated. The reason for using AHP is solving multivariate decision making problems with hierarchical structure. Then, data needed for implementation of the model should be collected. This stage is the most important stage after model formulation, since all inferences, conclusions, recommendations, and suggestions will be made based on results of calculation of these data. To this end, necessary data were collected by developing, distributing and collecting questionnaires.

FINDINGS

Q1: What are factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company?

Following gathering ideas and recommendations of the experts, 8 factors were determined as the main affecting factors in the current situation as follows:

Strategy and goal setting,
Resource allocation,
Organizational structure,

Organizational culture,
Communication and information,
Competitive pressure,
Management,
Control and technology

Q2: How is priority of factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company?

AHP Model Design

Modeling in AHP is based in hierarchy tree which represents the problem under study. Its level 1 is the goal and last level is competing alternatives and intermediary levels are decision making criteria. In the problem modeling of the current research, the goal is determining and prioritizing factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company, which is summarized in the tree, and competing alternatives are final affecting factors, which are selected following statistical analysis. 8factors including 1. Strategy and goal setting, 2.Resource allocation, 3. Organizational structure,4. Organizational culture, 5.Communication and information, 6.Competitive pressure, 7.Management, 8. Control and technology are considered as decision making criteria for evaluating the alternatives. That is, implementation of strategic plans in Persian Gulf Petrochemical Company is affected by these 8 factors.

According to the calculations (available in appendix), weight of 8 main factors is given as Table1.

DISCUSSION AND CONCLUSION

Regarding research question 1, following gathering ideas and recommendations of the experts, 8 factors were determined as the main affecting factors in the current situation as follows: 1. Strategy and goal setting, 2. Resource allocation, 3. Organizational structure, 4. Organizational culture, 5. Communication and information, 6. Competitive pressure, 7. Management, 8. Control and technology.

Findings regarding research question 2 on prioritization of factors affecting implementation of strategic plans in Persian Gulf Petrochemical Company showed following prioritization: 1. Organizational culture, 2. Communication and information, 3. Organizational structure, 4. Management, 5. Competitive pressure, 6. Resource allocation, 7. Technology and control, 8. Strategy and goal setting.

Thus, it can be stated implementation of strategic planning means having clear and specific plan to achieve specific and clear goals, and determining these goals in advance influences implementation of strategic plans. Today all countries formulatelong-term and short-term plans for their development and progress. They plan for their future situation in global system and measures which should be taken.

Since the stage of strategy formulation is done independently from implementation stage, most plans fail always in this stage, while plans stop rarely in the entry stage. In over 80 percent of cases, the plans are not transferred to the floor of the organization from the beginning which is mainly due to inadequate resource allocation.

Current business environment is environment of rapid changes. These changes have caused that experts in recent decades raise broad discussions on necessity for paying attention to organizational structure. Organizational structure may affect implementation of organization's plans including strategic planning.

Organizational culture concept is regarded as an important factor in productivity and performance of the organization and if there is good working culture between management and employees, it would lead to strengthening organizational commitment, ethics promotion, higher performance and productivity, and better implementation of strategic plans.

Since planning is one of the major tasks of managers and it is closely related to other tasks, if there is planning-based attitude in the whole individual and organizational life, a kind of commitment to action based on futurist thinking and commitment to establish it is developed. Realization of individual and organizational goals requires planning. Need for planning is due to the fact that all organizations act in a dynamic environment and thus they seek for spending their limited resources to meet growing and various needs, and such environmental dynamicity and uncertainty results from environmental changes. It increases undeniable necessity for planning. Hence, it can be stated management has impact on implementation of strategic plans.

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Table 1: Weights of main criteria

No.	Main Criterion	Weigh of Main Criterion
1	Organizational Culture	0.303
2	Communication and Information	0.205
3	Organizational Structure	0.131
4	Management	0.121
5	Competitive pressure	0.118
6	Resource allocation	0.085
7	Technology and Control	0.077
8	Strategy and goal setting	0.033

Result of prioritizing factors using AHP and Expert Choice software are given in Diagram 1.

Organizational culture has highest impact and strategy and goal setting has least impact onimplementation of strategic plans.

Prioritization of Sub-Criteria Affecting Implementation of Strategic Plans

Table 2: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Determining strategies for planning	0.033	0.101	0.003
2	Determining policy of implementing strategic plans		0.255	0.008
3	Specifying goals of strategic plans for employees		0.643	0.021

Specifying goals of strategic plans for employees has highest impact and determining strategies for planning has least impact on implementation of strategic plans.

Table 3: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Enough resources to implement the strategic plans	0.085	0.426	0.036
2	Constituting the Executive Committee for resource allocation		0.248	0.021
3	Sufficient funds for implementation		0.326	0.028

enough resources to implement the strategic plans has highest impact and Constituting the Executive Committee for resource allocation has least impact on implementation of strategic plans.

Table 4: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Impact of structural complexity	0.131	0.385	0.050
2	Impact of organizational structure's formalization		0.110	0.014
3	Impact of structural centralization		0.505	0.066

Structural centralization impact has highest impact and organizational structure's formalization has least impact on implementation of strategic plans.

Table 5: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Presence of participatory culture	0.303	0.221	0.067
2	Presence of adaptability culture		0.221	0.067
3	Presence of compliance culture		0.558	0.169

Presence of compliance culture has highest impact and presence of participatory culture has least impact on implementation of strategic plans.

Table 6: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Effective communication	0.205	0.664	0.136
2	Communications for implementing strategic plans		0.190	0.039
3	External communications		0.146	0.029

Effective communication has highest impact and external communications has least impact on implementation of strategic plans.

Table 7: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	entry of new investors	0.118	0.231	0.027
2	Competition among effective competitors		0.218	0.026
3	Replacement threat		0.551	0.065

Replacement threat has highest impact and competition among effective competitors has least impact on implementation of strategic plans.

Table 8: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Presence of executive manager in strategic plans	0.121	0.664	0.080
2	Manager's mastery over implementation of strategic plans		0.145	0.018
3	Manager's awareness about over implementation of strategic plans		0.191	0.023

Presence of executive manager in strategic plans has highest impact and manager's mastery over implementation of strategic plans has least impact on implementation of strategic plans.

Table 9: Weights of sub-criteria

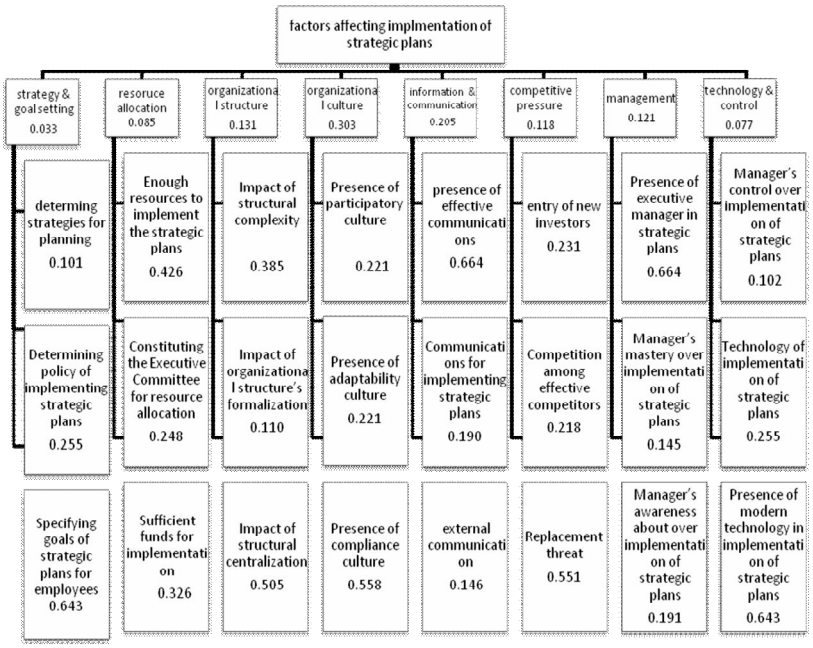
No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Manager's control over implementation of strategic plans	0.077	0.102	0.007
2	Technology of implementation of strategic plans		0.255	0.019
3	Presence of modern technology in implementation of strategic plans		0.643	0.049

Presence of modern technology in implementation of strategic plans has highest impact and manager's control over implementation of strategic plans has least impact on implementation of strategic plans

Table 10: Final prioritization

No.	**Sub-criterion**	**Weight of main criterion**	**Weight of sub-criterion**	**Final weight**
Organizational culture	Presence of adaptability culture	0.303	0.558	0.169
	Presence of compliance culture		0.067	0.221
	Presence of participatory culture		0.221	0.067
Communication & information	Effective communication	0.205	0.664	0.136
	Communications for implementing strategic plans		0.190	0.039
	External communications		0.146	0.029
Organizational structure	Impact of structural centralization	0.131	0.505	0.066
	Impact of structural complexity		0.385	0.050
	Impact of organizational structure's formalization		0.110	0.014
Management	Presence of executive manager in strategic plans	0.121	0.664	0.080
	Manager's awareness about over		0.191	0.023

	implementation of strategic plans			
	Manager's mastery over implementation of strategic plans		0.145	0.018
Competitive pressure	Replacement threat	0.118	0.551	0.065
	entry of new investors		0.231	0.027
	Competition among effective competitors		0.218	0.026
Resource allocation	Enough resources to implement the strategic plans	0.085	0.426	0.036
	Sufficient funds for implementation		0.326	0.028
	Constituting the Executive Committee for resource allocation		0.248	0.021
Technology & control	Presence of modern technology in implementation of strategic plans	0.077	0.643	0.049
	Technology of implementation of strategic plans		0.255	0.019
	Manager's control over implementation of strategic plans		0.102	0.007
Strategy & goal setting	Specifying goals of strategic plans for employees	0.033	0.643	0.021
	Determining policy of implementing strategic plans		0.255	0.008
	Determining strategies for planning		0.101	0.003



Decision Making Tree

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RESEARCH ARTICLE

Identifying and Prioritizing Factors Affecting Strategic Planning Success in Islamic Republic of Iran Customs using AHP Technique (Case Study: Tehran Province Customs)

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ABSTRACT

Current paper aims at identifying and prioritizing factors affecting strategic planning success. It is a descriptive study of analytical survey type. Data were collected using expert ideas. Following studying theoretical and research literature, factors affecting strategic planning success were identified and classified. Initial classification included 8 factors: 1. Participation of top management, 2. Impact of top management awareness about knowledge and its importance, 3. Team participation of employees, 4. Organizational commitment, 5. Employee acceptance, 6. Change management, 7. Proper environmental evaluation, 8. Suitable database and management information systems. Findings for second research question regarding prioritization of factors affecting strategic planning success in Tehran Province Customs showed priorities as follows: 1. top management awareness about knowledge and its importance, 2. Participation of top management, 3. Team participation of employees, 4. Employee acceptance, 5. Organizational commitment, 6. Suitable database and management information systems, 7. Change management, 8. Proper environmental evaluation.

Key words: managers, planning, strategic planning, Success.

INTRODUCTION

Strategic management is a process which is used by most successful and famous companies of the world for directing and progressing their plans and activities with long term horizon and achieving goals and realization of organizational mission. This type of planning which have been often used by great organizations would lead to selection of strategies which direct toward organizational excellence if they are properly formulated and timely implemented. Strategic planning is highly important for every organization in today competitive world, it has unique characteristics and various models have been proposed by theorists. Simply speaking, strategic plan can improve performance. Members of the organization got confused by the fixed tasks and daily challenges and they may lose direction of the organizational goals and their vision toward it. a strategic plan not only is able to improve understanding of the goals in members, but also it can create and stimulate futurist thinking based on a common understanding of the organizational mission. Cooperation among members of the organization will be effective if they work with shared assumptionstoward shared goals (ZareiMatin, 1992). Formulation of strategic planning in Tehran Province Customs is regarded as one of the major requirements of the success in Islamic Republic of Iran'scustoms, because performing any activity without considering its goal especially at organization dimensions may distort the organization and lead to its failure and recession. In strategic planning, macro goals and limitations for their realization is specified, and by analyzing needs of stakeholders and role of the organization in meeting these needs and analyzing weaknesses and strengths inside the organization and external opportunities and threats, it formulates strategies which facilitate realization of the depicted vision. Considering role and importance of Islamic Republic of Iran's customs in economic activities and global markets, and given the fact that it face severe competition like any other organization and always seeks for success, it needs utilization of strategic planning. Considering importance of strategic planning, current research aims at identifying factors affecting strategic planning success using AHP technique in Tehran Province Customs.

Theoretical background

Strategic Planning

According to some authors, planning is the process through which the organization combine and integrate all its activities and attempts regarding expected situation to achieve it and pas the way (Bello et al., 2008). Strategic planning is a kind of planning which requires consciously setting appropriate goals for the organization considering environmental conditions and application of suitable approach to meet these goals. Strategic planning includes a framework or ground for realization of strategic thinking and directing operations to achieve specific and planned outcomes (Bello et al., 2008). In other words, strategic planning is organized and ordered attempt for adopting fundamental decisions and performing basic measures which shape essence and orientation of the organization's activities within a legal framework (Bryson, 2011).

Research Background

Reviewing research background shows various studies have been allocated to strategic planning. Table 1 summarizes some of them.

Following specifying research subject and defining it, theoretical foundations and models are studied and domestic and foreign studies are reviewed. Then, following factors are selected as factors affecting strategic planning success: Participation of top management, Impact of top management awareness about knowledge and its importance, Team participation of employees, Organizational commitment, Employee acceptance, Change management, Proper environmental evaluation, Suitable database and management information systems. According to the model proposed by Haghighi (2009), impact of five factors including senior management participation in the strategic

planning process, senior management awareness of knowledge and importance of strategic planning, team participation of employees in the strategic planning process, change management in the strategic planning process and accurate environmental assessment in success of strategic planning in National Iranian Gas Company was supported. These factors were selected as factors affecting strategic planning and were entered into finalmode

Methodology

Research method in this work can be examined in several views. In terms of purpose, it is applied research, because it is conducted in order to find rapid solution for problems so that barriers can be eliminated through systematic planning or they can be prevented. On the other hand, this research is descriptive and analytical survey in terms of research nature. In order to collect data in this work, following approaches were used: library studies: in this approach, information are collected through studying books, papers, journals, internet sources and information databases, and after selection of the sources, notes are taken and foreign texts are translated for research foundation. Interview: experts are interviewed for evaluating variables based on the author's experiences and other research variables are designed in order to collect information. Questionnaire: it is used as AHP pair-wise comparisons. Since statistical analysis is not used in this method, there is no discussion on statistical population, sampling and questionnaire in statistical population.

Five experts who were experiences in terms of organizational position, education, etc. in Tehran Province Customs were used as experts and decision makers. Face and content validity was used for determining validity of the questionnaire. Following designing and developing the questionnaire, ideas of the experts and professors were taken and following modifications, face validity and content validity will be supported. In order to examine reliability of the questionnaire, common questionnaires like Likert scale were not used, rather AHP pair-wise comparisons was used. Inconsistency rate of the questionnaire was smaller than 0.1 (0.001) and reliability of the questionnaire was confirmed.

$$I.I=(-\lambda_{max}-n)/(n-1)$$

$$I.R. = I.I/(I.I.R_{6*6}) = 0.001$$

In this research, firstly main factors affecting strategic planning success are identified and selected and then they are prioritized. Factors were identified based on library studies and interview with the experts and initial selection and classification was done.

Intial classification include 8 main factors as follows:

1. Participation of top management, 2. Impact of top management awareness about knowledge and its importance, 3.Team participation of employees, 4.Organizational commitment, 5.Employee acceptance, 6. Change management, 7. Proper environmental evaluation, 8.Suitable database and management information systems. It is evident that importance and influence level of these factors is different.

Following specifying final factors for description, MADM model, AHP, was formulated. The reason for using AHP is solving multivariate decision making problems with hierarchical structure. Then, data needed for implementation of the model should be collected. This stage is the most important stage after model formulation, since all inferences, conclusions, recommendations, and suggestions will be made based on results of calculation of these data. To this end, necessary data were collected by developing, distributing and collecting questionnaires.

FINDINGS

Q1: What are factors affecting strategic planning success?

Following gathering ideas and recommendations of the experts, 8 factors were determined as the main affecting factors in the current situation as follows:
Participation of top management
Top management awareness about knowledge and its importance
Team participation of employees
Organizational commitment
Employee acceptance
Change management
Proper environmental evaluation
Suitable database and management information systems
Q2: How is priority of factors affecting strategic planning success?

AHP Model Design

Modeling in AHP is based in hierarchy tree which represents the problem under study. Its level 1 is the goal and last level is competing alternatives and intermediary levels are decision making criteria. In the problem modeling of the current research, the goal is determining and prioritizing factors affecting strategic planning success, which is summarized in the tree, and competing alternatives are final affecting factors, which are selected following statistical analysis. 8 factors including 1.Participation of top management, 2. Top management awareness about knowledge and its importance, 3. Team participation of employees, 4.Organizational commitment, 5.Employee acceptance, 6. Change management, 7. Proper environmental evaluation, 8. Suitable database and management information systems are considered as decision making criteria for evaluating the alternatives. That is, strategic planning success is affected by these 8 factors. According to the calculations (available in appendix), weight of 8 main factors affecting strategic planning success is given as Table 2.

Priority of the criteria is as follows:

Top management awareness about knowledge and its importance has highest impact and Proper environmental evaluation has least impact on strategic planning success.

Prioritization of Sub-Criteria Affecting Implementation of Strategic Plans

DISCUSSION AND CONCLUSION

Findings regarding first research question, following studying theoretical and research literature, factors affecting strategic planning success were identified and classified. Initial classification included 8 factors: 1. Participation of top management, 2. Impact of top management awareness about knowledge and its importance, 3. Team participation of employees, 4. Organizational commitment, 5. Employee acceptance, 6. Change management, 7. Proper environmental evaluation, 8. Suitable database and management information systems.

Findings for second research question regarding prioritization of factors affecting strategic planning success in Tehran Province Customs showed priorities as follows: 1. top management awareness about knowledge and its importance, 2. Participation of top management, 3. Team participation of employees, 4. Employee acceptance, 5.

Organizational commitment, 6. Suitable database and management information systems, 7. Change management, 8. Proper environmental evaluation.

Research findings showed individuals who are responsible for part of strategic planning should participate in designing that part. Various studies investigate key role of top management of the organization and its participation in success of strategic planning. Inappropriate understanding of top managers about this process and lack of their support and commitment are factors for strategic planning process failure. Strategic awareness in strategic planning process refers to appropriateknowledge about competitors, customer resources, and regulations. Identification of strategic planning goals allows organization to align goals of the organization and provide better plans by better choices.

Research findings indicate role and importance of team participation in various studies have been shown. Team participation plays basic role in strategic planning process and its success. Informing team of organizational changes is the main part of team participation. Research findings in this work are consistent with findings by Haghighi (2009). They found team participation as important in strategic planning success inNational Iranian Gas Company.

Research findings in this work are consistent with findings by Haghighi (2009). They found organizational commitment as important in strategic planning success inNational Iranian Gas Company.

Environmentaluncertainty is one of the factors affecting success of the organization's planning. In an uncertain environment, organizations perform business strategic planning as an organizational learning process. Research findings in this work are consistent with findings by Haghighi (2009). They found proper environmental evaluation as important in strategic planning success inNational Iranian Gas Company.

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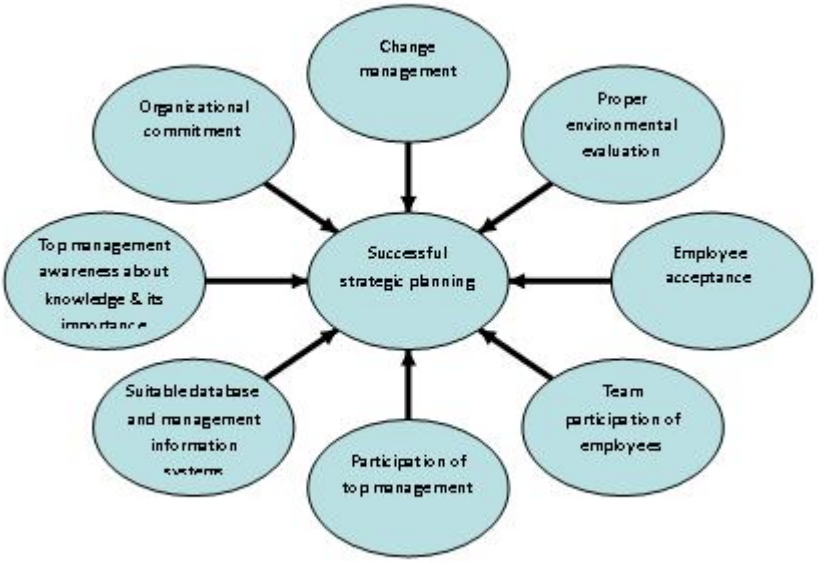

Fig1: Haghighi's model (2009)

Table 1: Summary of research background

No.	Author	Year	Title	Method	Finding
1	Samadi	2009	marketing strategic planning and appropriate strategy selection using AHP	AHP technique	Three extracted strategies include product development, horizontal integration and homogenous diversification, in terms of priority
2	Abarghooei	2010	Fuzzy approach to strategic planning in agriculture	Brainstorming	Results for fuzzy analysis show threatening and harmful effect of external factors as internal weaknesses is stronger than opportunities and strengths which are present for achieving optimal outlook. In strategy setting, internal weaknesses should be more considered than external threats.
3	Sadeghi	2011	Analysis of marketing	Descriptive	Findings show external output of the marketing information systems has

			information systems effect on strategic planning effectiveness (Case study: Banks)		strong impact on effectiveness of marketing strategic planning process. Other findings suggest variables of information content and form have highest and lowest explanatory power for changes in elements of strategic planning process.
4	Gholipour	2005	Strategic planning for SMBs	Descriptive	Results of data analysis show in the view of statistical sample, there is significant difference between strategic planning in large sized companies and this type of planning in small sized companies in various cases, and the model proposed in this research is suitable for strategic planning in small sized companies.
5	Ahmadi	2001	Investigating a mathematical optimization model for strategic planning of technology transfer in developing countries	Descriptive	The model includes two phases: phase 1: determining optimality of strategies, policies and plans under study using qualitative, quantitative, an critical criteria, phase 2: optimization of alternatives considering budget, HR, time, etc. limitations. Developed mathematical model was used for achieving technology needs by one of manufacturing units in Iran and its effectiveness was tested.
6	Haghighi	2009	factors affecting strategic planning process in National Iranian Gas Company	Ground finding	Impact of five factors including senior management participation in the strategic planning process, senior management awareness of knowledge and importance of strategic planning, team participation of employees in the strategic planning process, change management in the strategic planning process and accurate environmental assessment in success of strategic planning in National Iranian Gas Company was supported
7	Rahimnia	2011	elements of	Ground	Findings showed 70 percent of the

			strategic planning for providing conceptual and practical model for small industrial companies	finding	companies under study had coherent plans. Unlike previous studies, this study found no significant linear relationship between strength of strategic planning and environmental change.
8	Umbi	2010	Factors affecting implementation of strategic plans in technical training institutes in public centers	Ground finding	According to the findings, management support helps enhancingimplementation of strategic planning in Department of Veterinary.
9	Kouri et al.	2009	Factors for success of strategic planning: reconstruction of digital library scientific plan	Survey	Results for poll along with local experience of the authors show there are several potential factors including employee skill and budget which affect strategic planning.

Table 2: Weights of main criteria

No.	Main Criterion	Weigh of Main Criterion
1	Participation of top management	0.181
2	Impact of top management awareness about knowledge and its importance	0.328
3	Team participation of employees	0.145
4	Organizational commitment	0.103
5	Employee acceptance	0.105
6	Change management	0.037
7	Proper environmental evaluation	0.036
8	Suitable database and management information systems	0.065

Table 3: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Participation of managers in formulating strategic planning	0.181	1	0.181
2	Participation of managers in implementing strategic planning		1	0.181
3	Participation of managers in monitoring strategic planning		1	0.181

Table 4: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Awareness of managers about strategic planning knowledge	0.328	0.643	0.211
2	Awareness of managers about implementation of strategic planning		0.255	0.083
3	Participation of managers in training courses for strategic planning		0.101	0.033

Table 5: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Implementation of strategic planning as team	0.145	0.385	0.055
2	Cooperation of employees as team in strategic planning		0.504	0.073
3	Creating specific groups for strategic planning in different units		0.111	0.016

Table 6: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Continuous commitment of employees to strategic planning	0.103	0.231	0.024
2	Normative commitment of employees to strategic planning		0.218	0.022
3	Affective commitment of employees to strategic planning		0.551	0.056

Table 7: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Extent of acceptance of strategic planning importance	0.105	0.643	0.067
2	Lack of resistance toward strategic planning		0.255	0.027
3	Positive attitude of employees toward strategic planning		0.102	0.011

Table 8: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Familiarization of employees with the change which is created in the organization's planning	0.037	0.665	0.024
2	Acceptance of planning change by employees		0.145	0.000
3	Managing changes which are as a result of strategic planning		0.190	0.007

Table 9: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Preparing ground for entrance of strategic planning	0.036	0.325	0.011
2	Creating suitableenvironmental ground for strategic planning acceptance		0.426	0.012
3	Proper environmental evaluation		0.248	0.008

Table 10: Weights of sub-criteria

No.	Sub-criterion	Weight of main criterion	Weight of sub-criterion	Final weight
1	Availability of database	0.065	0.643	0.042
2	Availability of adequate information in organization		0.255	0.017
3	Access to organizational information		0.102	0.006

Table 11: Final prioritization

Factor	Weight of main criterion	Weight of sub-criterion	Final weight
Participation of managers in formulating strategic planning	0.181	1	0.181
Participation of managers in implementing strategic planning	0.181	1	0.181
Participation of managers in monitoring strategic planning	0.181	1	0.181
Awareness of managers about strategic planning knowledge	0.328	0.643	0.211
Awareness of managers about implementation of strategic planning	0.328	0.255	0.083
Participation of managers in training courses for strategic planning	0.328	0.101	0.033
Implementation of strategic planning as team	0.145	0.385	0.055
Cooperation of employees as team in strategic planning	0.145	0.504	0.073
Creating specific groups for strategic planning in different units	0.145	0.111	0.016

Continuous commitment of employees to strategic planning	0.103	0.231	0.024
Normative commitment of employees to strategic planning	0.103	0.218	0.022
Affective commitment of employees to strategic planning	0.103	0.551	0.056
Extent of acceptance of strategic planning importance	0.105	0.643	0.067
Lack of resistance toward strategic planning	0.105	0.255	0.027
Positive attitude of employees toward strategic planning	0.105	0.102	0.011
Familiarization of employees with the change which is created in the organization's planning	0.037	0.665	0.024
Acceptance of planning change by employees		0.145	0.000
Managing changes which are as a result of strategic planning		0.190	0.007
Proper environmental evaluation	0.036	0.325	0.011
Preparing ground for entrance of strategic planning	0.036	0.426	0.012
Creating suitable environmental ground for strategic planning acceptance	0.036	0.248	0.008
Availability of database	0.065	0.643	0.042
Availability of adequate information in organization	0.065	0.255	0.017
Access to organizational information	0.065	0.102	0.006

Decision Tree

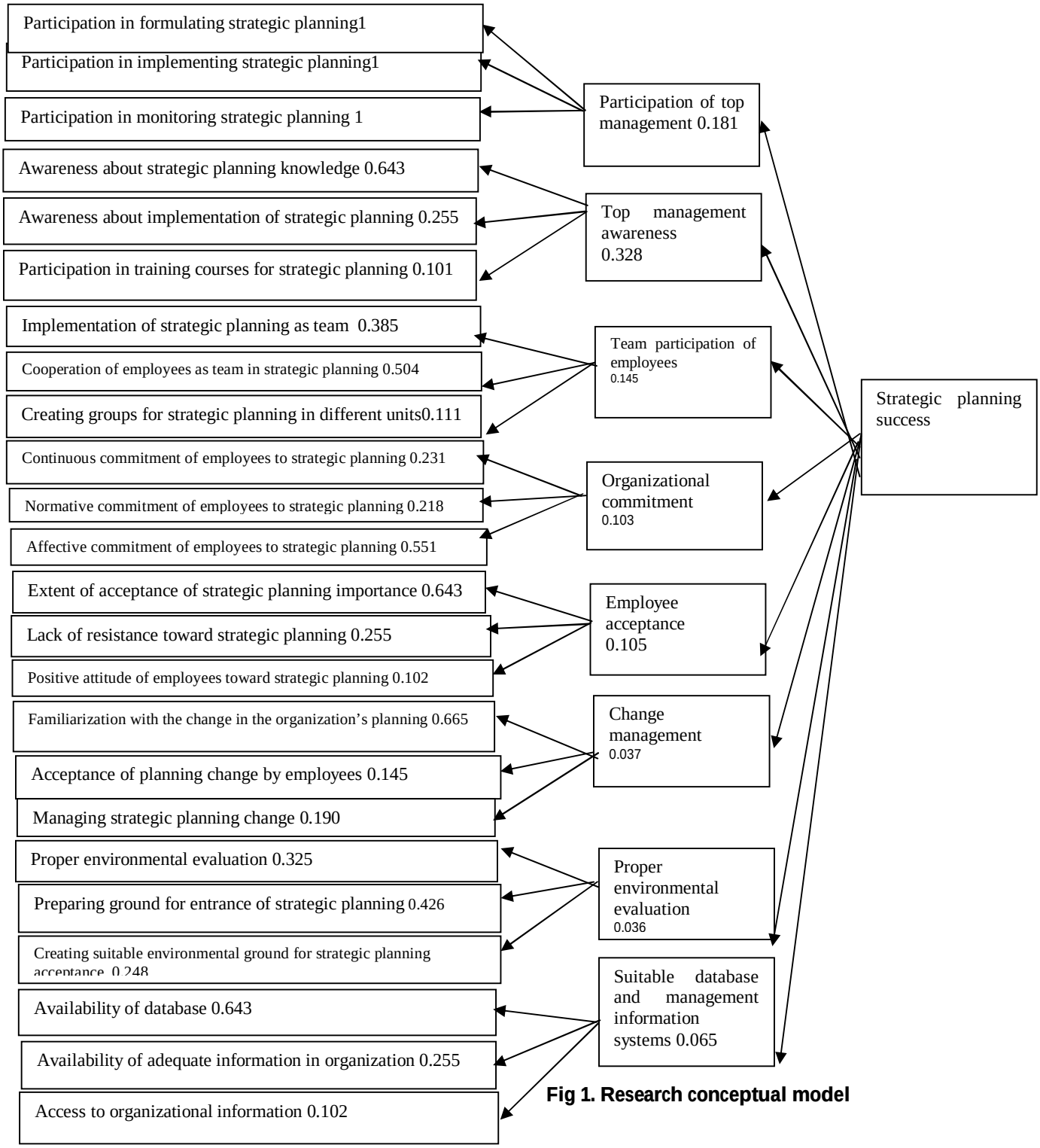

Fig 1. Research conceptual model

RESEARCH ARTICLE

Identification and Ordering Critical Success Factors in Implementation of Knowledge Management in Oil and Gas Karoon Company

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ABSTRACT

In the wisdom era in which knowledge is the most important asset of any organization many organizations have implemented knowledge management. Current work aims at investigating necessary infrastructures for knowledge management system establishment. Descriptive research method was used and it is a survey type since it investigates current status and describesdemographiccharacteristics. Lee and Choi model's questionnaire was used for investigating infrastructural factors including culture, structure, information technology, and human resources, and Lawson model was used for studying knowledge management processes including creation, acquisition, organization, storage, dissemination and application of knowledge. Validity of the questionnaire was confirmed by the experts and validity and reliability was obtained as 0.95 and 0.96, respectively using Cronbach alpha which is acceptable. Stratified sampling design was used and data were collected from a population of 541 employees of Oil Company. Sample size was specified as 226 using Krejcie and Morgan Table. To this end, 320 questionnaires were distributed and respective sample was collected for analysis. Results were obtained at descriptive statistics (mean, SD) and inferential statistics (t-student test and Friedman) levels using SPSS software following verifying normality by Kolmogorov-Smirnov test. Findings indicate only information technology is in suitable status for successful establishment of knowledge management system, and this factor has highest priority in infrastructural factors and knowledge acquisition has

highest priority in KM processes. Investigating status of infrastructural factors and processes is the primary action which can provide strong foundation for subsequent actions in this regards.

Key words: Knowledge Management, Infrastructure, Organizational Culture, Organizational Structure, Information Technology, Human Resources.

INTRODUCTION

Knowledge is the main asset of the organization for creating sustainable competitive value and advantage (Chen, 2011). Organizations have also been influenced by knowledge accumulation so that increased volume of information in the organizations and necessity for using knowledge in organizational decision making over two last decades has led to emergence of a phenomenon known as knowledge management. It indicates necessity for planning, organization, leadership, and monitoring organizational knowledge as well as management of knowledge access process so that it is effective and efficient (Kelly, 2004). Vatnabi and Snow (2008), knowledge management can be defined as process of acquiring, storing, sharing, dissemination and application of tacit and explicit knowledge beyond the organizational boundaries (Bakhshizadeh, 2011). Knowledge management is regarded as an organizational strategy and asset for management of organizational knowledge and it utilizes processes of creation and acquisition, storage, sharing and dissemination, retrieval and use of tacit and explicit knowledge. Knowledge management approaches means that companies and organizations seek for creating competitive advantages through continuous learning which is obtained as a result of formulating various types of knowledge (Ignasio, 2008).

Lawson (2003) proposed a model by combining processes from three knowledge models from three groups of authors including Wig (1997), Parieh (2001) and Horwith and Armascost (2003). According to this model, knowledge management cycle model is classified with six different processes: 1. Knowledge creation, 2. knowledge acquisition, 3. knowledge storage, 4. knowledge organization, 5. knowledge application, 6. knowledge dissemination. Knowledge management infrastructures are enablers for increasing the efficiency of knowledge management activities. Among the enablers of knowledge management, technology, organizational structure and culture are the most powerful enabling factors (Gold, 2001).Focus and formalization aspects are determinants of organizational structure (Tata and Prased, 2004). Organizational culture includes cooperation, trust, and motivation for knowledge sharing and transfer in the organization (Detinne et al., 2004). Since imposing changes in the organizations is not possible without involvement of the individuals (Gaffor, 2008), human factor should be especially considered for evaluation of readiness and thus successful implementation of knowledge management.

Looking at organization's nature it can be found great part of employees will be retired over few years in the future. Acquiring, sharing and using knowledge of retired employees before leaving organization is one of the risks and problems of public organizations. To this end, human resource management is considered as an important strategy in public organizations and knowledge management as one of management tools plays significant role in human resource management strategy.

The main research question in the current work originates from the fact that Karoon Oil and Gas Production Company intends to implement knowledge management system in its organization, and it wants to be aware of status of existing knowledge management processes. Current level of knowledge management on the oil company is specified by measuring level and extent of establishment of infrastructural processes and factors, and the gap can be found by comparing between current and optimal status. Identifying presuppositions and necessary grounds for implementing knowledge management helps better implementation.

Thus, considering importance of knowledge management establishment in Karoon Oil and Gas Production Company, current research aim at providing answers for following questions: what are necessary infrastructures for knowledge management system implementation in the company? How is current status and readiness of knowledge management infrastructures and processes? Does it provide possibility for establishment of knowledge management system? What are priorities of infrastructural factors for providing suitable solutions? Infrastructures (enablers) and their readiness level will be investigated in the following. Answers of these questions can be helpful and guiding for managers and decision makers in Karoon Oil and Gas Production Company for successful establishment of knowledge management system.

Theoretical foundations

In recent years, knowledge management has been regarded as one of the most attractive and challenging issues in business management area and its application scope is extending along with other issues of management area. According to Zirax, knowledge management is processes of absorption, application and re-application of individual and organizational knowledge (Hadizadeh et al., 2010). Knowledge management is a complex process of aligning organizational mission with the best methods which enables the organization to be competitive and profitable in its sector. Snowden (2002) classifies knowledge management literature which has been developed over 15 last years. It is classified into three different phases or generations which can be summarized as follows: 1. efficient use of knowledge, 2. knowledge learning and transfer, and 3. creation of new knowledge (Snowden, 2002).

The authors have identified different processes for knowledge management including creation, transfer and use (Spender, 1996), acquisition, transfer and use (Delong, 1997), identifying, acquiring, developing, sharing, dissemination, use and maintenance (Probest et al., 2000). Alavi (2001) claimed that knowledge creation alone does not suffice and other mechanisms are needed for knowledge storage and retrieval. The key point in knowledge management is ensuring that provided knowledge is usefully utilized (Probst, Rub and Rumhardt, 2000). Effective knowledge application helps companies to increase their effectiveness and reduce the costs (Davenport and Klahr,1998). Knowledge application includes knowledge application for supporting decision making, action taking and problem solving and it ultimately leads to knowledge creation.

Organizational culture includes a collection of values, beliefs, and norms of procedures which are shared by the organization's individuals (Roobin, 2004). Organizational structure is one of the factors which affect organizational behavior and it is effective in the way and evolution of behavior of individuals and groups. In fact, managers can divide, organize, and control organizational activities with the help of organizational structure and they are able to provide a stable framework for achieving organizational goals.

Information technology as the responsible factor for maintaining knowledge management attempts is one of the major knowledge management enablers in the organization (Gaffoor, 2008; Yeh et al, 2006).

With studying knowledge management literature it can be found human resource and knowledge management are closely related and many knowledge management plans failed because of negligence to human factor. Employees are the main elements in every organization, and the organization with more empowered and productive employees is more successful (Arabi, 2012).

Human capital represents the knowledge inventory of an organization's individuals (Bontis and Girardi, 2000, p.85). According to Chen and Huang (2007), competency of employees is the hard part of human resource which includes knowledge, skills, and talents. Attitude of employees is the soft part of human resource which includes motivation and job satisfaction. Attitude is regarded as a requisite which causes that employees express their competency freely (Chen and Huang, 2007).

REVIEW OF LITERATURE

Chang (2011) in his work entitledKnowledge Management Implementation Pattern Using Fuzzy Performance Development, Case Study: Health Organization, studied knowledge management infrastructures and provided a model of knowledge management processes and enablers for using nursing knowledge assets. Results of fuzzy quality performance development indicate during implementation of knowledge management in this hospital, strengthening enablers is necessary for promoting these elements in knowledge management process. Matrix of interaction between knowledge management enablers and knowledge management process elements indicates this hospital should attempt to improve employee satisfaction and reduce gap between important and satisfaction level of elements in knowledge management process. Enablers include evaluation, leadership, information technology and organizational culture, and knowledge management processes and enablers were evaluated averagely suggesting readiness of the organization for knowledge management implementation.

Ghafoor (2009) in his research from Faculty of Economics and Management, Stellenbosch University, entitled Evaluation of Readiness for Knowledge Management Application in Local Governments Studied by Stellenbosch Municipality stated knowledge management can considerably promotes organizational productivity and it requires long term commitments and commitment of all organizational members. Prior to knowledge management implementation, it is necessary to ensure knowledge management enablers are ready and adequately developed in the organization. Evaluation of knowledge management enablers is necessary for achieving organizational success and effectiveness of knowledge management processes. Considering reviewed literature, enablers include “Organizational culture", "structure", "human resources", "information technology", "strategy and leadership” which are not unique and they are interrelated. Thus, in order to successful implementation of knowledge management, the organization should develop these variables adequately and support them.

Yeh et al. (2006) in their work entitled Knowledge Management Enablers: Case Study aiming at analyzing basic role of enablers for knowledge management implementation in the organization stated knowledge management enablers in the organization cause knowledge development and stimulation of knowledge creation leading to improvement and effectiveness of knowledge management activities which enables simple implementation processes and higher knowledge management productivity speed. According to them, strategy and leadership is the most important part of top management support. For organizational culture, the main part id sharing culture which actually needs information technology. For empowerment and enabling, educational courses and learning channels and motivational programs for employees are key factors.

Also, for information technology, digitizing documents and speed of knowledge search for reuse are the main factors. They also identified establishment of a dedicated unit as a key factor for developing and extending knowledge management and communication and coordination between different units. Their model was practically confirmed in the industry and it can be a reference for business and academic environments,

RESEARCH MODEL AND HYPOTHESES

Two main dimensions of this research are knowledge management processes and infrastructures and Lawson’s model was used for measuring knowledge management processes. According to this model, knowledge management cycle is classified with six different processes: 1. Knowledge creation, 2. knowledge acquisition, 3. knowledge storage, 4. knowledge organization, 5. knowledge application, 6. knowledge dissemination. In this research, knowledge management infrastructures are extracted based on Lee and Choi’s model (2003) which includes: Information Technology (Technology), organizational structure, organizational culture and human resources. Research model is proposed as Fig 1.

This model includes following hypotheses:

H1: The organization has suitable information technology for successful establishment of knowledge management.
H2: The organization has suitable organizational structure for successful establishment of knowledge management.
H3: The organization has suitable organizational culture for successful establishment of knowledge management.
H4: The organization has suitable human resource for successful establishment of knowledge management.
H5: The organization has suitable organizational processes for successful establishment of knowledge management.
H5-1: The organization has suitable knowledge creation process for successful establishment of knowledge management.
H5-2: The organization has suitable knowledge acquisition process for successful establishment of knowledge management.
H5-3: The organization has suitable knowledge organization process for successful establishment of knowledge management.
H5-4: The organization has suitable knowledge storage process for successful establishment of knowledge management.
H5-5: The organization has suitable knowledge dissemination process for successful establishment of knowledge management.
H5-6: The organization has suitable knowledge application process for successful establishment of knowledge management.

Methodology

Current research is applied research and proposed factors for effective knowledge management can be used for organizations which intend to implement knowledge management. In terms of data collection method and due to using questionnaire for data collection, it is a descriptive survey. Since current research studies ideas of managers and employees in identification and investigation of key success factors for knowledge management system establishment in Karoon Oil and Gas Production Company, and evaluates current status of factors for implementation of knowledge management system, it is descriptive research.

Data analysis

Descriptive statistics (frequency, percent, mean, and SD) and inferential statistics (one-sample t-student test and Friedman test and Cronbach alpha for calculating reliability coefficients) were used for data analysis. SPSS software version 21 was used for analysis of collected data.

Statistical population, sample and sampling method

Statistical population includes all employees (male and female) with high school degree and above in Karoon Oil and Gas Production Company, which were working in Karoon Industrial Zone. According to figures by Human Resource Supply and Allocation Unit the number was 541 at 2014 (time of conducting research).

In order to specify sample size, Krejcie and Morgan Table was used and it was specified as 226. To this end, 320 questionnaires were distributed and finally 226 questionnaires were collected and evaluated.

Data collection method and tool

In order to collect data, an author made questionnaire with 58 items was used. The questions were designed in to parts for measuring g knowledge management processes and knowledge management infrastructures. The part

designed for knowledge management processes was developed based on Lawson's standard questionnaire (2003) including items 1–24. This questionnaire was designed based on Likert scale. 24 items in this part are divided into 6 parts with 4 items and each level of activity was assigned to each of six processes. In the part dedicated for measurement of knowledge management infrastructures, view of employees toward knowledge management in the company under study was measured. This part was measured by standard questionnaire of Lee and Choi (2003) and Rampersod (2002) which covers human resource dimension. This part of the questionnaire includes five-point Likert scale covering items 25 to 58 in relation with technology, structure, culture, and human resource components. Five first items are related to technology, 10 items are related to organizational structure, 12 items are related to organizational culture and 7 items are related to human resources. Organizational structure includes decentralization and formalization dimensions in the organization. Out of 10 related items, 5 first items measure focus in the organization and next 5 items measure formalization in the organization.

Validity and reliability

In order to ensure if questionnaire items provide suitable questions for investigating respective indexes, standard questionnaire was used following consultation with professors and obtaining ideas of experts.

Reliability of the questionnaire was verified using Cronbach alpha. Reliability coefficients of knowledge management processes and knowledge management infrastructures questionnaires were reported as 0.96 and 0.95, respectively denoting optimal rehabilitee coefficients for the questionnaire.

RESEARCH FINDINGS

Information wasanalyzed by SPSS software. The results are provided in this section and they are examined.

In order to investigate adequacy of the sample size and variance of t5he variables, sample size adequacy test is used. Kolmogorov-Smirnov index is a measure of sampling adequacy. Sig value greater than 5% shows the sample has a normal distribution. The test results are given in Table 1 below.

Demographic variables including gender, age, education, and working experience are studied. Male employees included about 96.0 percent and female employees included about 4.0 percent of the sample. Age group 30 – 40 years had highest frequency (45.01%) and age group 20 – 29 years had lowest frequency (9.3%). Employees with high school diploma had highest frequency (407.0%) and employees with MA degree and above had lowest frequency (4.04%). Employees with working experience of 21 to 30 years had highest frequency and employees with working experience of 31 years and above had lowest frequency.

In order to examine status of each component, one sample t-test was used. The main point in using one sample t-test is selecting the test value, that is, the middle point should be chosen. Given the considered scale in items, test value was set as 3. If mean of answers in each component of variables is above 3, its status is regarded as optimal, and otherwise the variable is not in the optimal status in the view of the population under study. In this test, H_0 and H_1 are stated as follows for investigating mean status of the population idea.

$$\begin{cases} H_0: \mu x \leq \mu_0 \\ H_1: \mu x > \mu_0 \end{cases}$$

Considering above mentioned facts, $\mu_0 = 3$.

Decision is made considering p-value index. If it is smaller than test level (α) and limits of the confidence interval, "mean difference with test value" is positive, H0 is rejected. Test level is considered as 0.05. Researchhypotheses with results obtained from the analysis will be given in the following.

H1: H_0: In the view of employees, information technology infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, information technology infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 2, mean score of items related to IT status in the view of employees is larger than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is positive, thus null hypothesis is supported and alternative hypothesis is rejected. Hence, H1 is supported.

H2: H_0: In the view of employees, organizational structure infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, organizational structure infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 3, mean score of items related to organizational structure status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. Hence, H2 is rejected.

H3: H_0: In the view of employees, organizational culture infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, organizational culture infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 4, mean score of items related to organizational culture status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H3 is rejected.

H4: H_0: In the view of employees, human resource infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, human resource infrastructure for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 5, mean score of items related to human resource status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H4 is rejected.

H5: H_0: In the view of employees, organizational processes for successful establishment of knowledge management in Karoon Oil and Gas Production Company are suitable.

H_1: In the view of employees, organizational processes for successful establishment of knowledge management in Karoon Oil and Gas Production Company are not suitable.

Considering Table 6, mean score of items related to organizational processes status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5 is rejected.

H5 -1: H_0: In the view of employees, knowledge creation process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge creation process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 7, mean score of items related to knowledge creation process knowledge creation process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-1 is rejected.

H5 -2: H_0: In the view of employees, knowledge acquisition process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge acquisition process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 8, mean score of items related to knowledge acquisition process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-2 is rejected.

H5 -3: H_0: In the view of employees, knowledge organization process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge organization process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 9, mean score of items related to knowledge organization process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-3 is rejected.

H5 -4: H_0: In the view of employees, knowledge storage process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge storage process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 10, mean score of items related to knowledge storage process knowledge creation process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-4 is rejected.

H5 -5: H_0: In the view of employees, knowledge dissemination process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge dissemination process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 11, mean score of items related to knowledge dissemination process knowledge creation process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-5 is rejected.

H5 -6: H_0: In the view of employees, knowledge application process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is suitable.

H_1: In the view of employees, knowledge application process for successful establishment of knowledge management in Karoon Oil and Gas Production Company is not suitable.

Considering Table 12, mean score of items related to knowledge application process knowledge creation process status in the view of employees is smaller than theoretical mean value (3) and there is statistical significant difference. Test result indicates sig level is smaller than 0.005 and t is negative, thus null hypothesis is rejected and alternative hypothesis is supported. That is, H5-6 is rejected.

Friedman Test for Ranking Key Infrastructural Factors in Successful Establishment of Knowledge Management

As observed in Table 13, X^2 is 0.2450 which is significant at level p = 0.000 and it denotes different level of importance for factors. IT factor with mean rank of 0.334 is in the first rank and most important factor, and organizational culture factor with mean rank of 0.179 is in the last place of importance.

Infrastructural factors were evaluated at four parts including IT, organizational structure, organizational structure, organizational culture and human resource. The diagram indicates current status and optimal status for each component. IT, organizational structure, human resource, and organizational culture are identified as the most important infrastructural factors respectively in Karoon Oil and Gas Production Company. Having suitable IT has highest importance of the employees and its status is more suitable than other variables in the company. Special attention is necessary for organizational culture which has no suitable status for successful implementation of knowledge management in the company and is in the lowest rank of importance, and appropriate culture should be created by training and necessary incentives for successful knowledge management establishment.

Friedman Test for Ranking KM Key Processes in Successful Establishment of Knowledge Management

As observed in Table 14, X^2 is 0.9648 which is significant at level p = 0.000 and it denotes different level of importance for KM processes. Knowledge acquisition with mean rank of 0.193 is in the first rank and most important process, and knowledge dissemination process with mean rank of 0.288 is in the last place of importance.

Diagram 10-4. Comparison of mean ranking of KM processes

Investigating Impact of KM Processes on Success of KM Establishment in Karoon Oil and Gas Production Company

Following diagram indicates current and optimal status and importance of KM processes.

Knowledge management processes were measured and evaluated at three parts including creation, acquisition, storage, organization, dissemination and application, and their current status ad optimal status and importance level can be seen in the diagram. Knowledgeacquisition, organization, creation and storage are the main process factors for knowledge management in Karoon Oil and Gas Production Company. Knowledgeacquisitionprocess has highest importance and knowledgedissemination process has lowest importance and has no suitable condition for successful establishment of knowledge management, reason of which may be negligence to teaching, learning and empowering employees for acquiring necessary knowledge.

DISCUSSION AND CONCLUSION

Today knowledge is regarded as a key and valuable competitive asset which is seen as the basis for sustainable growth and preserving stable competitive advantage. The society attention and demand for information is increasing in the new century. Thus, the society inevitably needs enhancement of information and knowledge management. Organizations have also been influenced by knowledge accumulation so that increased volume of information in the organizations and necessity for using knowledge in organizational decision making over two last decades has led to emergence of a phenomenon known as knowledge management. It indicates necessity for planning, organization, leadership, and monitoring organizational knowledge as well as management of knowledge access process so that it is effective and efficient. Given various proposed models in knowledge management field, current research uses a model including six processes: knowledge creation, acquisition, organization, storage, dissemination, and application. Successful implementation of knowledge management requires availability of necessary infrastructures for its implementation in the organization; otherwise, knowledge management strategy would fail. These infrastructures which are known as enablers include information technology, organizational structure, organizational culture, and human resource.

Results of t-test indicate organization has suitable information technology for successful establishment of knowledge management. However, the organization does not have suitable organizational structure, organizational culture, human resource, and organizational processes, knowledge creation, acquisition, storage, dissemination and application process for successful establishment of knowledge management. Friedman test was used for ranking infrastructural factors and processes of knowledge management among employees of Karoon Oil and Gas Production Company. Information technology and organizational structure were in top ranks and human resource and organizational culture were in the lowest ranks. Among knowledge management processes, knowledge acquisition, organization and creation components had highest rank and knowledge application, storage and dissemination components had lowest ranks.

Findings are consistent with findings by Chang (2011) in information technology dimension. In organizational culture dimension, it is consistent with findings by Sadeghi (2011). In terms of organizational structure component, it is consistent with findings by Ghafoor (2010). In terms of human resource dimension, it is consistent with findings by Ghafoor (2009) and Yeh (2006). Also, findings in knowledge management processes are consistent with findings by Chang (2011).

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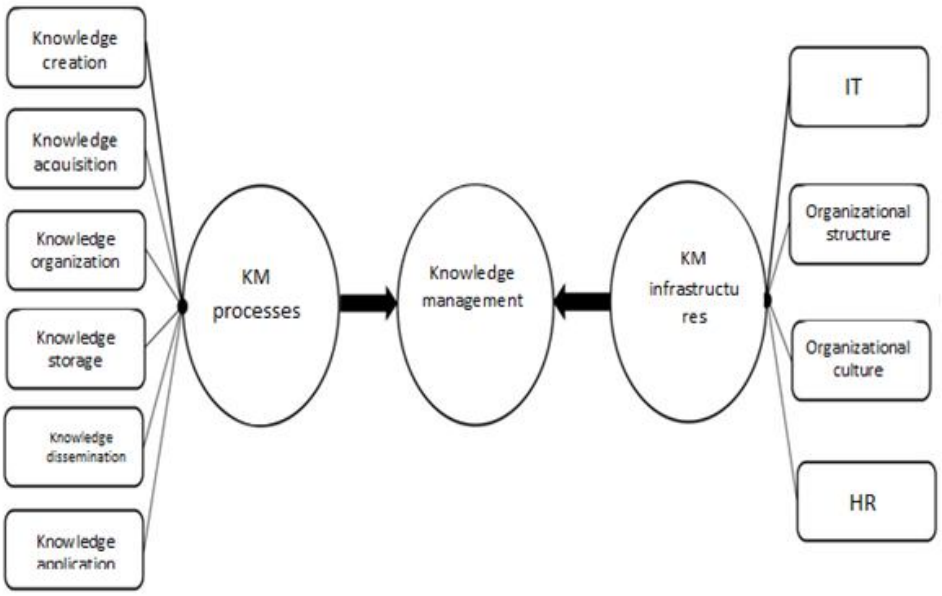

Fig 1. Research model

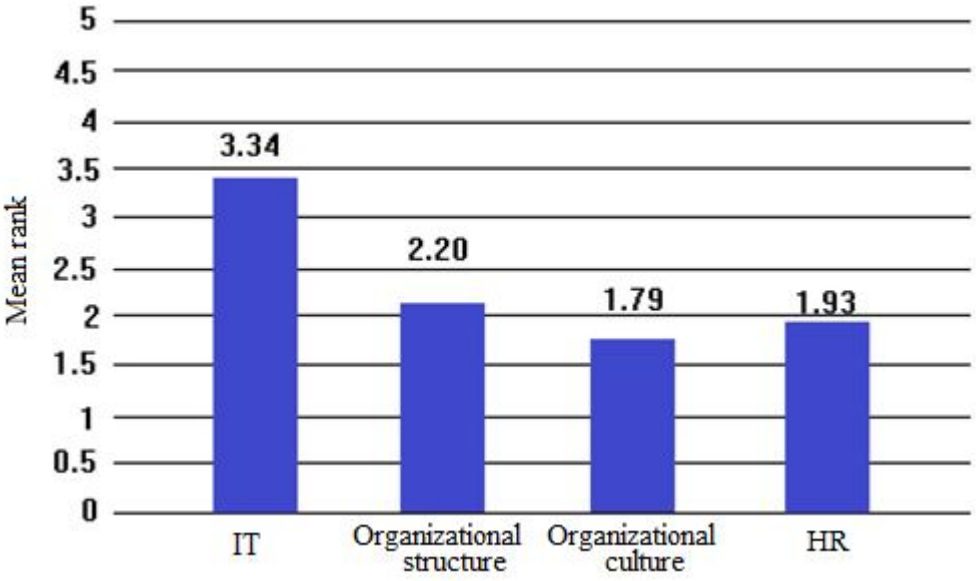

Fig 2. Comparison of mean ranking of KM infrastructures

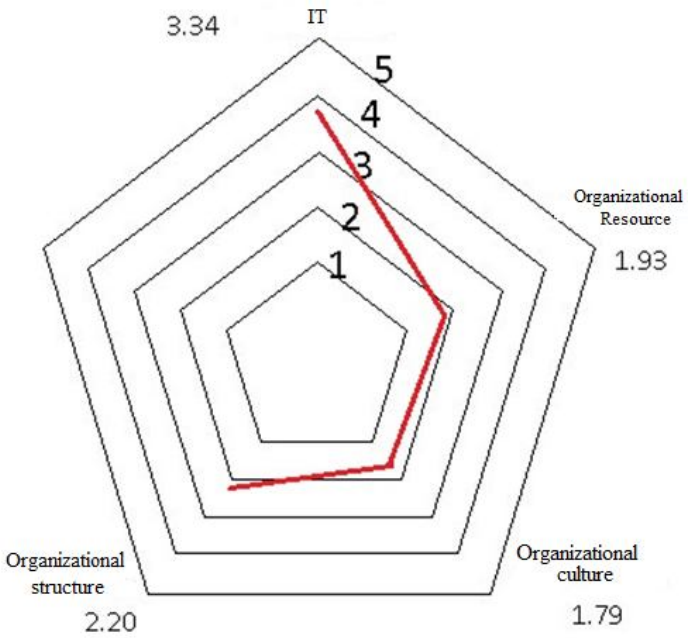

Fig 3. Status of KM infrastructures

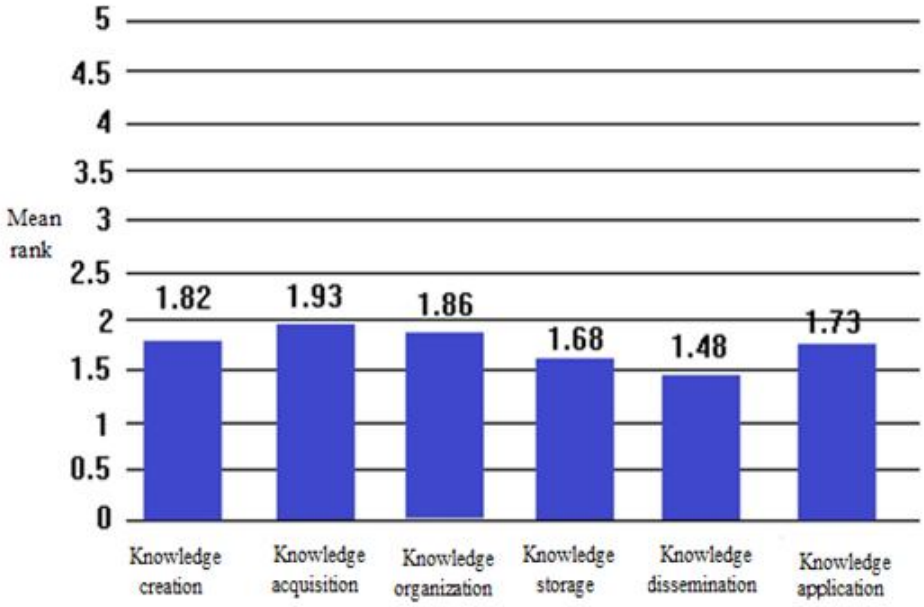

Fig 4. Comparison of mean ranking of KM processes

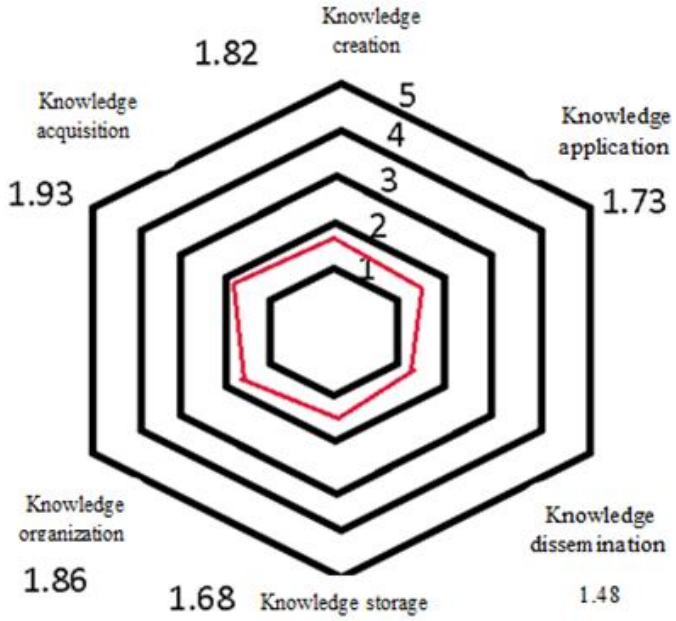

Fig 5. Status of KM processes

Table 1: Results of the Kolmogorov-Smirnov test

statistic	**0.031**
Df	225
Sig.	0.200

Table 2: Results of one sample t-test analysis for comparison of mean status score of information technology infrastructure in the view of employees with mean criterion score (3)

Variable	**Mean**	**SD**	**Test value**	**Df**	**T statistics**	**Sig level**	**Test result**
IT	0.334	0.0825	3	225	0.612	0.00001	H1 is supported

Table 3: Results of one sample t-test analysis for comparison of mean status score of organizational structure infrastructure in the view of employees with mean criterion score (3)

Variable	**Mean**	**SD**	**Test value**	**Df**	**T statistics**	**Sig level**	**Test result**
organizational structure	0.220	0.0590	3	225	-6.38	0.00001	H1 is rejected

Table 4: Results of one sample t-test analysis for comparison of mean status score of organizational culture infrastructure in the view of employees with mean criterion score (3)

Variable	**Mean**	**SD**	**Test value**	**Df**	**T statistics**	**Sig level**	**Test result**
Organizational culture	0.179	0.0742	3	225	-0.552	0.00001	H1 is rejected

Table 5: Results of one sample t-test analysis for comparison of mean status score of human resource infrastructure in the view of employees with mean criterion score (3)

Variable	**Mean**	**SD**	**Test value**	**Df**	**T statistics**	**Sig level**	**Test result**
human resource	0.193	0.0740	3	225	-0.974	0.0151	H1 is rejected

Table 6: Results of one sample t-test analysis for comparison of mean status score of organizational processes in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
Organizational processes	0.175	0.0742	3	225	-0.833	0.00001	H1 is rejected

Table 7: Results of one sample t-test analysis for comparison of mean status score of knowledge creation process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge creation	0.182	0.0863	3	225	-0.1156	0.0002	H1 is rejected

Table 8: Results of one sample t-test analysis for comparison of mean status score of knowledge acquisition process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge acquisition	0.193	0.0897	3	225	-0.993	0.0225	H1 is rejected

Table 9: Results of one sample t-test analysis for comparison of mean status score of knowledge organization process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge organization	0.186	0.0823	3	225	-0.782	0.0009	H1 is rejected

Table 10: Results of one sample t-test analysis for comparison of mean status score of knowledge storage process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge storage	0.168	0.0830	3	225	-0.691	0.00001	H1 is rejected

Table 11: Results of one sample t-test analysis for comparison of mean status score of knowledge dissemination process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge dissemination	0.148	0.0762	3	225	-0.598	0.00001	H1 is rejected

Table 12: Results of one sample t-test analysis for comparison of mean status score of knowledge application process in the view of employees with mean criterion score (3)

Variable	Mean	SD	Test value	Df	T statistics	Sig level	Test result
knowledge application	0.173	0.0870	3	225	-0.695	0.00001	H1 is rejected

Table 13: Friedman test results ranking infrastructural factors

Factor	Mean rank	Rank	(X^2)	Df	P Sig level
IT Infrastructure	0.334	1	0.2450	3	0.00001
Organizational Structure Infrastructure	0.220	2			
organizational culture Infrastructure	0.179	4			
human resources Infrastructure	0.193	3			

Table 14: Friedman test results ranking KM processes

Factor	Mean rank	Rank	(X^2)	Df	P Sig level
knowledge creation process	0.182	3	0.9648	5	0.00001
Knowledge acquisition process	0.193	1			
Knowledge organization process	0.186	2			
Knowledge storage process	0.168	5			
Knowledge dissemination process	0.148	6			
Knowledge application process	0.173	4			

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RESEARCH ARTICLE

Determining the Cost of Registry Services Provided in State Organization for Registration of Deeds and Properties, Lorestan: Presenting a Model as Prerequisite for the Implementation of Operating Budgeting System

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ABSTRACT

Nowadays, it is necessary to explore effective and prospective tools and approaches of predicting future performance of organizations and forecasting their resource requirements to clarify state budget system and preventing the imposition of high costs upon the country. Legal requirements oblige all executive agencies to take an action to improve budgeting system from the existing methods to a purposeful and operational method. In this regard, costing based on activities of the new method in measurement and estimating the cost of a product or service is used as introduction and infrastructure of the process of budgeting in the executive agencies. According to the studies conducted in State Organization for Registration of Deeds and Properties of Lorestan Province, this article presents a general model for determining the cost of the activities and services within the system of operating budgeting. Therefore, based on the research questions, this study has developed the following hypotheses. (1) It is essential to calculate the cost of activities to implement performance-based budgeting. (2) The current governmental accounting system is not proper to implement performance-based budgeting system. Implementation of performance-based budgeting system provides the possibility to evaluate the performance of the operating system. This study employs mostly field study approaches and it uses library-based research in some cases. Data gathering tools are observation query, and analysis of documents and interviews; the research statistical society consists of all offices of State Organization for Registration of Deeds and Properties of Lorestan Province. Analysis in this study is carried out through a combination of qualitative

and quantitative methods. After analyzing the collected data and designing the model, the first and second hypotheses were accepted. The third hypothesis was investigated with respect to the lack of full implementation of performance-based budgeting system in State Organization for Registration of Deeds and Properties of Lorestan Province; its effects on the performance of administrative apparatuses were not provided. Finally, suggestions for future research will be presented.

Key words: performance-based budgeting, activities, efficiency, effectiveness, the cost of activities;

INTRODUCTION

Nowadays, the condition of organizations has become more complex and unreliable (Kargar Shooraki & Zare, 2009). Due to the complex and changing conditions of decision-making, increasing rate of competition and expectations of service recipients and other beneficiaries, lack of resources, economic and financial crisis, environmental restrictions, social responsibility etc, there is no space for any kind of error and mistake by present organizations in any level and size in either public sector or private sector (Shaban Zadeh, 2011). These items arise the government's multiple attention to the economy, efficiency and effectiveness of government resources or the government's financial management. Encountering this condition not only requires the improvement of budgeting methods and procedures for increased coordination of system but also added a new aspect for deciding on in management and public financial management, or operating and planning budgeting system to review the evaluation of government's management activities (Office of financial resources planning and budget, Studies and Planning Unit of Health Economics, 2005). Hence, adjustment of operating budget has been placed on the government agenda, especially Management and Planning Organization of Iran since 2006 (Mahdavi, 2007). Three main elements in the operating budgeting are considerable: planning, calculation of the cost and performance evaluation. Meanwhile, the correct calculation of the cost of services and activities is important so as it can be considered as introduction and infrastructure of the process of operating budgeting (Torabi Pour & Abolqasem Pour, 2007).

Significance of the Study

Increasing the efficiency and effectiveness of the most important challenges of today's organizations. Operating budgeting system distinguishes between "efficiency" and "effectiveness". Efficiency implies the beneficial use of the desired resources, but effectiveness is related to performance. These two issues will be provided by calculating and managing the cost of activities, services and programs, which were not possible in the traditional method of budgeting (Andrews and Hill, 2003). The establishment of operating budgeting results in the removal of the defects of the existing method of budgeting in State Organization for Registration of Deeds and Properties. In addition, legal requirement including Article 138 and 144 of the Fourth Development Plan, Article 16 of the Law on Civil Service Management, and paragraph 32 of the general policies of the Fifth Development Plan, oblige all state offices all executive agencies to take an action to improve budgeting system from the existing methods to a purposeful and operational method (Andrews and Hill, 2003). Naturally, with the establishment of model proposed in this study performance assessment, knowledge of the actual costs of its activities, the compensation process reengineering costs and increasing efficiency as well as effectiveness will be possible in manners that are more favorable.

Research Method

The main objective of this study is to design and develop a general model for calculation of the cost of activity within the framework of performance-based budgeting in State Organization for Registration of Deeds and Properties of Lorestan Province. Selection of research method depends on the purpose, the nature and subject of the research and its practical possibilities. This study employs mostly field study approaches and it uses library-based research in

some cases. In field study, the researcher should collect data from the external environment with reference to people or the environment, and communicating directly with the unit of analysis. Thus, Data gathering tools are observation query, and analysis of documents and interviews.

Methods of Data Collection

Since this research aims to design and develop a general model for calculation of the cost of activity within the framework of performance-based budgeting, most of the study was conducted as a field study. The researcher began to collect preliminary data through collecting some evidences from target organization including organizational charts, job descriptions, goals, existing contracts, cost credit agreements and expenses list; then, he categorized expenses based on the nature of expenses through going to the organization and interviews with officials and experts in finance budget, and he classifies them based on the direct and indirect aspects. In the next phase, operational and supporting offices were detected. Afterward, the researcher evaluated principles for allocation of indirect costs. In this regard, opinions of the organization officials and management supporting guidelines were used. In determination of principles of indirect expenses, the researcher pays attention to the fact that the selected principles are regarded as the main cause of costs and there is a high positive correlation between the ground and indirect expenses. There is a need for appropriate criteria for each of the supporting agencies to prorate the costs of supporting agencies to operating agencies. Each of the supporting agencies is studied to determine the principles of operation. After determining the criteria for supporting agencies, programs and activities necessary to achieve organizational goals were identified. In addition to identifying activities, determining measurable indicators for each activity is also an important accomplished affair. Extensive research has been done to collect data about the activities and the size of particular activities carried out by each operational unit. Moreover, separate meetings were held with employees and managers of operational units. After performing the necessary explanations and preparing a list of activities carried out by the unit, the managers of the units were asked to determine the percentages of each of the activities in the related operating offices according to experiences of the past years and taking into account the future intended plans. In other words, they were asked to determine the volume of operations spent by each activity in an operating unit.

Data Analysis

This section presents a general model at first. Then an exclusive model to calculate the cost of activities was designed for State Organization for Registration of Deeds and Properties of Lorestan Province.

Performance-based budgeting adds efficiency and effectiveness to the traditional aspects of budgeting. This system distinguishes between efficiency and effectiveness. In efficiency, beneficial use of resources will be required; it does not merely mean cost savings because cost saving may be detriment to the while efficacy is associated with the performance.

The main goals of performance-based budgeting are the reform of public sector management and increasing the effectiveness of expenditure in this section. In general, performance-based budgeting process can be divided into four parts as follows:

Setting goals and objectives.
Determination of quantitative indicators to estimate the costs and performance of any application.
Estimation of costs of necessary programs to achieve the objectives of the.
The identification of deviations from the budget and control over the budget period.

According to the studies conducted in State Organization for Registration of Deeds and Properties of Lorestan Province, performance-based budgeting process includes the following steps:

Determination of organizational goals and identification of activities and programs needed to achieve the objective.

Assessment of the quantitative targets for each of the programs and activities.
Identification and classification of the state apparatus costs.
Prediction of the amount of money needed to achieve the targets.
Identification of supporting units.
Identification of operational units.
Classification of direct costs and indirect costs in terms of the agencies.
Tracking costs related directly to the offices.
Determination of appropriate standards for allocation of indirect costs based on the standards.
Calculation of the operational units' costs sum after sharing the the costs of supporting units and dividing it into the direct and indirect costs.
Determination of appropriate method of sharing the cost of supporting offices to the operational officers.

Calculation of the support units' costs sum after sharing the the costs of supporting units and dividing it into the direct and indirect costs.
Determination of activities associated with each of the operating units.
Determination of the percentage of activities carried out by each operating office (Determination of activity percentage).
Allocation of costs of each of the operational bodies to related activities based on specified percentages and cost determination of activities and programs.
Determination of the final cost of each unit's activity from quantitative targets

Assessment of the deviation from budget to control costs timely by the management.

Determination of organizational goals and identification of activities and programs needed to achieve the objective.

With regard to macroeconomic policy, each state apparatus determines its long- and short-term goals. The goals determined by a governmental apparatus should be accessible and accurate according to the available resources and detailed analysis.

The targets can be determined according to the following:
The fulfillment rate of people's needs.
To be in line with the general policy of the government.
To have economic, social, cultural and political reasons.
Its importance for the community.

Assessment of the quantitative targets for each of the programs and activities.

When programs and activities needed to achieve the objectives are defined, the quantitative rate of the specified activities and programs should be determined. It means they should explain the number of work-units that are going to be carried out by executive agency for the above period. In determination of quantitative targets, one should be careful to explain the numbers with respect to available resources and their necessity.

Identification and classification of the state apparatus costs

In this step, all expenditures needed to achieve quantitative targets are evaluated. According to surveys conducted in the related organization, these costs can be divided into two categories: direct and indirect costs. Direct costs refer to the costs that are directly traceable to the operational and supporting bodies and indirect costs are not directly traceable to the operational and supporting bodies. The latter is divided between operational and supporting bodies through its proper basis. The instances of this cost, which are the same in all organizations and government agencies except for a few cases, are shown in table 1.

However, it should also be noted that which costs listed below are in the class of inevitable personnel costs, and which one is included in the category of other costs.

Prediction of the amount of money needed to achieve the targets

In this stage, all administrative apparatus and units, especially budgetary units, should begin to predict the costs necessary to achieve their intended goals. It should be noted that these costs can be predicted according to the information of past years and programs of future years. Care must be taken in predicting costs and the prediction should not be implemented from total to parts, but it should be carried out based on goals.

Identification of supporting units

Supporting units' main duty ids not doing an activity, but they are designed to support operational offices. The main activities of the executive body do not operate without the supporting units (Table 2).

Identification of operational units

Operational units carry out the main task of organization or government agency and they are usually different in the departments and government agencies.

Classification of costs to direct costs and indirect costs in terms of the agencies

At this point, all specified costs are divided into two groups of direct costs and indirect costs according to supporting and operational offices. Direct costs are traceable directly in the intended offices. Indirect costs are not traceable directly in a specific office and they are divided between different units according to proper standards. Direct-indirect classification of costs in terms of offices and tracing or allocation method are shown in the table 3.

Tracing direct costs to related offices

As said earlier, direct costs such as phone, printing, replication, repair, and fuel of vehicles are traced respectively the units of telecommunication, printing and replication, transportation.

Determination of appropriate standards for allocation of indirect costs based on the standards

In this case, a standard must be selected that have a stronger association with indirect costs; in other words, the standard should be the main cause of costs, and the indirect costs increase with the increase of the above standard. Indirect costs and standards for their allocation are mentioned in table 4.

Calculation of the supporting units' costs sum for each unit

At this stage, all identified fees are traced and prorated to supporting and operational offices; therefore, all intended costs would gather in supporting and operational offices. Now, it is possible to allocate the collected costs in supporting offices to operational offices.

Determination of appropriate method for sharing the cost of supporting offices to the operational officers

Since the major activities are carried out by operational officers, all the collected costs in supporting offices in the supporting offices should be prorated to operational offices. Consequently, the cost of the support bodies is zero. To do this, methods of cost allocation are used to transfer costs in supporting offices to operational offices, including:

Direct allocation method
Unilateral allocation method
Bilateral allocation method (mutual)

The most accurate method is the third; but it is not used and not cost effective due to the complex calculations. In this situation, direct or unilateral method is used. Note that if supporting offices are providing service to other supporting offices beyond operational offices, it is better to use the unilateral approach.

Calculation of the operational units' costs sum after allocation of the supporting units' costs and dividing it into the direct and indirect costs

Of course, the allocation standards are predicted so that it determines the exact amount of direct traceable costs in operational offices and the amount of costs having been prorated from supporting offices or prorated indirectly through standards to the operational offices (which form the indirect costs). It also determines the inevitable personnel expenses and other costs.

Determination of related activities to each operational unit

As previously stated, programs and activities are defined for state apparatuses with respect to aims and objectives. In this step, the researcher determines the related activities to each operational unit and the overall perspective of the program. This step is implemented by experienced staff at the operational units, management supervision and deputy.

Determination of the percentage of activities carried out by each operating office (Determination of activity percentage).

As measurement units vary for each of the activities, one cannot use the same base. Hence, it is necessary to determine the percentage of activity carried out by each operational office. For instance, in the accumulated costs in the X operational unit is 100,000 Rials and it is determined that this unit spend 60% of his activities to activity A, 30% to activity B, and 10% to activity C, the cost of activities is as follows:

Activity A: 100,000 * 0.60 = 60,000
Activity B: 100,000* 0.30 = 30,000
Activity C: 100,000* 0.10 = 10,000

It is worth mentioning that activity percentages are determined according to investigations conducted by the management and staff of each operating unit; in this regard, the future information have been considered in addition to the past information (last year).

Allocation of costs of each of the operational bodies to related activities based on specified percentages and cost determination of activities and programs

When activity percentages were determined, one can calculate the final cost of every activity by multiplying the percentages in operation units' costs. It should be mentioned that an operational unit may carry out some activities, or one activity is carried out by some offices. When one activity is carried out by some offices, it should be determined exactly the percentage of each office; when the exact cost of each activity is determined, the amounts of salaries, inevitable wages, and other expenses should be verified exactly. Then, we can calculate the final cost of each program by adding the final cost of each related activity. It is also possible to calculate salaries, inevitable wages, and other expenses.

Determination of the final cost of each unit's activity from quantitative targets

In fact, state apparatuses forecast quantitative objectives for each program and consequently each activity according to the ability and capacity of the target unit. Here, the researcher is going to compute the final cost of each unit by dividing the related expenses of each activity to its quantitative objectives; then, we are able to calculate the final cost of each program by dividing the related expenses of each program to its quantitative objectives. For example, suppose the final cost of Activity (A) is 15000000 Rails, let the units carry out 1000 units of this activity, then the final cost of each unit of the activity equals 15000 according to the predictions.

Presentation of modern for cost of activities carried out by State Organization for Registration of Deeds and Properties of Lorestan Province

This section provides a model for State Organization for Registration of Deeds and Properties of Lorestan Province. First, the costs are classified according to their natural essence; then, the costs are divided in two groups of direct and indirect costs based on the offices. Direct costs are traced to different offices and indirect costs are allocated to different offices according to proper standards. Afterwards, the supporting offices' costs, which are stated in the second column, are allocated to operational offices. After the accumulation of all costs in operational offices, shown in third column, the costs will be allocated to activities with respect to the percentages of performed operations. Consequently, the final cost of activities, and subsequent program costs will be determined (figure 1).

Figure 1: general model for calculating the cost of activities carried out by state of organization for registration of Deeds and properties of Lorestan province

CONCLUSION

According to conducted studies, calculating cost of activities is a prerequisite for operating budgeting and implementation of performance-based budgeting system is a group, organizational, and even state action to reduce costs and save them, develop the country, emphasize the results and effectiveness of resource consumption. The implementation requires fundamental changes in government accounting system to calculate the cost of activities simplifying state operation, increasing efficiency and effectiveness of their operations, and increasing accountability of the government. Organizations establishing a logical connection between their consuming resources and results of ongoing programs are more powerful to improve their operation, document the results of their annual activities, and

defend the allocated budget. Obviously, the basis of such a space is almost impossible without having detailed knowledge of the cost of current activities in organizations. Therefore, the execution the budget law requires serious attention and effort to calculate the cost of activities.

Research Recommendations

Holding training and justification classes for managers and employees of different units.
Playing a more active role in responding and resolving ambiguities by the Audit Court.
The establishment of enforcement units outside the Central Administration and Organization.
Providing practical examples of the implementation of cost management in workshops.
Classification of activities, and quantitative and qualitative categorization.
Separating the portion of projects related to the costs from the total credit issued to executive agencies.
Allocation of special credit for projects subject to cost.
Delegating more authority to take advantage of the specialists available in the center.
Justifying lead managers and further communication of involved experts of the headquarters with provincial and district units.

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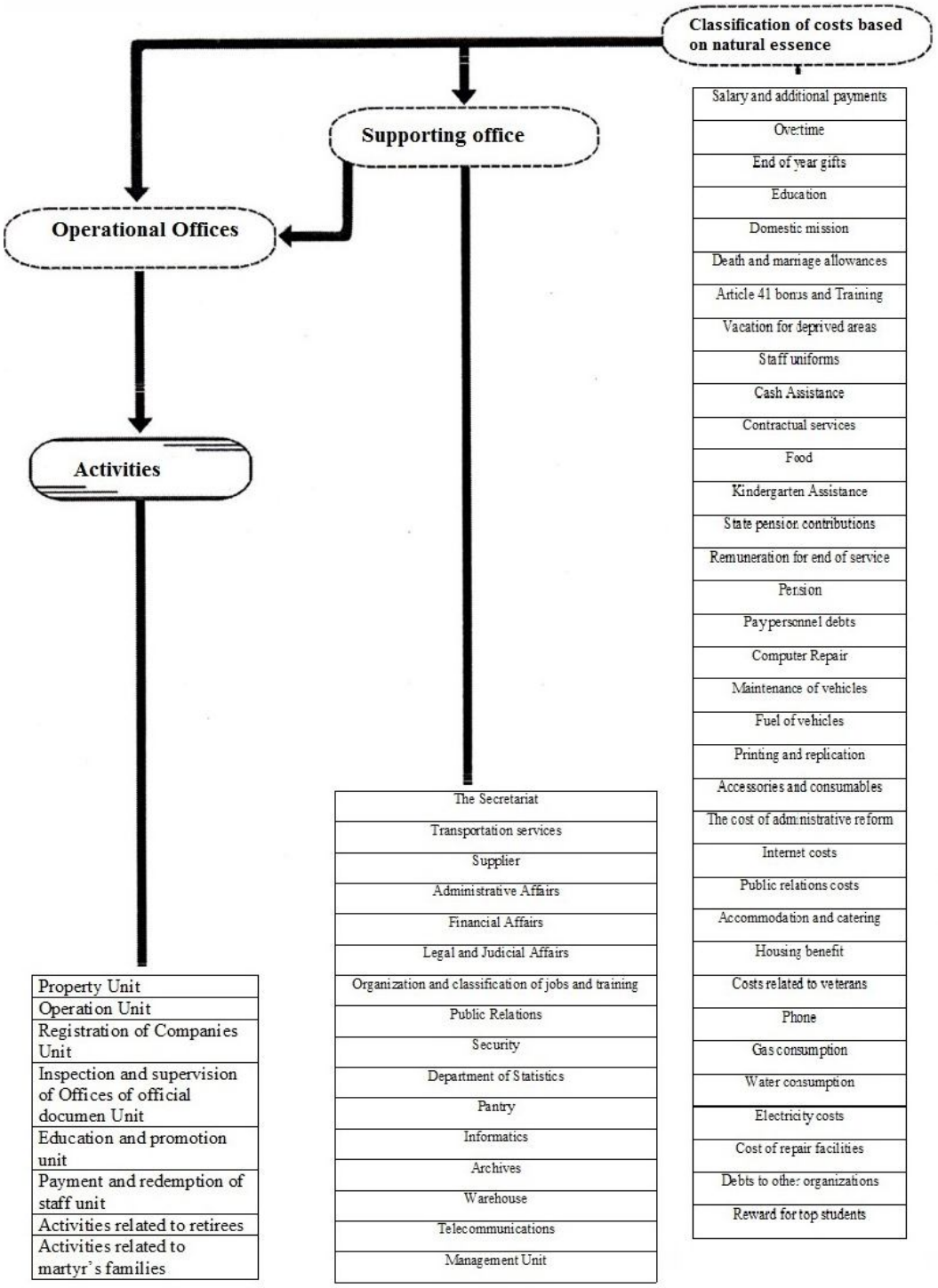

Figure 1: general model for calculating the cost of activities carried out by state of organization for registration of Deeds and properties of Lorestan province

Table 1: Classification of costs based on the natural essence

Cost title based on the natural essence	Cost title based on the natural essence
Salary and additional payments	Computer Repair
Overtime	Maintenance of vehicles
End of year gifts	Fuel of vehicles
Education	Printing and replication
Domestic mission	Accessories and consumables
Death and marriage allowances	The cost of administrative reform
Article 41 bonus and Training	Internet costs
Vacation for deprived areas	Public relations costs
Staff uniforms	Accommodation and catering
Cash Assistance	Housing benefit
Contractual services	Costs related to veterans
Food	Phone
Kindergarten Assistance	Gas consumption
State pension contributions	Water consumption
Remuneration for end of service	Electricity costs
Pension	Cost of repair facilities
Pay personnel debts	Debts to other organizations
Car Insurance	Reward for top students

Table 2: Supporting units and their allocation basis

Supporting unit	**Allocation basis**
The Secretariat	Number of Correspondence
Transportation services	Time of using the vehicles
Supplier	The number of requests per unit
Administrative Affairs	Number of employees
Financial Affairs	Number of employees and funding per unit
Legal and Judicial Affairs	Volume of operations
Organization and classification of jobs and training	Number of employees
Public Relations	Number of employees
Security	Number of employees
Department of Statistics	Number of employees
Pantry	Volume of operations
Informatics	Number of employees

Archives	Number of computers
Warehouse	Record Archives
Telecommunications	Application number and volume of the inventory goods in stock
Management Unit	Number of employees

Table 3: classification of costs and methods of tracking or allocation

Cost title based on the	Direct	Indirect	methods of tracking or allocation
Salary and additional	•		According to the staff of each office, traced to
Overtime	•		According to the staff of each office, traced to
End of year gifts	•		According to the staff of each office, traced to
Education	•		According to the staff using educational
Domestic mission	•		According to employees who have gone on
Death and marriage	•		According to employees who have used it.
Article 41 bonus and	•		According to employees who have used it.
Vacation for deprived areas	•		According to employees who have used it.
Staff uniforms	•		According to the number of employees in the
Cash Assistance	•		According to employees of each office who
Contractual services	•		To the offices that are subject to the contract.
Food	•		According to the number of employees in the
Kindergarten Assistance	•		According to employees of each office who
State pension contributions	•		Traced to non-operational activity of debts
Remuneration for end of	•		Traced to non-operational activity of pension.
Pay personnel debts	•		Traced to non-operational activity of debts
Car Insurance	•		Traced to vehicles unit
Reward for top students	•		According to employees of each office who
Computer Repair	•		Computer unit
Maintenance of vehicles	•		Vehicles unit
Fuel of vehicles	•		Vehicles unit
Printing and replication	•		Printing and replication unit
Accessories and	•		Traced according to documents held in stock
The cost of administrative	•		Administrative and supporting unit
Internet costs	•		Computer unit
Public relations costs	•		Public relations
Accommodation and	•		Public relations
Housing benefit	•		According to employees of each office who
Costs related to veterans	•		Units in which the employees have used the
Phone	•		Telecommunications unit
Gas consumption	•		Allocated to offices based on the

Water consumption	•		Allocated to offices based on the number of
Electricity costs	•		Allocated to offices based on the
Cost of repair facilities	•		Allocated to offices based on the
Debts to other organizations	•		Traced to non-operational activity of debts

Table 4. Indirect costs and standards for their allocation

Row	Indirect costs	Allocation Standard
1	The price of water	Number of employees
2	Power costs	Square meter
3	The cost of gas	Square meter
4	Indirect Calls	Number of employees in units that have not a direct line
5	The cost of repairs and installations	Square meter
6	Building insurance costs	Square meter

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RESEARCH ARTICLE

The Design of Cultural-Recreational Paradise (Pardis) in Shafagh Complex of Zob Ahan of Isfahan

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ABSTRACT

For the modern human being involved in the mental and psychological tensions of variety and complexity of social relations, three factors of population density, information accumulation and environmental crises namely the lack of relation between human being and nature created a type of mental crises and this neural crisis has adverse effects on physical, mental and social diseases in the form of abnormalities. To satisfy physiological and social needs and playing social roles, human being needs the spaces with suitable conditions and if he cannot create the required conditions, the behavior is change and he can adapt himself with the existing conditions. Thus, an Iranian person has never considered his interaction with environment separated from his culture, these two factors can get meaning beside each other in Paradiseand Iranian garden. This study attempts to find a way by which the environment, activities, individual action interaction models with environment can be organization with culture. Indeed, this study attempts to create the spaces to improve cultural-recreational sites design as it improves the quality of cultural-recreational spaces of open environments. This study is conducted by qualitative method and descriptive-analytic data collection method and based on Iranian garden construction in cultural-recreation spaces, it can be considered with a person interaction with environment beside culture. The required site is located in Shafagh complex of ZobAhan in Isfahan (district 13 of Municipality of Isfahan). The main idea of design is based on northern-southern area of Iranian garden and other spaces are organized based on required areas around this area. In the design, it is attempted to create coordination and integration between the designed elements. Water element is an

effective organic factor in site. It is also attempted to keep it as a comforting factor. It is hoped that this study is a positive step to design open spaces of cultural-recreational sites to meet the physiological and social interaction needs.

Key words: Culture, Garden, Green space, open space, Paradise, Social interactions

INTRODUCTION

Today, a new ontology is discussed in the views of many theorists in which the coordinated relation between human and nature is searched. Among architecture approaches, the relation with nature is turned into a challenging issue but the impact of this issue on architecture is reflected in various mental and physical levels. This issue is based on an important need of human life. It seems that one of the reasons of variety of levels among nature-based architecture approaches is based on disagreement regarding nature concept. In some nature-based approaches, real and net quality is searched in architecture space. What emphasizing the literal, artistic, cultural and belief aspects of Paradisemodel in thought life of human being is searching good perfection of the desire of returning to the eternal origin (heaven), the origin from which human being is taken out (descension) and the returning to this place is in the form of a collective model in the collective unconscious. This enables human being to make active fantasy and critical creativity, extra-materialistic idealistic as tangible. This ideal perfection by its positive and negative aspects in mental world think about world research and its materialistic existence is impossible. Sometimes, it draws the model of achieving the world as it is claimed by imitating it, we can achieve a good system in reality (Parham and Ghaemi, 2010). The description of earthly heavens via cultural relations between Greece and Rome with Iran went to west and it is called paradisus in Latin term and its meaning is consistent with the same image Iranians had as better and " best paradise" earthly or heavenly (Mallory, 1997, p. 628, Corbin, 1990, 138). On the other hand, the term " PeiriDeze" was turned into "Pardis" in Sasanid era. These paradises were royal gardens of Sasanid era and they entered Arabic countries via western borders in this description and like "Ferdoos" shows a representation of heaven gardens in the mind of people (Farevashi, 1976, 135). In arid climate of Iran, green gardens are considered as cool and comfortable place for recreation and comfort. The reasons are main factors and some of them are specific as economic, political, cultural and recreational reasons (Motedayen, 2010). If the relation between human, nature and artificial environment is favorite, the health and mental health in society is increased with hopeful quality and the need of human nature to close relation with nature and enjoying its graces can make human, nature and providing mental health in the current world as interacting. The current human being attempts to recreate his physical and mental health in nature (Shahcheraghi, 2012). Any element in environment beside its performance has some possible capabilities (Gibson, 1979). Any element in nature fulfills performance and can have extra capacities. In this theory, it is assumed that the perception of audience of hidden capabilities of elements of perspective can refer to the social, cultural backgrounds. Environmental capabilities are not only dependent upon its elements and they include human grounds as culture and society (Costall, 1995; 467). Indeed, creating suitable facilities for recreational-cultural activities isa necessity for excellent life of an informed person. Indeed, in development trend, some spaces are created regarding these activities and these spaces should be designed as valuable and like other needs, cultural-recreational issues should be the necessities of life to make great cultural, scientific and economic changes. To meet physiological and social needs, and to play social roles, human being needs the spaces with suitable conditions and behavior is changed only when the required conditions are not created and the existing conditions can be adapted. This study attempts to find a way by made environment, activities, interaction models and individual action with environment can be beside the culture. Indeed, this study attempts to create the spaces to improve the open spaces design of cultural-recreational sites as it improves the quality of cultural-recreational spaces of open spaces. Site is designed and managed as it is the main goal of creating cultural-recreational spaces.

Theoretical basics

Culture is a complex set of identifications, arts, beliefs and traditions, law, tradition, attitudes and etc. a person can achieve in his society (Murish, 1994). The culture of each person is the result of awareness, recognitions and experiences, when the data are not used directly, but we can say each person is the owner of culture and no society can lose its culture (Felamaki, 2006). By recognition of culture, we can say cultural complex is the spaces gathering to start an attempt to increase individual and social culture. The spaces that are different in terms of size, form and performance but due to having a visual order are associated to each other (Sharifianpour, 2003). The quality of life environment of people in society is effective on their routine activities namely, their mental features. Human life is affected by various environmental issues in all periods. The health is based on dynamics of a society, healthy and active people in society giving good moods to the environment and promote the society to excellent goals. Individual and environment has close relation and create a unified environment as none of them are defined alone and they are interact with each other. Human being relation with surrounding environment is based on a set of senses, today, one's unconscious image of self, a person life, parts feedback and senses in a made environment can be formed (Tihal, 1997, 94). Presenting a full analysis of mutual effect of human being and environment is complex based on all effective factors. Human being requires specific qualities of environment based on needs and goals to be active in environment. The environment determines recipients, the activities are organized and can be also re-created (Shahsavari, 2004, 12). The activities leading to mental comfort are called recreationalactivities; these activities have great influence on reduction of mental tensions, morale, mental comfort and increasing problems tolerance. If recreational activity is done voluntarily and with satisfaction, the result is good. The recreational games as demonstration, boating, fishing and etc. are these activities (Shokuhi, 1994, 13). The environment and views show thousands of ecological, technological and cultural factors. Conditions are specific designed or non-designed sites being made by these factors and they are experienced by people. A person with physical survival and security and mental enrichment attempts to use the processes to encode and decode the concepts in conditions. A person attributes concepts to perception features (perception concepts) and by association of these conditions, direct and indirect experiences of their past (associated concepts) can be extracted (Seyed Sadr, 2009, 134). Now, we can deal with the definition of green space and this region is covered by plants in inside or surrounding cities with two important functions for cities: 1- Adjusting temperature and air temperature, 2- aesthetics in cities, natural or artificial arena are under the influence of establishing threes and flowers, lawn and other plants as based on the supervision and management of human being and considering the regulations, rules and specializations to improve biological , habitat and welfare conditions of citizens and non-rural population centers. Urban green space includes urban parks, green belt, gardens and recreation places and forest parks and etc. (Majnunian, 1995). In a simple description of geometry structure system of Iranian garden, we can say the garden is square or rectangle based on water volume as it can be provided and based on earth feature (at the same level with general slope, slope, close to river) and is based on regular geometry basis of plot or tracing can be performed. Geometry structure in Iranian garden is formed by two major forms, one creating three-axial along with each other in garden and another one is considering two main crossing axial and then garden division is divided into squares with regular divisions. Baghshahr in Isfahan is one of the best experiences regarding urban design about 400 years ago in our country. By this design, the regular main structure of new city is outside of previous city via using garden into garden principles and major city division based on biaxial can create great Charbagh and is linked with the main new square and Gheisarie market with sensitive and less intervention and also old city is linked. In Safavid era, development in new city follows order and structural relation between garden and city (Mirfandarski, 1995, 127). Indeed, nature in current life environments namely in cities and metropolises is effective on stress, fear, perception, comfort, security, privacy, domain and other mental indices and can be importer in individual and collective health of society. Today, sustainable development model is considered as mental health issue of human being in the form of the relation between human and environment. According to designers, the quality of structural environment is the result of relationship between nature and anthropogenic environment. The researchers and designers considering mental health in review of gardens can present their experiences in the form of executed plans and they can be considered in four main groups. Domestic gardens, healing gardens, garden-participative parks and urban enclosed gardens (Shahcheraghi, 2012, 255). Iranian

garden is an independent phenomenon of virgin nature in the mind and contemporary culture of Iran and contemporary culture of Iranian people accepts "garden phenomenon" in physical environment of environment.

Study purpose

The searching of direct and indirect effects of open space on quality of cultural-recreational spaces and applied recognition of environment capabilities and improving it.

Improving the knowledge of designing open spaces of cultural-recreational sites can be designed, made and managed as it can improve the quality of space in open environments. Ignoring the type of comprehensive plan in designing the architecture of a cultural-recreational center, some issues as communication networks, external development spaces, centrality and edges of Paradise, locating of main buildings and environmental factors can be considered. The creation of green space and design of intimate spaces between the buildings with the aim of integration and linking of buildings and external space to each other has a general image of paradise and it can achieve the recognition of activities and interaction models of individual action with environment beside the culture on designing the architecture of a cultural-recreational center. The paradise design principles are based on design of human being, linking with nature and vision, creating pedestrian area and protection of plant nature.

Conscious arrangement of perspective elements in natural environments and cultural-recreational paradises as it leads to the recreation of concentration of soul and body.

Based on the above goals, the following questions are raised:
Is paradise effective on architectural space of cultural-recreational center?
What are the effective features on improving architectural quality of cultural-recreational paradise?
What is the effect of architecture quality of cultural-recreational paradise on audience physical aspects?

Study Method And Type

Study method depends upon the type of study and its nature and based on study subject as the design of cultural-recreational paradise, after the infrastructural architecture studies, the researcher conducts qualitative study along the scientific studies and its scientific results in the study. Qualitative study is conducted by data collection, library and field study to create the spaces to improve design knowledge of open spaces of cultural-recreational sites and meeting the physiological and social needs. Based on the study purpose, different types of studies are divided into three types of basic, applied and development. The present study evaluates a high quality environment to eliminate physical and mental problems and environmental crises namely the lack of relation between human and contemporary human nature and this study is qualitative-applied. The studies of Paradise and Iranian garden model evaluated the spatial needs of required site for designing complex as conducted after infrastructural studies and based on study title and the results by applied (qualitative) can be performed.

Study population and sampling method

The study population is a set of people or units with minimum common attribute. In this study, the study population includes garden and required buildings and their users and sampling method is purposeful.

Data collection instrument

The study method depends upon the study type and its nature and based on subject, after the infrastructural architecture studies, two stages are considered and at first we considered the descriptive-analytic method of features and concepts as nature-based approaches, Paradise model, site quality and etc. After the recognition of needs and investigation of sample centers in Iran, the required spaces are designed. In this study, library documents and observation including Persian and Latin books, Internet, journals, scientific journals, global standards, images and urban maps and state documents.

Natural situation and geography if Isfahan city

Isfahan city with longitude 51°, 39', 40'' eastern and latitude 32°, 38' ,30'' northern is located in center of Iran with average sea level height 1570m in Zayanderood coast. From country divisions, Isfahan city is center of Isfahan province in the distance 425km in south of Tehran. The plain on which Isfahan city is located is with average slope less than 3% and its slope is northwest to southeast (Shafaghi, 2002). This province with area of about 107018 km2 is restricted from east to arid and semi-arid area and from West to Zagros mountainous region, green area (Azaniet all, 2013). Based on climatic divisions of country, Isfahan is located in arid climate but some factors are effective on the climate of this province as place height, the rising and falling and their directions, rainfall, effect of wind, close and far distance from western mountainous region and Kavir plain in east and southeast, Isfahan population is 1796967, of which 121032 people live in district 13.

District 3 in Isfahan city

This region is bounded from north along with Zayanderood of Nirogah street intersection to Sohrevardi square, from south to ZobAhan highway, from east to Simin and Janbazan street and from west to Yazdabad bridge along Qods township to power plant road in Zayanderood margin (Figure 1)(municipality site of district 13 in Isfahan).

Physical condition of district 13 of Isfahan city

The townships of district 13 of Isfahan city from physical index (sport, cultural, educational and religious spaces in township level) have considerable differences in terms of comparison with ranking of Topsis table and the results are shown in Table 1 (Topsis model includes 13 stages done by various math techniques)(Azani et al., 2013).

Locating The Required Site

Recognition of spatial features of site to design an urban space is of great importance more than any other issue. The researcher considered many factors as easy access, good location, good weather and suitable area to design cultural-recreational paradise. The required site is located in Shafaghstreet with approximate area 26 thousand square meter in the west of Isfahan city. Except the old dried brick in mountainous area in the north of site, this site has not the limitations of internal (historical texture) and most of its constructions are dedicated to contemporary era. The location of site in proximity to Ghaemie mountain, old dried brick and mountainous park of Abshar in north, KuhNur and Fazilischool in the west of site, ShahidAbaspour power plant and DonbeMountain in southwest can be considered. In this project, the analysis of selected site is investigated in the form of social physical issues as in Figure 2 we can consider site location.

Effective elements on plan

One of the important and effective elements on site design is mountain as the land is located in its food. Also, it is considered one of the most important elements. This site is located in the proximity of mountain and has average slope in northern-southern areas. This slope is effective on site design and landscape of complex and is useful to create beautiful perspective with various perspectives. Other effective elements on site are including: Optimal angle of east and southeast lighting of site, natural elements as green space around site and climatic factors as wind direction, light and land topography.

The required vegetation of design

Besides their effect on air purification and showing the best aspects of nature, plants are also used to cover the unsuitable perspectives. Regarding the introduction of plants to renovate vegetation in region and creating open space, we can consider the followings:1- Ecological conditions on mountain, to provide a consistent condition with natural conditions of mountain and studied area and ecological conditions of region are required., 2- Existing vegetation of required complex, the required land of vegetation of cypress, pine, bushes and decorative plants. To apply the best and prettiest vegetation in landscape design, we should have general introduction with different plant vegetation and decorations.

STUDY FINDINGS

The study findings are the result of qualitative evaluation and we can say the existing architectural elements in each space are effective on its users and this effect is positive directing a person to comfort. The relationship between human and nature has direct impact on increasing his mental health. Thus, if the relation between human, nature and artificial environment is free, mental health is increased in society and the need of human nature to close relation with nature and enjoying its graces, human, nature and mental health providing in current world are interacting. Recognizing the activities and individual interaction models with environment beside culture to provide comfort, mental security, motivation and intellectual and artistic motivations can be achieved. In this section, we respond the raised questions:1- Is Paradise effective on architecture space of cultural-recreational center?

According to the studies done by author in this case, there is a good link between buildings and garden and the designers don't consider these two items separated and this is one of the best features to consider Iranian garden. It seems that only paying attention to archetype and geometry of Iranian garden cannot be useful as abstract and conceptual interpretations of garden and helping the designers in process, design and creation of works. In cultural approach to gardens, responding to materialistic, social and mental needs of a person or a group of society can be reviewed. Iranian garden is equipped with fitness order, deprivation and inhibition, free from extreme behaviors, efficiency and profitability, suitable for saving and stability. Also, it has ideal coordination and can justify its regulations in good climate areas even humid areas and we can achieve the best results. 2- Which features are effective on improving the architectural quality of cultural-recreation Paradise? What are the good features of cultural-recreation Paradise architecture. Based on considering the needs, values and goals, human being requires specific qualities. The environment determines the receiving items, organizes the activities and can create need. The composition of elements of garden as land, edges and wall, confinement, opening and path, bottom and ceiling, irrigation system, furniture and decorations, garden components and its qualities are formed. In Iranian garden, other features in garden as emphasis on horizon, separation of inside and outside, importance of wall element, spatial consistency, complexity of composition of historical elements, dependence of garden to surrounding perspective as qualities of linking of components and elements to garden can be raised. Most of these features are general aspects of gardens confined in climatic, cultural and historical grounds. 3- How is the effect of architectural quality of cultural-recreational Paradise on audience? The quality of living environment of people in society affects

their routine activities namely their mental features. According to the contemporary human, paradise is a comfortable place. Providing physical comfort and association of meanings and concepts is a mental factor and architecture can provide it as the most important factor of space order. The main key of designing cultural-recreational paradise is a comfortable space for contemporary human being or the citizen involved in routine stressful environments.

The idea of plan

The main idea in designing of this complex is protecting the green nature of the studied site and organic and homogenous design with existing nature and minimum involvement to create an enjoyable environment. The start point or nodal point or plan idea can be very different and the plan idea is one thing and if it is many things, one of them is fully major. The first step is the design of paths. The line defined as area starts in northern-southern direction and with its direct movement and based on Iranian garden (water is flowing along the path) can continue its movement and at the end of its moving path can achieve the existing index point in site (cultural complex). The next step in the design is a simple processed volume and as it follows the old small houses, it is also a modern one. Cultural building by being inspired by Iranian architecture is formed as a small house in the garden. An area as fountain, entrance and main building can be linked. This project includes a full yard and composed of building and green space and glass façade of building indicates protection against pollution and climatic conditions and extraversion. The low buildings design around Paradise is enclosed by thick wall. Symmetry principle is used in designing green spaces and building design. A checked geometry network with rectangular level as divided into some squares and final stage is the arrangement of spaces designed associated with the use of design and application method. Some spaces as restaurant, green house, arbourand sport fields are organized around this area.

The classification of required spaces in design

In the design of this complex, it is attempted to design various educational, cultural, recreational and service spaces as a coherent complex: Educational spaces, cultural, spaces, cultural-recreational spaces, open educational spaces, leisure-recreational spaces, green house, administrative spaces, service spaces, camping (arbour) and mobile spaces.

CONCLUSION

Regarding the works being explained, there was a good link between the buildings and garden and the designers didn't consider them separated and this is one of the best features in Iranian garden. It seems that only dealing with archetype of Iranian garden geometry cannot help the designers in process, design and creation at the same level as abstract and conceptual interpretations of garden. In other words, we can say, according to the contemporary human, paradise is a comfortable place. Providing physical comfort and association of meanings and concepts is a mental factor and architecture as the most important factor of space order can provide it. The main key of paradise design is a comfortable space for contemporary person and it is based on a combination of local architecture, organic and modern technology architecture. It is attempted that the design is regarding the protection of green space, maximum view and perspective and the best direction and coordination can be created between the designed elements. Also, water element is an effective organic factor in site and it is used as a comforting factor. It is hoped that this study is a positive step to design open spaces of cultural-recreational sites to meet the physiological and social interaction needs.

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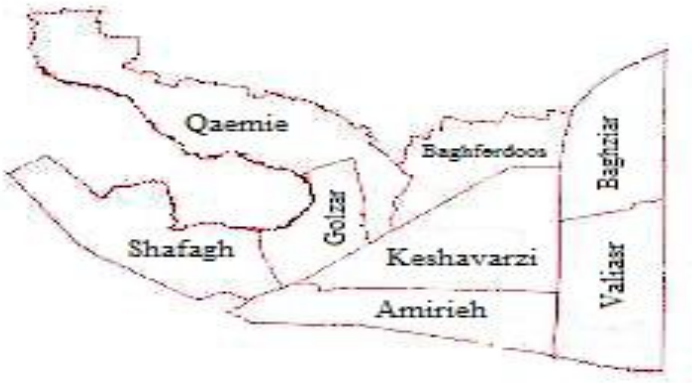

Figure 1- Townships of district 13 with population and area (source: Ezani et al., 2013).

Figure 2- Cultural-recreational Paradise site in Shafaghstreet

Table 1- The mean of index (physical) in 8 townships of district 13 of Isfahan (source: Azani et al., 2013).

Township	The mean of physical index (sport places, cultural and etc.)	Ranking
Amirieh	5106/2	5
Baghferdoos	2453/4	2
Baghziar	3.3958	8
Qaemie	4458/3	3
Golzar	4348/4	4
Keshavarzi	2105/3	1
Shafagh	2667/3	6
Valiasrtownship	4737/3	7

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RESEARCH ARTICLE

Effect of Training for Learning and Study Strategies for Academic Achievements

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ABSTRACT

Objective: This study aimed to explore the effect of learning and study strategies and skills on academic achievement of students in the academic year 2012-2013 in Zahedan.

Methods: A quasi-experimental study was conducted by 385 female and male students in the fourth grade of high school who participated in the annual test of the Ghalamchi Institute, Zahedan. Randomly, 120 students were selected as samples. Both experimental and control groups each containing 60 subjects were selected from different areas of the city. Average of the three last tests were used as the baseline pre-test score. Totally, 12 study training sessions were conducted on the experimental group. By average of the three last test before university entrance test, the post-test score was calculated for experimental group.

Results: the present study shows that trainings for study and learning skills and strategies influence the academic achievement of students. Independent t-test showed that training for study skills is not significantly different in academic achievement of boys and girls. The Chi-square test also showed that training for study skills was effective in achieving better scores by the experimental group than by the control group.

Key words: academic achievement, Students, Study Skills and Strategies, Ghalamchi Institute, Zahedan

INTRODUCTION

Study skills and strategies are the basis of scientific competitions, so proper use of them is linked to the achievement of learners (Gettinger & Seibert, 2002: 350)

Although some students may independently find their effective ways of study, several studies suggest that impaired learning and study skills can negatively influence all advantages of a good learning environment and even cognitive abilities, personality, physical and mental health of learners and, if efficient, they can modify many potential failures or shortcomings in the educational environment and academic motivation (Palincsar & Klenk, 1992: 225). In a study at San Jose State University (1998), researchers concluded that a course of study skills through workshops for students increased substantially the average scores compared to the previous semester (Ince & Priest, 1998). In the State University of Nurfalak, study skills were included in the curriculum for two years; the feedbacks suggested satisfaction of students with the course (Yip, 2007).

Shams (2000) showed that study skills and unfamiliarity with effective and efficient methods influenced the academic failure of students. Mardanian (2003) found that successful students used more effective methods for the study. Falk (1984) revealed that lack of study skills influenced the academic failure of learners. Rabiei et al. (2003) concluded that his studied group did not use pre-reading which provides a background for a general understanding of a text; also, his students were not familiar with the known methods of study. Rouhani et al. (2012) concluded that learners did not have sufficient knowledge of study skills. Review, pre-reading, remembering and concentrating are known methods of study. He believed that trainings for study skills for learners in the form of workshops or courses could be effective on their academic success. Hashemi (2008) concluded that students who learned learning and skills strategies felt more academic success than the control group. In addition to interest and perseverance, academic achievement depends on the quality of study (Schmid & Telaro, 1998: 79)

Unfortunately, not only Iranian students but their families annually experience stress and anxiety for university entrance examination as a scientific marathon. To be successful in this competition, families spend enormous economic costs for private lessons. Meanwhile, various academic consults are performed in schools. Student confusion among piles of books and various educational methods adds to it. Our question is how effective can be trainings for known learning and study skills and strategies in academic achievement of students? If in the form of workshops or courses, can these trainings be effective in improving quality of learning and as a result academic achievement of students? If these methods and strategies are effective in increasing learning and this academic achievement and admission in the favorable field, they can largely provide learners and even families with mental comfort; moreover, they can considerably reduce the economic costs spent over private lessons which have unfortunately become competitive in the academic society.

Methodology

To test hypotheses, 120 out of 385 male and female students in the third and fourth grade of high school who registered for the tests of Ghalamchi Institute of Zahedan in 2012-2013 were selected as samples from 6 high schools of different areas of the city. The average levelled scores of September 14, October 12 and November 16 tests including all courses of the second and third grade of high school were extracted from repertoires of students as baseline pre-test scores. Ghalamchi Institute is a famous academic institute with branches in all Iranian cities which provides several tests to prepare students for university entrance examinations.

Consultants of the 6 high schools were trained for SQ4R and MURDER methods as well as skimming, scanning, careful reading and exploration from Seif (2001) 's Learning and Study Strategies. Educators were also trained for types of note-taking, summarizing and some disadvantages of study. Trained educators taught two experimental groups (30 boys and 30 girls) under the supervision of researchers in December, January, and February for 12 sessions provided examples for each of the different methods, especially SQ4R developed by Anderson (1990) and Folk (1995). This method was used for its organization of content, design, and review as the most effective method for students (Seif, 2001). Lessons from Biology, Chemistry, Islamic Insights, and Geology were taught by expert teachers interested in using this method. Average scores of June 03, 07 and 17, 2013 were used as post-test scores.

METHODS

The study was conducted using a quasi-experimental methodology. Control group included 60 subjects (30 boys from two high schools and 30 girls from two high schools) and the experimental group included 60 subjects (30 girls from two high schools and 30 boys from two high schools in different areas of the city); the subjects were randomly selected from high schools with highest number of members in the Ghalamchi Institute.

Objective

The purpose of this study is to examine the effect of trainings for study skills and strategies on academic achievement of students. This study also finds a significant difference in trainings for study skills between girls and boys.

Hypotheses

Trainings for learning strategies and study skills influence academic achievement of students.
There is no significant difference in trainings for learning strategies and study skills between girls and boys.

Trainings for learning strategies and study skills satisfies students with admission in the desired field of study.

RESULTS

Independent t-test was used to compare the average levelled scores. The results show no significant difference in the average score of pre-test between two groups before the intervention. By 12 training sessions for study skills and strategies for the experiment group, a significant difference was found in the average levelled score of the last three tests, namely post-test. In other words, training was effective, because the calculated p was $0.001<0.01$. Independent t-test was used to compare the average levelled scores between girls and boys in each group (control and experiment) in pretest and posttest. The results showed no significant difference in pre-test and post-test between scores of girls and boys in the experiment group. While, there was a significant difference in the control group in pre-test and post-test. Girls obtained higher scores in the pre-test and post-test.

In relation to the hypothesis 3, the findings are listed in the Table 3. By informing the results of 2013 entrance exams, the samples were asked to consult the center to select a field of study. Out of 55 controls who were consulted, 35 were dissatisfied and only 20 felt satisfaction with their scores. Out of 57 experiments, 38 were satisfied and 19 felt dissatisfaction with their scores. The Chi-square test showed that trainings for learning and study skills could relatively satisfy the experiment group by better scores, compared to the controls.

DISCUSSION AND CONCLUSION

One of the reasons for the decline and academic failure is poor study skills of learners. In addition to economic losses, ineffective learning is followed by problems such as frustration, loss of confidence, feelings of inferiority, depression and the absence of full development of individual talents and abilities in education. A student learns new concepts when they are based on the previous knowledge. Cognitive structures are learning strategies that facilitate the learning process of learners. Learnings strategies are simple structures by which students can learn materials rapidly and keep them in mind for a longer period. Using learning strategies, learners can actively participate in the learning process, link new material with previous knowledge and continually monitor their learning process (Hoseyni-Shahidi, 2005). During recent years, appealing to study skills and strategies which facilitate learning and improve quality of education has been encouraged in academic centers (Safi, et al., 2010).

This study showed that correct techniques of study influence the academic success of students. Methods and strategies of study increased the quality of learning and academic achievement of the studied group relative to controls. The findings of this study are consistent with Hashemi (2008), Shams (2000) and Mardanian et al (2003), Ince and Priest (1987) in San Jose State University and Yip (2007), in Hong Kong. Considering confusion of Iranian students in a pile of books which are daily increasing, this not only cause anxiety among students and parents, but also fear of failure in the examinations imposes considerably costs on families. Trainings of these skills can reduce some of these problems. Gordon (2009) in Hong Kong confirmed this fact.

This study showed that trainings for study skills and strategies can partially reduce these concerns. Satisfaction of students with results of examinations can be a result of quality and careful study, which itself reduces these concerns. These findings are consistent with Schmid and Telaro (1998) who believed that academic achievement depends on interests and persistence of students in addition to the quality of their study techniques.

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Table 1: comparison of the average levelled scores for pre-test and post-test of the both groups

Test	Group	Average score	Standard deviation	Number	Degree of freedom	t	P
Pre learners	Experiments	5497.74	873.95	60	118	0.55	0.57
	Control	5411.06	829.33	60			
Post-learners	Experiments	6162.96	856.44	60	118	118	0.0001
	control	5432.35	847.1	60			

Table 2: comparison of the average levelled scores of boys and girls in pre-test and post-test of both groups

Group	Test	Gender	Mean	Standard deviation	Number	Minimum	Maximum	p-value
Experiments	Pre-test	Boys	5293.07	786.14	30	4266	7234	0.07
		Girls	5702.41	921.54	30	3950	7253	
	Post-test	Boys	6066.57	812.72	30	4300	7358	0.38
		Girls	6259.35	901.4	30	4127	7609	
Controls	Pre-test	Boys	5049.38	669.1	30	4096	6364	0.0001
		Girls	5772.74	825.17	30	4191	7307	
	Post-test	Boys	5075	696.45	30	4100	6616	0.0001
		Girls	5789.70	843	30	4066	7377	

Table 3: satisfaction of control and experiment groups with the results of university entrance examination

Satisfaction	**Yes**		**No**		**Total**	
Distribution	Number	percentage	Number	percentage	Number	percentage
A	20	4.36	35	6.63	55	100
B	38	7.66	19	3.33	57	100
Total	58	8.51	54	2.48	112	100

$X^2 = 10.29$ df = 1 p<=0.001

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RESEARCH ARTICLE

Dyeing Silken Fabric with Natural Annatto Dye in Presence of Chitosan as Bio Mordant

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ABSTRACT

This paper presents a novel approach to dye the silk fabric with annatto as natural dyeafter treating with chitosan. Silk fabrics were treated with chitosan solution at different concentrations (0.1%, and 0.6%).It has been found that, the dye bath exhaustion is increased with the increase of chitosan concentrations.

The K/S values (at λ_{max}= 480 nm) of dyed sample have found 6.1 for untreated sample and for treated samples with0.1% and o.6 %concentration ofchitosan are respectively 8.2and8.4.The color difference and fastness to washing and rubbing of chitosan treated and untreated fabrics were evaluated and compared.Results show that, the rubbing and washing fastness of samplesimproved by increasing of chitosan concentration in dye baths.

Key words: Chitosan, Dyeing, Silk fabric, Annatto dye.

INTRODUCTION

Silk worms produce a protein fiber discovered in 2,700 BC. Silk fibers consists of 97% protein - fibroin, a filamentous protein and sericin (gum), a non-filamentous protein- and also other impurities such as pigments, wax, carbohydrates, and inorganic salts.Silkfiber for lustering is popularized[1-3].

In recent times, due to the improvement of people's living standards and need for environmental protection, the demand of natural biodegradable and eco-friendly fibers like silk is increasing day by day [4]. The coloration of silk fiber is mainly carried out with acid, metal complex,reactive and vat dyes.Thesedyescandamagethe environment.There are many natural dyes that can use for dyeing silk. One of this dyes, is annatto dye.Natural dyes require chemicals in the form of metal salts to produce an affinity between the fabric and the dye and these chemicals are known as mordants thatcan beusedreplacemetal saltsaschitosanas anaturalmordants.

Annatto dye is used mostly in dairy industry in coloring butter, cheese, ghee, chocolate, ice cream in medicines and in making boot Polished[5-7]. It was originated in tropical America and was acclimatized also in other tropical countries of the word.Coloring matter is obtained from this tree. The pulp is rich in tannin but contains a mixture of eight colorants of carotenoid group[8]. Annatto dyes used on the silk fabrics, but products low shades.Figure 1 shows chemical structure of annatto. Thisdyeisnegatively charged. Silkisalsoapositiveandnegative charge. Soit canbeabsorbeddyeonsilk. Cationic sites canincreased be introduced either by ammonization or cationization.

Also chitosan can use as natural mordant. Chitosan [β-(1-4)-2-amio-2-deoxy-D-glucopyranose] is a nontoxic and biodegradable [9-11] biopolymer, abun- dantly found in nature; especially in the exoskeletons of crustaceans[12]. Chitosan has three reactive groups. They are the primary and secondary hydroxyl groups on each repeat unit, and the amino group on each deacetylated unit (Figure 2)[13-17].

As a kind of protein fibers, silk was believed to be bonded to chitosan mainly due to ionic interactions between free hydroxyl groups of chitosan and the amino groups of silk. Thus annatto dyes can adsorb on to the amino groups, and dye ability increased(Figure 3).

The current paper investigated the dye ability and color performance of chitosan treated silk fabric dyed with annatto dye and compared the results with the fabric dyed without chitosan treatment.

MATERIALS AND METHODS

Scoured silk fabric (100%silk, 30 denier, Warp and Weft Respectively 71 and 67) was purchased from Simin Company.Chitosan powder (color off white, deacetylation> 70%) was collected from KimiaGostar company. Detergent was collected from Sigma Company and Annatto dye was purchased from YasSepid Company.

Chitosan solution was prepared by dissolving 3 gram powder chitosan in 80% acetic acid.The fabrics were treated in chitosan solution (0.1 and 0.6 concentrations) for 50 minutes at 30°C temperature.Then samples were dyed with 2 % annatto for 50 minutes at 100°C temperature. For the ease of identification, all the test fabrics were coded as shown in Table 1.

Oneofthe fabricsdyedwith annatto at 2% (on the weight of fabric) and two samples finished with chitosan before dyeing withdifferent concentrations of chitosan (0.1%and 0.6%) were used for fabric treatment. The dyeing and finishing procedure are shown in graphs 1 and 2.

Dyeing Procedure

The color properties of dyed fabrics were analyzed by spectrophotometer. Colorfastness to washing and rubbing color fastness were measured according ISO 105 C03 and ISO 105 X 12. Wash fastness tester (Gyro wash model no: 415/8), rubbing fastness tester (Crock meter, model no: 670) from James H Heal & Co, UK were used for the respective fastness testing.

RESULTS AND DISCUSSIONS

Dye bathExhaustion

Dye exhaustion may define as the leaving of dye from the dye bath and attachment to the fiber being dyed. For instance, 70% exhaustion would mean that 70% of the total amount of dye has attached to the fiber, and 30% is still in solution. Dye bath exhaustion can be calculated as the mass of dye taken up by the material divided by the total initial mass of dye in the bath, for a bath of constant volume. Bath exhaustion determines with fallows equation:

$$\%Exhaustion = \frac{C_0 - C_s}{C_0} \times 100$$

Where, C_0 and C_s are the concentrations of dye in the dye bath initially and at some time duringthe process, respectively.The treatment of fabric with chitosan has enhanced the dye sites in silkAs a result, the treated fabric absorbed more dyestuff than the untreated sample and thisabsorption has increased the exhaustion percentage of dye in the treated fabric.

Colorimetric assay

Lightness (L^*), Redness-greenness and Yellowish-blue analyzed by Color measuring instrument (spectrophotometer). The chitosan treated fabric samples has low $L^*$and high $a^*$and b^*.They areobserved in figures 4 to 7.

Color shades of the dyed fabrics were analyzed by K/S values. Color measuring instrument (spectrophotometer) determines the K/S value of a given fabric through Kubelka-Munk equation as follows.

$$\frac{K}{S} = \frac{(1-R)^2}{2R}$$

Where R = reflectance percentage, K = absorption and S = scattering of dyes. It has been found that the chitosan treated fabrics have absorbed significantly higher amount of dyes than untreated fabrics.

Fastness Properties

Washing and rubbing fastness of the dyed samples were also measured. Rubbing fastness was evaluated in dry and wet condition. Fastness ratings of different types of test samples are presented in the Table2.

As can be observed in the table 2, the color fastness of $C_{0.1\%}$.D and$C_{0.6\%}$.D are higher than U. $C_{0.6\%}$.D has highest Dry and Wet Rubbing Fastness. Also washing fastness of $C_{0.6\%}$.D is higher than $C_{0.1\%}$.D. Results show that dye ability and rubbing and washing fastness of treated fabric improved. Silk was believed to be bonded to chitosan mainly due to ionic interactions between free hydroxyl groups of chitosan and the amino groups of silk. Thus annatto dyes can adsorb on to the amino groupsand dye ability and wash and rubbing fastness increased.

CONCLUSION

This study is intended to improve the absorption of annatto dye by silk fabrics after treating with chitosan. The application of chitosan on silk fabrics enhances the more cationic sites for more dye adsorption and also increases the amino group for fixation. Accordingly, dye exhaustion, a*,b* and depth of shade(k/s) improve in the treated fabric compared to the untreated fabric and rubbing and washing fastness treated fabric compared to the untreated also improved. But L* treated fabric decreased compared to the untreated fabrics. So the treatment of silk with chitosan can be an effective way for the coloration of silk fabric with natural dye similar annatto.

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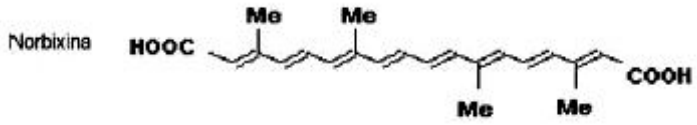


Figure 1. Coloring components of annatto:norbixin

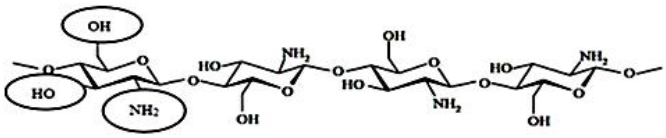


Figure 2.Chemical structure of chitosan

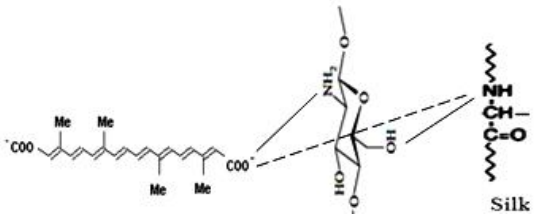
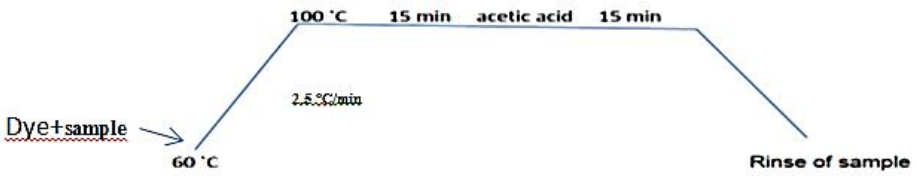
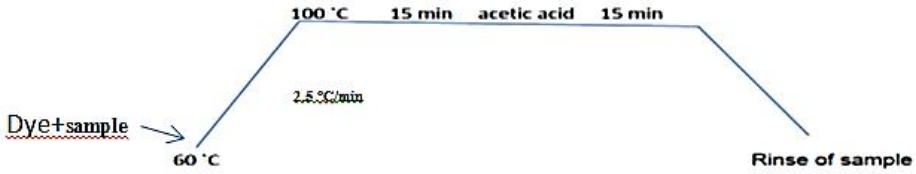


Figure 3. Links between dye, silk and chitosan

Graph 1. Chitosan treatment bath



Graph 2. Annatto dye bath



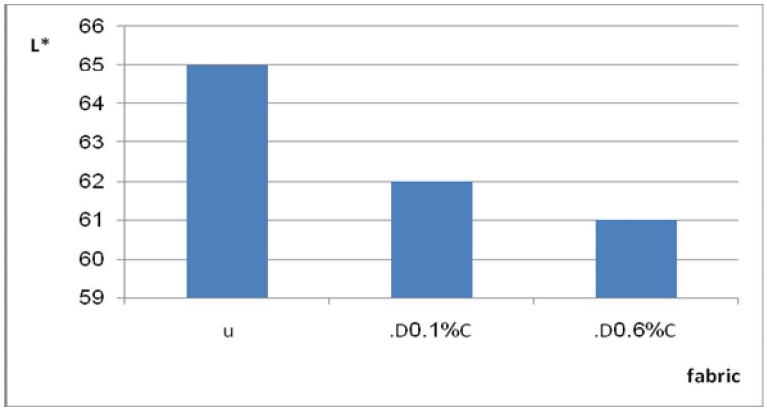


Figure 4. L* of samples

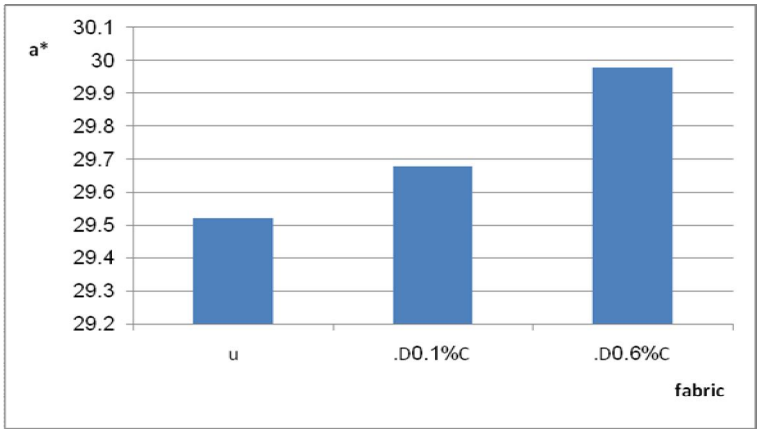


Figure 5. a* of samples

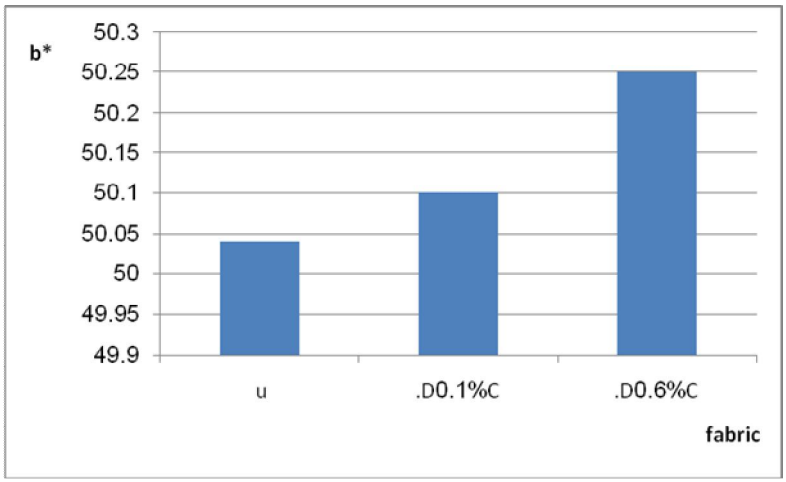


Figure 6. b* of samples

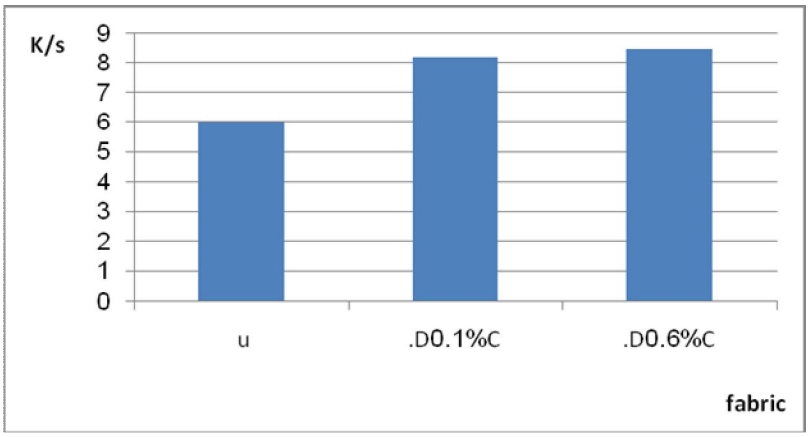


Figure 7. K/S of samples

Table 1. Test fabric coding.

Samples	Code
Untreated Fabric	U
Treated fabric with 0.1% Chitosan solution	$C_{0.1\%}.D$
Treated fabric with 0.6% Chitosan solution	$C_{0.6\%}.D$

Table 2. Fastness to washing and rubbing of dyed fabrics

Fabric Type	Rubbing Fastness		Washing fastness
	Dry	Wet	
U	3.5	4	4
$C_{0.1\%}$.D	4.5	4	4.5
$C_{0.6\%}$.D	5	4.5	5

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RESEARCH ARTICLE

Isolated and Inulin-Producing Bacterial Strains from Soil Samples of Gonbad, Gorgan and Aliabad District in Golestan Province

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ABSTRACT

Microbial enzymes can be roughly classified into three major fields of application: those which can be used to synthesize useful compounds; which can stereospacifically carry out important bioconversion reactions and which are able to hydrolyze polymers into interesting monomers.These enzymes are producedby various microorganisms, including bacterial strains, filamentous fungi and yeasts. The aim of this study was to isolate and screen wild-type inulinase producing bacterial strains from soil samples ofGonbad,Gorgan,Aliabad district, Golestan province. The soil samples were collected from different locations, including farm and garden.The primary screeningwas performed based ona hydrolytic zoneona inulin-based medium and Lugol's iodine solution. Then morphological and biochemical characteristics of the isolated bacterial strains with inulinase activity were determined. Additionally, species-specific identification by 16S rDNA sequencing was performed on a few bacterial strains which had more inulinase activity.Nineteeninulinase producing bacterial strains were isolated from the soilsamples. Out of Nineteenstrains, 4 bacterial strains with more inulinase activity were identified by 16S rDNA sequencing.The species-specific identification revealed these 4 isolates as Bacillus Cereus strain BF15, Bacillus sp.AK16,Bacillus Cereus strain LD22 and Enterobacter Cloacae P101. Bacillus pumilus strain PIA39 was found the nearest homolog tothe Bacillus sp.AK16 and Pseudomonas spp.

Key words: Inulinase, Isolation, Bacterial, Soil, 16S rDNA sequence.

INTRODUCTION

Microbial enzyme inulinase hydrolysis plant polymer inulin into pure fructose withsome glucose. Inulin is the storage carbohydrate in the roots and tubers of plants such asJerusalem artichoke, chicory or dahlia. Inulin and analogs are polyfructans, consistingof linear ß-2,1-linked polyfructose chains displaying a terminal glucose unit. The averagelength of an inulin chain varies as a function of the plant and a season. Theoretically, inulinshould contain 30 sugar units at a minimum. Oligosaccharides are compounds with greatpotential for use in the food industry. Particularly, fructooligosaccharides (FOS) are interesting,because of their favorable functional properties such as low calorie and noncariogenicsweeteners, improvement of the intestinal microbial flora, relief of constipation, decrease oftotal cholesterol and lipid in the serum and the promotion of animal growth (Vandamm,1983).Lately in Croatia there is a great interest in adding FOS to dairy products, becauseprebiotic inulin enhances absorption of calcium (vanden Heuvel,1999). Inulin can be considered as dietary fiber,substitute for fat and low calorie sweetener (Roberfroid M.,1993). The use of prebiotic ingredients incombination with probiotics (e.g. high quality synbiotic yoghurts) offers an excitingpossibility to enhance the health effects (Gibson G.R etal.,1995).According to there is little data oninulinases producing bacterial strains andhigh-yield inulinase producer in Iran,the aimof thisstudy was to isolate and screen wild-type strains capable ofproducing inulinase from soil and identify the best inulinase producer among the isolates in Gonbad,Gorgan,Aliabad district, Golestan province.

MATERIALS AND METHODS

Isolation of inulinase producing bacterial strains: Soil samples were collected from different locals, including gardening, farm and forest of Gonbad,Gorgan,Aliabad district. After saving the soil samples, we addedsoil sample2%in the sterilized enrichment medium containing inulin 2%, yeast extract 0.5%,$(NH4)_2SO_4$0.5% and adjusted to pH: 7.0 (Gao et al., 2009). The inoculated flasks were incubated at 37°C for 24h with shaking at 150 RPM on a rotary incubator shaker. Then, the medium was serially diluted and 0.1 ml of the final dilution (10^{-5})was spread on agar plates of the same medium.The agar plates were incubated at 37°C for 24h. Thereafter, the bacterial colonies were selected for screening of inulinase activity (Aramoon etal.,2014).

Screening of inulinase producing bacterial strains: The isolated bacterial strains were screened based on hydrolytic zone on inulin-based medium (Li et al., 2011). The screening was carried out on the basis ofLugol'siodine screening assay. The bacterial isolates were grown at 37°C for 24h on the agar plates. Then, the plates were flooded withLugol's iodine solution containing potassium iodide (1.5%,W/V) and iodine (1%,W/V) for 2 min. Thereafter, the plates were washed three times with sterilized distilled water and left it open for 30 min.The existence of inulin hydrolysis enzyme was detected by a clear zone surrounding the bacterial colony after incubation(Singh et al., 2013). Then, the diameter of each hydrolytic zone was measured.

Morphological andbiochemical characteristics of bacterial isolates: The morphological characteristics were determinedby Gram`sreaction, Spore formation and motility of the bacterial isolates. Then, the isolates were biochemically characterized by some tests, including gelatin hydrolysis, Voges-Praskuar test, citrate utilization, casein hydrolysis, starch hydrolysis, nitrate reduction, arginine dihydrolyse, catalase and oxidase tests.The fermentation of carbohydrates such as trehalose, mannitol, arabinose, galactose, salicin, glycerol and glycogen were also examined.

Determination of growth: The growth of isolates was measured in inulin broth at 37˚C for 24h with shaking at 150 RPM.Then, theOpticaldensity of four times dilutedbroth was estimatedat 600 nm in a UV-VisibleSpectrophotometer. The cell free broth was used as a blank.

DNA extraction and PCR amplification of 16S rDNA gene sequence: The bacterial isolate was cultured in nutrient broth overnight.Then, the genomic DNA of the grown isolatewasextracted using Geno Plus TMGenomic DNA Extraction Miniprep System (Viogene, China).Thequality and quantity of the extracted DNA weredetermined by agarose gel electrophoresis (%1).The genomic DNA was used as a template for 16S rDNA gene amplification using consensus primers (Weisberg et al., 1991).

To do PCR,2X Master Mix (Thermo scientific, USA)wasapplied.The reaction mixture was prepared by adding 1µl of each primer (20pmol),5µl of DNA template and 19µl of double-distilled water (DDW). The PCR amplification was performed with 30 cycles of denaturation at 95˚C for 1min, annealing at 60˚C for 90s, and extension at 72˚C for 2min. The initial denaturation and final extension were 95˚C for 3min and 72˚C for 5min respectively.The primers used in this study are summarized in Table 1.

The PCR amplification was performed successfully and anticipated fragments with 1500bp were observed on 1% agarose gel (Figure 1). Then, the purified PCR products were sent to Macrogen CO. (South Korea) for sequencing. The obtained nucleotide sequences were searched for homology in the NCBI nucleotide database using a BLAST tool (Altschul et al. 1990).

RESULTS

The isolation procedure was carried out with a synthetic medium containing ammonia sulfateand inulinas the nitrogen and carbon source,inrespect. A total of 18 bacterial strains was isolated from 15 soil samples on the basis ofappearance and size of coloniseon the inulin-based medium. The growth of these isolates on the aformentioningmedium indicated positive inulinase activity.Amongst the 18isolates, 7 isolates showed clear hydrolyticzone on agar plates and were considered inulinase producer. This simple and rapid technique, plate assay,is very efficient for the screeningof a large numberof inulinase producingbacteria from the environmentalsamples such as soil. The growth of the isolates was also measured in inulin broth by spectrophotometry.Thereafter, the morphological and biochemical characteristics of thestrains were determined.According to the results, the mostof isolated strains(63%) belonged to the Bacillus genus.Out of the 19 strains, 4 bacterial strains with more growth in inulin broth and greater hydrolytic zone on inulin-based medium was selected. Then, the species-specific identificationwas performed on them by16S rDNA sequencing. The results revealedthese isolates as Enterobacter Cloacae P101,Bacillus sp.AK16, Bacillus Cereus strain LD22,Bacillus Cereus strain BF15 and. Bacillus pumilus strain PIA39 was found the nearest homolog to the Bacillus sp.AK16,Pseudomonas spp.

DISCUSSION

The aim of thisstudywas to isolate and screening the inulinase producing bacterial strains from the soil of Gonbad,Gorgan,Aliabad district, Golestan province. The results showed the most of the isolates belongs to theBacillus genus.The bacterial inulinases have always been of interest to the researcher's due to their mostability (Nandagopal and Kumari, 2006).Many attempts have been made by researchers to isolate and identify new bacterial strains with high inulinase productivity. In a research, it has been described that Bacillus subtilis, Bacillus polymyxaMGL21, Bacillus licheniformis,Bacillus sp. Snu7and Pseudomonas mucidolens have a good inulinase activity (Singh and Gill, 2006).In anotherstudy,nine bacterial strainswith inulinase activity were isolated from the soil

samples, but four of the strains were thermophilic and belonged to the Bacillusgenus (Allais et al., 1986).It has been revealed that the production of inulinase in some bacteria such as Bacillus macerans and Xanthomonas oryzae is associated with growth (Park et al., 2001; Cho & Yun, 2002) as a result;some environmental factors such as pH and temperatureeffecton the inulinase activity of different species of bacteria.Kwon et al (2003), reported thatthe inulinaseactivity ofBacillus polymyxa MGL21 occurs atoptimal pH 7 and optimal temperature35°C.In a study conducted by Singh (2013) the most inulinase activity of Bacillus safensis AS-08 was observedafter 20h of growth at 37°C. According to the results of these researchers, we evaluated the inulinase activity of the isolated strainsat optimal pH 7 and optimal temperature 37°C.

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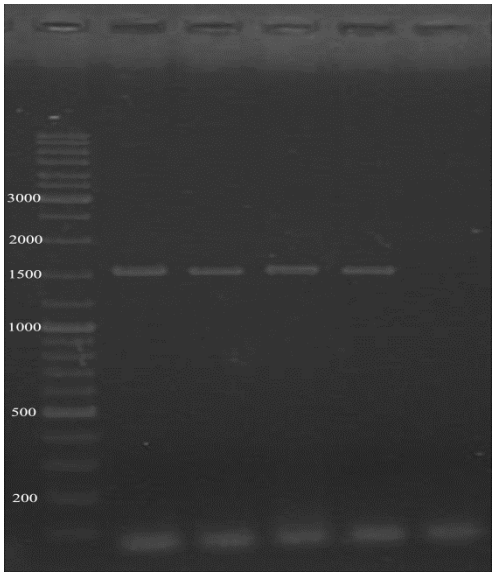

Figure 1:Lanes: 1, DNA ladder Mix as a size standard; 2, 3 and 4 PCR result in the on the genomic DNAs of the four isolates

Table 1: Primers used in this study(Weisberg et al, .1991)

Primer name	Primer sequence	PCR product length
16S-F	AGAGTTTGATCCTGGCTCAG	1500bp
16S-R	ACGGCTACCTTGTTACGACTT	1500bp

RESEARCH ARTICLE

The New Methods of Identification for Learning Disorders

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ABSTRACT

The purpose of this study was to identify new ways of learning disorders. The first similarity of children affected by the learning disorders is their disability in learning. The differences among such children become obvious when we classify all of their disabilities. Dyslexia is common for the children who have problem in reading and they do not its reason; however, they are clever as the other students. Some of such children lose their self confidence and this defect can lead them into bad works such as crimes. But the others try to use their abilities in the other fields such as sport, sciences, working with computers, buying and selling or the arts. In fact, such children lost their hopes in order to reach their aims. So finding the biological reasons of such problems as well as overcoming it is very difficult. The understanding of the best method of reading can direct our attention to the other methods in order to overcome such problem. So, the teachers can solve such problems by the help of the parents and the experts and they can assist such children as they can read in the best way. Reading is the important skill as the teacher must have information about it.

Key words: Learning disorder, Identification. New methods.

INTRODUCTION

During many times, the students who have problems in learning their courses are called as the ones who affected the disabilities such as neural, cognitive and conceptual disorders. Based on the new findings about learning, a group of experts replaced the expression "disorders of learning" into the previous ones in 1963; since the word "disability" [which indicates the other expressions or terms such as physical or mental disability means the disabilities that do

not change into the perfect ability] seems like the inappropriate word, but it seems that if the terms of disorders are used in learning, it will be so effective [based on the writers of the learning's problems] (Tabrizi, 2001). Some of such students are called as the stupid, scatterbrained and ill-devised ones as each of them is not acceptable. So, if these problems are recognized at the definite time, they will be treated. More than one century, the psychologists and the experts of educational sciences and speech therapy try to determine and specify these problems as well as solving them in such children. There are more than sixty definitions about the disorders of learning as: disorder in one or several psychological processes is related to the understanding or the use of oral or written language and it can be in different forms such as disability in listening, thinking, speaking, reading, writing or fulfilling the mathematical calculations. From 1994, some of the educational and therapeutical centers of students faced the especial problems of learning [from the ministry of education] and in such situations, the students used the especial part time services in order to solve these problems [besides studying in the general schools].

Definitions of learning disorders

In 1968, a definition about learning disorders was presented by the committee of national counseling toward the disable children in their annual report. This definition is about the disable children who are not able in learning a process or several processes and their problems in this field are related to the psychological ones such as understanding or using the oral or written language. Therefore, the emergence of such disabilities can be in the forms as disorder in listening, thinking, and reading, writing or calculating (Faryar – Raxshan, 1988, pp.: 24-26). The learning disability is not obvious in the apparent organs of a child. So, the disable child can have the powerful body, good ears and also good wisdom but such child is weak in the performance. His/her disability is real as a disable paralyzed person.

Who faced the learning disorders?

Such disable persons are present in all levels means from the beginning of school to the university. The rank of some children who study at the level of elementary schoolsis that these children can be treated and the opportunity of their treatment is so high. Therefore, the number of children who affected such problems will be decreased in the near future [in the higher levels] (Wallas, MacLaflin, translated by Monshi Toosi, 1994).

Disorder of learning

The experts of the psychological health and medical experts defined disorder of learning as the disorder of biological neuron or the disorder of language processing which was occurred by the performance of the brain. One of the consequences of the brain's inefficiency in the people affected by the learning disorders is the method of such people in order to access the information and process it. So this method is different from the others who can gain the information and process it without problems. The learning disorders may be in different fields such as determining the words, understanding them, reading them, spelling them or writing them. The learning disorder usually depends on the unusual performance of the brain in the domain of speech. One of the learning disorders in the scientific fields may cause the other problems in the other fields; for instance, the daily activities of a person in his/her home as potential disability of his/her memory, understanding the issues or solving the problems or it may depend on the other problem such as biological neuron. In addition, it may have bad effect on the social relations because the weakness of cognitive process in a person affects his/her thought and s/he faces the problems such as misunderstanding (Ravarki, 1995; Tisatesania et al., 1997).

Types of learning disorders

The first similarity of children affected by the learning disorders is their disability in learning. The differences among such children become obvious when we classify all of their disabilities (Wallas, MacLaflin, Translated by Monshi Toosi).

There are various kinds of unusual disorders of brain which can lead into the learning disabilities as their reasons did not determine and classified until now. For example, bad – reading (dyslexia) is one of the disorders which affect the reading and spelling of words. The studies have shown that the unusual performance of brains in the language – hearing processing (such as acoustic processing of automatic rapid naming) was seen in most of the people who affected the dyslexia (Shai Witz et al., 2002; Wolf et al., 2000).

Based on the available evidences, automatic and rapid naming and acoustic processing are the ones as by them, it is possible to predict the skills of reading (Kibi et al., 2003); even though there is a different structure in the visual system of most people (Eden et al., 1996). The effects of especial visual defects on the learning may extend to the other skills. The disorder of mathematics is the one which affects the calculation of mathematics and also how to solve the mathematical problems. There are various studies in such fields that show that the different kinds of the unusual performance of the brain lead into the disorders of learning. The studies about the mathematical disorders as we use the neural images are not extensive as the studies of dyslexia. But the neurological studies proved the types of inefficiencies in the brain (Hacket et al., 2001).

Importance of the appropriate evaluation

An evaluation of the neuron of psychology can provide the required fields for evaluating the especial performance which is so important in the domain of learning disorder such as motion – sensing abilities. Comprehensive evaluation by the evaluation of the neuron's psychology can provide the possibility for recognizing the weak and strength points which are important for determining the domains of intervention. A learning disorder is a permanent one. Its effect can be significant on the emotions, learning and professional performance based on the life situations, interpersonal relationships and the weak or strength points of each person and also the society. The learning disorder can have a bad effect on the jobs of people. Determining these disorders in the definite or specific time can facilitate the fields of job, education and also the plans of therapy. In any case, these problems must be determined within the framework of time.

Which factors are the reasons of learning disorders?

It is proved that the reasons of learning disorders or their origin is relatively ambiguous. Some of the present problems about the concept of learning disorders are the reflection of our disability. Some of them are presented as follows:

Educational factors

Bad style of teachers in teaching, less information of teachers about the required skills for teaching the basic lessons, the high or less expectations of teachers, bad planning of the educational systems, lack of learning the social skills, ignoring the oral language skills, inappropriate use of learning methods and syllabus.

Environmental factors

Various environmental factors increase the complexity of learning disabilities or may be, they are the reasons of such disabilities such as nutrients, health, weak motivation, inattention to the health and weakness in doing works due to being hungry, colors, artificial flavors of foods, etc which affect the more movement or motion of the children [based on the view of Fayn Gold]. Chronic cold, breath problems, allergies, … are effective in the learning process of children. Fall, brain damages, and the others affect the learning of children. Sensing motivation of the children [who are at the stage of growth] requires the sensing data until they learn the points about themselves and their environment. Motivation by language, due to its role in thinking and learning the other skills, has an especial place in the life of children. And for this reason, the disability of the children may result from the lack of good models at the beginning stage of their growth. The social and emotional growth of children who affected the learning disorders and also who faced the problems such as anxiety, lack of authority, disquiet, may have a relationship with the other problems such as lack of natural safety, shortage of kindness in their home or schools and the other ones.

Psychological factors

The children affected learning disorders may have disabilities in the psychological performances such as understanding, memorizing and the other ones.

Physiological factors

Most of the experts believe that the main reasons of learning disorders are resulted from the damages of brain [less or severe] and also the damages which occurred the neural and central systems.

Genetic factors

Based on the available evidences, the learning disorders are more in some of the families and less in the other ones. In other words, these factors are the other reasons of learning disorders.

Biochemical factors

The various metabolic disorders are the ones which lead into the disorders of learning such as hypoglycemia, …

Pre, post factors of birth and at the time of birth

Delay of growth

Based on the view of Bendar, Dehrisch, Johnski, Longfud and the others, lack of the emergence of the growth factors of some children affected the learning disorders may result from the growth delay of some central – neural system. Therefore, such children can overcome such problems when they become grow.

Relative defect of brain

It seems that every conclusion about the importance of brain damage in the children affected the learning disorders in the best conditions are along with the experimental results or aspects. Etiology is so important than the other issues.

How can recognize the learning disorders?

Based on the presented definitions about such problems, it seems that the teachers are the first ones who recognize these problems in the children and they try to do various methods of learning or teaching, however, they won't get the successful results in these fields and for this reason, the teachers introduce such children into the rehabilitation centers. The stages of evaluation in the educational centers of the especial problems of learning are presented in the following sections:

Searching the background and interview

This category refers to the general background of a person which is provided by reviewing the files of a child, interview with his/her parents and also the child her or himself.

Clinical observations

The observer gains the information about the traits, characteristics and the behavioral aspects of a child in the stages of evaluation.

Formal tests

Psychological tests of Waksler

It is an important evolution in recognizing the especial children. This test is derived from the use of psychological tests. This kind of evaluation helps us to increase our knowledge and also it shows that the services of educational system must be so comprehensive as the children or students affected the especial problems of learning can increase their information and also participate in the general classes and schools as well, they get the complementary educations. In order to get these aims, the test of Waksler is one the tools which is so important in the evaluation of the children affected the especial problems of learning.

Visual tests

Such as motional – visual test of Bendar, Gesalt and the visual – cognitive test of Frosting

Hearing test of Wampen

Educational development test

Educational development of reading, writing and mathematics

Motion growth test of Linkoln – Ozrotski

The most important agent in treatment is a teacher who is in a direct relationship with the student and can analyze the homework of such children; the analyses such as the mental processes and learning styles of children, preparing the educational materials based on the weakness and strength points of children as effective educational methods in reading, for instance, the method of linguistic experience [10], methods of multi – sensing in reading [11], and learning how to read. Therefore, in the method of linguistic experience, reading is accounted as the basic aspect of language or linguistic points. So, the development of the skills such as reading is in a direct relationship with the

development of the other skills such as hearing, speaking and writing and also its raw materials is the experiences and the language of the child. This method is useful for the children and its foundation is the dictionaries of words and the visual memory of children toward words.

Guidelines of education

Some people believe that the others affected dyslexia [due to the educational problems] are not fast and clever in learning the points. So, for overcoming this idea, the teacher can define the biographies of the people who affected such problems. And the teachers must consider the seat of such children in the class and pay more attention to them. Therefore, placing them in the front rows can increase the attention of teacher toward them. As well, the teachers can give the especial assignments to the other children who do not have such problems in order to make them aware of the problems of such children who affected dyslexia. Through this way, they become aware of the problems of such children. When the students have problem in reading, the teachers must ask them to read them or call them as the stupid students. Reproach of teachers makes them hopeless. The teachers must not ask such students to read the texts loudly. They must allow them to read texts by a calm voice and also permit them to record the voice of the other students. The assignments that must be finished in the written forms are the other problems of such students who affected dyslexia. So, the teachers must not compare the works of such students with the other ones. And the teachers must encourage such students without considering the quality of their works. The teachers must be flexible and also allow the students to record their reports on CDs or use the software which are designed for the words. The plans must be prepared for such students and the fields must be provided for them as they use the facilities. These methods help them as they cannot feel that they are alone and also decrease the anxiety and concern of such children. Each mistake by such children must be solved by themselves such as tracking, writing the letters and wrong words and their pronunciation during writing, use of the continual periodical practices, lengthening the time between sessions of practices and etc. By doing the tests of cognition, the problems of such children will be defined or clear as in which level, they stopped their education, what are the problems, their problems are related to their understanding, memory, language, etc. Then, an individual educational plan or IEP will be provided based on the weakness and strength points of the children (Faryar – Raxshan).

Teacher's therapy process

A good relationship between teachers and children will be formed. The children become aware of their successes and failures. The therapy will be initiated from the lowest stage as the children were unsuccessful and it continues to the next stage which is the self – concept of the children. It shows the plans of therapy as the games. The activities of one stage will be finished and then, it goes into the next stage (Pamphlet of Delakato).

The required activities in the field of evolutionary problems

1- Increasing accuracy and attention
Visual accuracy
Hearing accuracy
2- Memory
Visual – hearing – touching – movement memory
3- Understanding and perception
Visual – hearing – touching – movement – sensing perception
4- Thinking or thought
Determining the similarities and differences – expressing the concepts – problem solving – classification
5- Linguistic skills

Learning the receivable oral linguistic points – learning the integrative oral linguistic points – learning the expressive oral linguistic points

Required activities in the educational fields are problems in reading, writing, spelling and mathematics. The teachers in order to solve the aforementioned problems must find the weakness points and also initiate his/her therapeutical plans. Then, by searching them, the teacher will be able to overcome or solve the educational problems of the students by the use of appropriate educational methods.

CONCLUSION

Dyslexia is common for the children who have problem in reading and they do not its reason; however, they are clever as the other students. Some of such children lose their self – confidence and this defect can lead them into bad works such as crimes. But the others try to use their abilities in the other fields such as sport, sciences, working with computers, buying and selling or the arts. In fact, such children lost their hopes in order to reach their aims. So finding the biological reasons of such problems as well as overcoming it is very difficult. The understanding of the best method of reading can direct our attention to the other methods in order to overcome such problem. So, the teachers can solve such problems by the help of the parents and the experts and they can assist such children as they can read in the best way. Reading is the important skill as the teacher must have information about it.

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RESEARCH ARTICLE

Effect of Deterioration on Germination and Growth of Chamomile (Matricaria Chamomilla)

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ABSTRACT

This study was laid out in order to analyze the influence of seed aging on the different germination and growth components of seedlings in Chamomile (Matricaria chamomilla). This experiment was a complete randomized design with four replicates. To create different aging treatments, seeds were incubated in sealed contain of 50ml distilled water at temperatures of 43 ºC for 0, 1, 2, 3, 4, 5 and 6 days. Fifteen seeds of each treatment evenly placed on Whatman filter paper No.1 in sterilized 9cm Petri dishes separately for germination and seedling growth test. Radicle and hypocotyl lengths were measured 21 days after germination. Seeds with roots 2mm long were considered as germinated. The number of germinated seeds was counted daily and expressed as the percentage of the total seeds. At the end of test the number of normal seedlings determined. The root and stem dry weight was determined by drying the plant material in oven at 80C for 24h prior to weighing. The results showed that analyzing different treatments of aging demonstrates significantly differences from the electrolyte conductivity**,** germination percentage, germination rate, normal seedling percentage, radicle length, hypocotyl length, radicle dry weight, hypocotyl dry weight and seed vigor index. With increasing in seed aging levels all traits decreased

expect electrolyte conductivity that it increased. Under seed deterioration condition the repair mechanism is either absent or inefficient or the membranes are completely damaged, thus permitting the causing the loss of vigor and in final germinability of aged seeds decreased and laid to decrease in dry weight and length of radical and hypocotyls. In final in this experiment we founded that deterioration decreased seed germination traits and seedling growth and seed vigor index in chamomile seeds.

Key words: Chamomile, Deterioration and Germination

INRODUCTION

Among traditional potential herbs, Matricaria chamomilla, commonly referred to as the chamomile plant, is a member of the Asteraceae, and is native to Europe and Western Asia (Renuka, 1992). Chamomile is known to be medically good for soothing, calming, relaxation, aching muscles, indigestion, acidity, hay fever, asthma, morning sickness, eczema, sore nipples, and exhaustion as well as being useful as a sedative, anti-inflammatory and anti-tenseness medicine (Afzali et al, 2009). German chamomile is an annual plant that is native to Southern and Western Europe, and North and West Asia. It has been cultivated in North America and Australia where it is naturalised. Roman chamomile, a perennial species, has similar uses. Matricaria chamomilla has been cultivated in arid and semiarid regions of Iran. Dried chamomile flower is an age-old medicinal drug that was well known in ancient Egypt, Greece and etc. Today, this species has spread throughout most of the European continent and can be observed in North Africa, Asia, North and South America as well as Australia (Pourohit and Vyas, 2004). Seed germination is a crucial stage in the life cycle of plants and tends to be highly unpredictable over space and time. Several environmental factors such as temperature, salinity, light, and soil moisture simultaneously influence germination. Successful establishment of plants largely depends on successful germination (Gorai and Neffati, 2007). Azimi et al (2013b) found that that application nitrogen and phosphate biofertilizers increased seed germination yield and yield components of barley under Boroujerd environmental condition. Storage of seed in developing areas like Iran is often less than ideal, and deterioration of seed can be significant. Sustainable mechanisms to improve seed storage and reduce the impact of seed deterioration on yield are needed to improve global food security (Biabani et al, 2011). Quality seed is the prime factor for crop productivity. Seed quality, as measured by its vigour and viability, plays a major role in establishment of seedling as well as higher crop yield. A major cause of low vigor has been identified as seed ageing (Mathews 1980). Seed deterioration is a serious problem in developing countries where seeds are stored in places usually without a proper control of humidity and temperature. Temperature and seed moisture content (and/or relative humidity) are the main factors influencing seed deterioration and viability loss in storage (Roberts, 1972). Seed deterioration leads to reductions in seed quality, performance and stand establishment (McDonald 1999). Seed deterioration is a loss of viability, vigor, and overall seed quality due to aging or adverse environmental factors. The percentage emergence of deteriorated seeds is less than that of healthy seeds. Therefore, deteriorated seed often produces uneven stands, spotty fields, and fewer plants per hectare than healthy seed. (Biabani et al, 2011). No systematic studies have been carried out on seed quality aspects of Chamomile in Iran. Therefore, the present study aims to analyze the influence of seed aging on the different germination and growth components of seedlings in Chamomile (Matricaria chamomilla).

MATERIALS AND METHODS

Experimental design deterioration treatment

In this experiment Chamomile (Matricaria chamomilla L. var. Bona) seeds used for test. A complete randomized design with four replicates was carried out for evaluation of response of chamomile seeds germination and seedling growth to accelerate aging condition. Seeds of Chamomile used in the experiment were provided from seed and

plant research center of Iran. To create different aging treatments, seeds were incubated in sealed contain of 50ml distilled water at temperatures of 43 ºC for 0, 1, 2, 3, 4, 5 and 6 days. After that fungal contamination of seeds was cleaned and used for germination and seedling growth test.

Experiment method

Seeds were surface-sterilised with a 3% sodium hypochlorite solution, rinsed in distilled water for three times and dried 36h before the experiment. Fifteen seeds of each treatment evenly placed on Whatman filter paper No.1 in sterilized 9cm Petri dishes separately for germination and seedling growth test according to ISTA (1983). All Petri dishes were sealed to prevent the loss of moisture and avoid contamination, and then placed in a Conviron PGR-15 plant growth chamber for 21 days. The seed were allowed to germinate at 20C with 12/12-h light/dark periodicity. The photosynthetic photon flux density was 340-mol $m^{-2}.s^{-1}$, provided by metal halide lamps, with a relative humidity of 45%. Germination was determined by counting the number of germinated seeds at 24h intervals over a 21d period and expressed as total percent germination. Seeds were considered to be germinated at the emergence of the radicle (Bewley and Black, 1994). Radicle and hypocotyl lengths were measured 21 days after germination. Seeds with roots 2mm long were considered as germinated. The number of germinated seeds was counted daily and expressed as the percentage of the total seeds. At the end of test the number of normal seedlings determined. The root and stem dry weight were determined by drying the plant material in oven at 80C for 24h prior to weighing.

Germination percentage and germination rate and were calculated using following formula.

$$G\% = (n/N)\times 100 \quad [3]$$

$$RG = \sum(Ni/Di) \quad [3]$$

G: germination percentage, n: number of seeds germinated, N: total number of seed in each petri dishes,
RG: rate of germination (seed /day), Ni: germinated seeds in each numeration, Di: day of each numeration,
Seed vigor was recorded by following formula:
Seed vigor = germination percentage × seedling length

Statistical analysis

The data were processed using the GLM procedure of statistical analysis system (SAS), (SAS Institute. 1990).

RESULTS AND DISCUSSIONS

Electrolyte conductivity (EC): The results showed that the effect of seed deterioration on EC was significant at 1% level (table 1). Mean comparison table shows that the highest electrolyte conductivity (59ds.m^{-1}) was recorded in 6d seed deterioration treatment and lowest electrolyte conductivity (11ds.m^{-1}) was recorded at control treatment (table 2).

Germination percentage: The results showed that the effect of seed deterioration on germination percentage was significant at 1% level (table 1). Mean comparison table shows that the germination percentage reduced with decreasing in seed deterioration levels. The highest seed germination percentage (97%) was recorded in control treatment and lowest of them (4%) was recorded at 6d seed deterioration (table 2).

Germination Rate: The results showed that the effect of seed deterioration on germination rate was significant (table 1). The results of mean comparison shows that the germination rate reduced with decreasing of seed deterioration levels too. The highest seed germination rate (91%) was recorded in control treatment and lowest of them (36%) was recorded at 6d seed deterioration (table 2).

Normal seedling percentage: The results showed that the effect of seed deterioration on normal seedling percentage was significant at 1% level (table 1). The results of mean comparison shows that the normal seedling percentage reduced with decreasing of seed deterioration levels. The highest normal seedling percentage (93%) was recorded in control treatment and lowest of normal seedling percentage (1%) was recorded at 6d seed deterioration (table 2).

Radicle length: The effect of seed deterioration on radicle length was significant at 1% level (table 1). The results of mean comparison shows that the highest radicle length (29.3mm) was recorded in control treatment and lowest of radicle length (4.7mm) was recorded at 6d seed deterioration (table 2). Radicle length reduced with decreasing of seed deterioration levels.

Hypocotyl length: The effect of seed deterioration on hypocotyl length was significant at 1% level (table 1). The results of mean comparison shows that the highest hypocotyl length (6.2mm) was recorded in control treatment and lowest of hypocotyl length (1.3mm) was recorded at 6d seed deterioration (table 2). Hypocotyl length reduced with decreasing of seed deterioration levels.

Radicle dry weight: The effect of seed deterioration on radicle dry weight was significant at 1% level (table 1). The results showed that radicle dry weight reduced with decreasing of seed deterioration levels. The results of mean comparison shows that the highest radicle dry weight (0.041g) was recorded in control treatment and lowest of radicle dry weight (0.008g) was recorded at 6d seed deterioration (table 2).

Hypocotyl dry weight: The effect of seed deterioration on hypocotyl dry weight was significant (table 1). The results showed that hypocotyl dry weight reduced with decreasing of seed deterioration levels too. The results of mean comparison shows that the highest hypocotyl dry weight (0.039g) was recorded in control treatment and lowest of hypocotyl dry weight (0.006g) was recorded at 6d seed deterioration (table 2).

Seed vigor index: The effect of seed deterioration on seed vigor index was significant (table 1). The results showed that seed vigor index reduced with decreasing of seed deterioration levels too. The results of mean comparison shows that the highest seed vigor index (1952) was recorded in control treatment and lowest of seed vigor index (289) was recorded at 6d seed deterioration (table 2).

DISCUSSION

Analyzing different treatments of aging demonstrates significantly differences ($P \leq 0.01$) from the electrolyte conductivity**,** germination percentage, germination rate, normal seedling percentage, radicle length, hypocotyl length, radicle dry weight, hypocotyl dry weight and seed vigor index (table 1). With increasing in seed aging levels all traits decreased expect electrolyte conductivity that it increased (table 2). Increasing seed age decreased germination percentage and this result is in accordance with Ghassemi-Golezani et al. (2010) in rapeseed, Bhattacharjee et al. (2006) in common bean and sunflower and Saha and Sultana, (2008) in soybean. Negative effect of aging in relation to seed performance, germination percentage and seedling indices was reported (Bailly, 2004; McDonald, 2004). Germinability of seeds in the aged seeds treatment was significantly reduced in comparison with both control seeds and those submitted to the accelerated aging test. Decreasing in germination percentage and germination rate was related to chromosomal aberrations that occur under long storage conditions (Akhtar et al, 1992). Bailly, (2004) told that decreasing of germination percentage and rate in aged seeds can be due to reduction of

hydrolytic enzyme activity and carbohydrate contents. In the present study results showed that after 6 days of deterioration, germination percentage had the lowest value. It is showing that by increasing aging time, germination percentage decreases significantly. We suggest that decrease in germination of seeds in high deterioration levels related to denatured of proteins and hydrolytic enzymes structure and function. Analyzing the effect of ageing period on radical and hypocotyls length showed that during the all ageing periods control treatment had the higher radical and hypocotyls length, while the shortest of them was observed from at 6day deterioration. Results of EC test showed that maximum solute leakage of the seeds was recorded for higher deterioration period in all treatments. Changes in membrane lipids therefore could account for the increase in solute leakage and increased in EC in higher deterioration treatments (Sung, 1996). During deterioration of seeds, chemical changes occur that alter the tensile strength of seed coats and increase their permeability to water and gases (Qaderi et al., 2003), thereby reducing the hard-seededness of the coats and causing the leakage of solutes, such as organic and inorganic ions, sugars, amino acids and even proteins, into the surrounding medium (Govender et al., 2008). Lin (1990) observed a decrease in the germination and vigor of bean seeds subjected to 1, 2, 3 and 4 days of aging that was related to an increase in solute leakage from seed, and they suggesting a close relationship between the deterioration of biological membranes and the loss of vigor and germination. This decay in the viability of aged seeds would normally be attributed to the loss of seed vigor due to ultracellular changes under aging of chamomile seeds.

Abnormal seedlings were increased in saver deterioration and normal seedlings were decreased. In some species, the AA test caused a decrease inpercent germination and a consequent increase in abnormal seedlings seemingly due to the high ethylene production of aged seeds (Takayanagi and Harrington, 1971). Germination rate is a direct measure of seed vigor. It may be defined as “number of germinated seeds per unit day”. Accelerated ageing also decreased the germination rate of seeds. The fastest germination rate was observed in control compared to the lowest at 6 days under ageing treatment. Significant differences were observed in all treatments. For example the maximum germination rate was achieved with the control followed by 1, 2, 3, 4, 5 and 6 days of ageing. Results demonstrated that ageing slowed down the process of germination. However, the ability to overcome protein insolubilization did not necessarily lead to higher germination rate, as evidenced by the low germination percentage (Castellín et al., 2010). Seed aging causes a decrease of seedling growth and dry weight. The results indicated that radical and hypocotyls dry weight decreased significantly as seed aging progressed. Overall, the results obtained in this study show that seed aging results in reduced seedling growth and this is a consequence of decline in weight of mobilized seed reserve (seed reserve depletion percentage), and laid to decrease in seed vigor index. Mousavinik et al (2011) told that sensitive component of seedling growth is the weight of mobilized (utilized) seed reserve and plant breeding efforts or physiological remedies (say chemical application) should be focused on improvement of seed reserve mobilization and seed vigor index decreased. Seed deterioration may influence seed viability and reduce seed vigor depending on the time span and conditions of deterioration (Panobianco et al., 2007) and in final laid to decrease in seed vigor index. Under seed deterioration condition the repair mechanism is either absent or inefficient or the membranes are completely damaged, thus permitting the leaching of greater electrolyte amounts and causing the loss of seed vigor (Panobianco et al., 2007) and in final germinability of aged seeds decreased. In final in this experiment we founded that deterioration decreased seed germination traits and seedling growth and seed vigor index.

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Table 1. Analysis of variance of Chamomile seeds germination and seedling growth under deterioration

S.O.V	DF	EC	Germination percentage (%)	Germination rate(%)	Normal seedling percentage (%)	radicle lenght	hypocotyl length	radicle DW	hypocotyl DW	seed vigor index
treatment	6	652	709**	2561**	3256**	1122**	635**	0.00012**	0.000082**	3412551**
Error	18	8.11	21	22	63	7.2	0.62	0.000014	0.000038	22153
CV%		6.6	4.5	7.2	5.6	9.22	11.3	6.3	11.2	5.7

**, * and ns: Significant at the 1% and 5% levels of probability

Table 2. Means comparison of Chamomile seeds germination and seedling growth under deterioration

Treatment	EC(ds.m^{-1})	Germination percentage (%)	Germination rate(%)	Normal seedling percentage (%)	radicle length(mm)	hypocotyl length(mm)	radicle DW(g)	hypocotyl DW(g)	seed vigor index
Deterioration									
period									
0	11f	97a	91a	93a	29.3a	6.2a	0.041a	0.39a	1952a
1d	14e	85b	89a	78b	27.6a	6a	0.04a	0.38a	1625b
2d	19d	82b	87ab	64c	24.2b	5.1b	0.035b	00.29b	1543b
3d	29c	73bc	63b	55cd	18c	4.5bc	0.032b	0.19c	1125c
4d	45b	45c	45c	32e	11.3d	4.1c	0.024c	0.15cd	952d
5d	52a	21d	41c	11f	6.3de	3.2d	0.019cd	0.12d	423e
6d	59a	4e	36d	1g	4.7e	1.3e	0.008d	0.006e	289f

Means with at least one similar letter in each column have no signification difference at %5 of probability level

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RESEARCH ARTICLE

Study on Antioxidant Activity in Some Medicinal Plants in Ardabil Province, Iran

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ABSTRACT

Scavenging of DPPH free radical is the basis of a common antioxidant assay. A number of protocols have been followed for this assay resulting in variation in the results of different laboratories. In this study rate of sweep potential of 2,2-diphenyl-1-picrylhydrazyl (DPPH) as antioxidant activity in five medicinal plants such as Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium nasturtium L.) were determined. About 60 gm of dry sample powder was weighed and macerated with 500 ml of each solvent separately. A solution of 0.135mM DPPH in methanol was prepared and 1.5ml of this solution was mixed with 1.5ml of extract in methanol containing 1000, 500, 250, 125, 62.5, 31.25, 15.625, 7.813, 3.906, 1.953 µg/ml of the extract. The reaction mixture was vortexed thoroughly and left in the dark at room temperature for 30 min. The absorbance of the mixture was measured spectrophotometrically at 517 nm. The results showed that there are different significant between five medicinal plants in antioxidant activity. In the all medicinal plant Nasturtium officinale had the highest (275.35±0.16(µg/ml)) production of DPPH as IC_{50} for antioxidant activity. This showed that in the five medicinal plant Nasturtium officinalehad a good potential for antioxidant and reactive oxygen species scavenging. After that Arnebia euchroma had the next rank of DPPH production (112.63±0.02 (µg/ml)) as antioxidant activity. The lowest

production of DPPH was obtained in Thymus vulgaris (23.68±0.01(μg/ml)). In this study we founded that water cress (Nasturtium officinale L.) had a highest DPPH production as antioxidant activity and this plant have potential for Pharmacia and medical purposes for faced of oxidative stress in human body. Therefore we can use this medicinal plant for extraction of useful antioxidant in drug production.

Key words: Medicinal plant, Antioxidant and DPPH

INTRODUCTION

In the scientific worlds there is increasing interest in antioxidants, particularly in those intended to prevent the presumed deleterious effects of free radicals in the human body, and to prevent the deterioration of fats and other constituents of foodstuffs. Antioxidants are considered important nutraceuticals on account of many health benefits (Valko et al., 2007). In both cases, there is a preference for antioxidants from natural rather than from synthetic sources (Abdalla and Roozen, 1999). Hence, strong limitations have been placed on their use and there is a trend to replace them with naturally occurring antioxidants. Moreover, these syntheticantioxidants also show low solubility and moderate antioxidant activity (Barlow, 1990). Therefore, search for natural antioxidant has greatly been increased in the recent scenario. There is therefore a parallel increase in the use of methods for estimating the efficiency of such substances as antioxidants (Schwarz, et al., 2001). Many phytochemical compounds of the plants act as antioxidants, which are scavengers of particles known as oxygen-free radicals (also sometimes called oxidants). Many phytochemicals have been classified as phytoestrogens, with health-promoting effects resulting in the phytochemicals to be marketed as nutraceuticals (Moutsatsou, 2007). It has been mentioned that antioxidant activity of plants might be due to their phenolic compounds (Cook and Samman, 1996). The antioxidant activity of the aerial part was determined using the 1, 1-diphenyl-2- picrylhydrazyl (DPPH) free radical scavenging assay by the method of Blois (1958). Scavenging of DPPH radical is the basis of the popular DPPH antioxidant assay (Alma, Mavi, Yildirim, Digrak, & Hirata, 2003). The duration of the reaction of radical scavenging activity between DPPH solutions and sample varied from 1 minute (Sroka and Cisowski, 2005) to 240 minutes (Miller et al., 2000; Prakash, 2001). One such method that is currently popular is based upon the use of the stable free radical diphenylpicrylhydrazyl (Molyneux, 2004). 2,2-diphenyl-1-picrylhydrazyl (DPPH) is a dark-colored crystalline powder composed of stable free-radical molecules(Sharma et al, 2009). DPPH is characterised as a stable free radical by virtue of the delocalisation of the spare electron over the molecule as a whole, so that the molecules do not dimerise, as would be the case with most other free radicals (Molyneux, 2004). . The delocalisation also gives rise to the deep violet colour, characterised by an absorption band in ethanol solution centred at about 520nm.DPPH has two major applications, both in laboratory research: one is a monitor of chemical reactions involving radicals, most notably it is a common antioxidant assay (Sharma et al, 2009). DPPH has several crystalline forms which differ by the lattice symmetry and melting point (Kiers et al, 1976). 2,2-diphenyl-1-picrylhydrazyl is a well-known radical and a scavenger for other radicals. Therefore, rate reduction of a chemical reaction upon addition of DPPH is used as an indicator of the radical nature of that reaction. The property of DPPH allows visual monitoring of the reaction, and the number of initial radicals can be counted from the change in the optical absorption at 520 nm or in the EPR signal of the DPPH (Mark S. M. Alger, 1997). Medicinal plants have been found useful in the cure of a number of diseases including bacterial diseases (Moradi kor and Moradi, 2013). Medicinal plants are a rich source of antimicrobial agents (Mahesh and Satish, 2008). The plant extracts have been developed and proposed for use as antimicrobial substances. Plants used in traditional medicine contain a vast array of substances that can be used to treat chronic and infectious diseases (Shrikant et al., 2012). Ability to increase production of chemically active molecules such as generation of reactive oxygen factors is a general feature organisms they are exposed to every day reactive oxygen species in the development of malignant diseases such as cancer, diabetes, gout, heart vascular disease affect by aging (kris-Ethertonmet et al., 2002). In plant tissues antioxidant systems that scavenger of ROS include enzymes purified from such as catalase, superoxide dismutase, peroxidase and enzymes of poison from dehydration products of glutathione-S-transferase lipid peroxidation contains phospholipids – Hydroproxide glothation peroxidase, ascorbate

peroxidase, and a network of the low molecular weight antioxidants, including ascorbate, glutathione, phenolic compounds, tocopherols and carotenoids and other requirements. Plus a complete set of enzymes including Monodehydro ascorbat reductase, dehydroascorbate reductase, glutathione reductase and regeneration of the active antioxidants is needed (Blokhina et al., 2003). Therefore, the aim of this study is assay of sweep potential in 2,2-diphenyl-1-picrylhydrazyl (DPPH) in five medical plants such as Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium officinale L.) as antioxidant activity in Ardabil province.

MATERIALS AND METHODS

The 2,2-diphenylpicrylhydrazyl assay is widely used in plant biochemistry to evaluate the properties of plant constituents for scavenging free radicals. Several protocols have been followed for this assay using different conditions such as different reaction times, solvents, pH and different compounds used as antioxidant standards. In this study rate of sweep potential of 2,2-diphenyl-1-picrylhydrazyl (DPPH) as antioxidant activity in five medical plants such as Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium officinale L.) were determined. About 60 gm of dry sample powder was weighed and macerated with 500 ml of each solvent (hexane, ethyl acetate and methanol) separately and kept overnight in shaker. The extract was collected after filtration using Whatman No.1 filter paper and was stored. Another 75 ml of solvent was added to the residual mixture and incubated in shaker for 24 hrs and the extract was collected again using a Whatman No.1 filter paper. This procedure was repeated once again and the extract was evaporated below 40 °C, which was used for further phytochemical analyses. The ability of the extracts to annihilate the DPPH radical (1,1 diphenil-2- picrylhydrazyl) was investigated by the method described by (Blois, 1958). Stock solution of the whole plant extracts was prepared to the concentration of 1 mg/ml. 100 µg of each extracts were added, at an equal volume, to methanolic solution of DPPH (0.1 mM) (Mathangi and Prabhakaran, 2013). A solution of 0.135mM DPPH in methanol was prepared and 1.5ml of this solution was mixed with 1.5ml of extract in methanol containing 1000, 500, 250, 125, 62.5, 31.25, 15.625, 7.813, 3.906, 1.953 µg/ml of the extract. The reaction mixture was vortexed thoroughly and left in the dark at room temperature for 30 min. The absorbance of the mixture was measured spectrophotometrically at 517 nm. Ascorbic acid was used as references. The ability to scavenge DPPH radical was calculated by the following equation:

DPPH radical scavenging activity (%) = [1 – (S – SB) / C] × 100%

Where S, SB and C were the absorbances of the sample, the blank sample (1.5 ml of methanol plus 1.5 ml of sample at different concentrations), and the control (1.5 ml of DPPH° solution plus 1.5 ml of methanol), respectively. The results are mean ± SD of three parallel measurements. IC_{50} values denote the concentration of sample, which is required to scavenge 50% of DPPH free radicals (Afolayan, 2007 and Han, 2008).

RESULTS AND DISCUSSION

In this study we study assay of sweep potential in 2,2-diphenyl-1-picrylhydrazyl (DPPH) in five medical plants such as Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium officinale L.) as antioxidant activity in Ardabil province. The results of present study revealed that there are different significant between five medicinal plants in antioxidant activity. It is highly vital to know about the antioxidant activities of each plant and the phytocompounds responsible for that. In this study, the DPPH free radical scavenging activity of the extracts of Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium officinale L.) is analysed as antioxidant activity. The molecule of 1,1-diphenyl-2-picrylhydrazyl is

characterised as a stable free radical by virtue of the delocalisation of the spare electron over the molecule as a whole, so that the molecules do not dimerise, as would be the case with most other free radicals (figure 1).

However, the results showed that, extracts of various plants showed different antioxidant ability (table 1). In all phases of plant growth, an antioxidant defense system is active and DPPH was product. Action of these antioxidants vary widely, with several factors such as stage of maturity, climate, plant parts used, harvest and storage conditions change (Mejia et al., 1988). In all medicinal plants rate of DPPH production was more than standard rate. The maximum sweep potential was found in water cress (Nasturtium officinale L.) and the minimum of it was fund in Thyme (Thymus vulgaris L.) as antioxidant activity in this medical plants (table 1).

Within the maturing plants phytochemical changes affecting their antioxidant activity and quality of different types of fruit and vegetables in the diet affects specific times (Conforti et al., 2007). In present medicinal plants in different phonological stages showed that the antioxidant ability to vary considerably over the phonological stage. Thus, with respect to the various compounds and antioxidant properties against various antioxidant harvest in order to deal with specific antioxidants can be done at the appropriate developmental stage. In the all medicinal plant Nasturtium officinale had the highest (275.35±0.16(μg/ml)) production of DPPH as IC_{50} for antioxidant activity. This showed that in the five medicinal plant Nasturtium officinale had a good potential for antioxidant and reactive oxygen species scavenging. After that Arnebia euchroma had the next rank of DPPH production (112.63±0.02(μg/ml)) as antioxidant activity. The lowest production of DPPH was obtained in Thymus vulgaris (23.68±0.01(μg/ml)). DPPH is a stable free radicals which dissolve in methanol, and their colors show characteristic absorption at wavelength 516 nm. When an antioxidant scavenges the free radicals by hydrogen donation, the colors in the DPPH assay solution become lighter (Li et al, 2011). Based on the results radical scavenging profile of ascorbic acid was comparable in methanol and buffered methanol as solvents. However, the IC_{50} values were fairly low as compared to those reported by earlier workers as 56 lM (Kano et al., 2005), and 629 lM (Ricci et al., 2005). Azimi et al (2013b) found that that application nitrogen and phosphate biofertilizers increased yield biochemical activity of some crops under Boroujerd environmental condition. DPPH radical scavenging activity is influenced by the polarity of the reaction medium, chemical structure of the radical scavenger, and the pH of the reaction mixture (Saito, Okamoto, & Kawabata, 2004). In human many diseases are caused by oxidative stress. Accelerated cell oxidation contributes to cardiovascular disease, tumor growth, wrinkled skin, cancer, Alzheimer's disease, and even a decline in energy and endurance Fresquet et al, 2006). The antioxidants play a vital role in delaying, intercepting or preventing oxidative reactions catalyzed by free radical (Vilioglu et al, 1998). In this study we founded that water cress (Nasturtium officinale L.) had a highest DPPH production as antioxidant activity and this plant have potential for Pharmacia and medical purposes for faced of oxidative stress in human body. Therefore we can use this medicinal plant for extraction of useful antioxidant in drug production.

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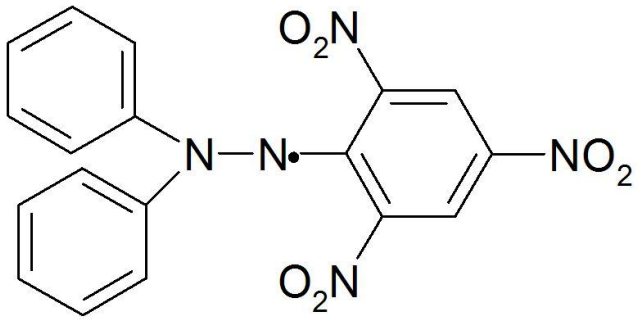

Figur 1. Structure of 1,1-diphenyl-2-picrylhydrazyl

Table 1. DPPH production in different medicinal plants such as Thyme (Thymus vulgaris L.), St. John's wort (Hypericum perforatum L.), Pig rose (Rosa canina L.), Abukhalsa (Arnebia euchroma L.) and Water cress (Nasturtium officinale L.) as antioxidant activity.

No	**Particular of tests (Antioxidant)**	**Results (IC_{50})**
1	Thyme (Thymus vulgaris L.)	23.68±0.01(μg/ml)
2	St. John's wort (Hypericum perforatum L.)	35.28±0.01(μg/ml)
3	Pig rose (Rosa canina L.)	56.30±0.11(μg/ml)
4	Abukhalsa (Arnebia euchroma L.)	112.63±0.02(μg/ml)
5	Water cress (Nasturtium officinale L.)	275.35±0.16(μg/ml)

Standard (Antioxidant)	**Results (IC_{50})**
Ascorbic acid	5.819±0.009(μg/ml)

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RESEARCH ARTICLE

The Relationship between Manager's Technical and Perceptual Skills and Their Time Management of Guidance Schools and High Schools in Baft City

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ABSTRACT

Education key factor in the development of social, economic, cultural and political life of society is to analyze the factors influencing the growth and development of advanced societies suggests that all countries have had some effect on the efficient education. The management of educational units has great importance, because the principles of schools can have a determinative role to guide the activities and to lead the process of education. The present study was conducted to investigate the relationship between managers technical and perceptual skills and their time management of guidance schools and high schools in Baft city. The method of this research is descriptive (correlational). The statistical community and participants include 78 managers (35 males and 43 females) selected totally from two levels of education at schools of baft city. The research tools include two questionnaires about the managers three-dimensional skills filled by manager and another questioner about the time management. The SPSS software were used for data analysis in this study. The results obtained from data analysis revealed that there is no meaningful relationship between technical skills of managers and their time managemen. There is no meaningful relationship between perceptual skills of managers and their time management.

Key words: Technical skills, perceptual skill, Time management, High schools, Baft City

Sareh Badparva

INTRODUCTION

Management and leadership are important for the delivery of good health services. Although the two are similar in some respects, they may involve different types of outlook, skills, and behaviours. Good managers should strive to be good leaders and good leaders, need management skills to be effective. The aim of good management is to provide services to the community in an appropriate, efficient, equitable, and sustainable manner. This can only be achieved if key resources for service provision, including human resources, finances, hardware and process aspects of care delivery are brought together at the point of service delivery and are carefully synchronized. Conditions for being an effective manager are best when these questions have clear and positive answers so that tasks are clear, the delegation of authority is known and managers know where and when to seek support for their decisions. Management also flourishes when the manager and the staff agree about the objectives of the work that they are doing, and can make decisions easily and with minimal risks. Health care delivery and patient circumstances are constantly changing, and managers have to continue to learn new abilities and skills to keep up. A significant portion of management involves skills and competencies such as motivating staff, communicating and negotiating with stakeholders, and maintaining certain attitudes and behaviours that maximize staff discipline and performance. Managers also need to understand the basic technical aspects of the services delivered. For most of these competencies, training courses, while effective, are often not sufficient to provide all the necessary skills. Today since efficiency and productivity are the highest goal of all managers, management professionals are discussed new discussion entitled "effective management", in which one of necessities for effective management is time management (Ratliff Bain, 2003). In the late 1950s time management was raised as a method for effective compliance of time with work. This method includes techniques for determining short-term goals, how to turn these goals into tasks and activities for faster implementation of them, how to plan and prioritize them according to diary, and how to prevent work interruption which provides limitations in performing tasks (Fields, 2002). In other term to understand personal and organizational skills levels of time management can be used as an indicator of choosing effective and efficient managers (Pollack, 1994). In this case, there had done several studies regarding relation between individual and organizational skills of time management. Karami Moghaddam announced that between personal skill and six aspects of organizational time management skills; there is a significant relationship (Karami Moghaddam, 1997). Macenzi, addressed to managers that: Always said we don't have enough time while time totally is your possession, but the something you don't have is that you don't have enough skills to manage time (Macenzi, 1993). Hafezi and Naghibee and Messiah, beside emphasis over relationship between personal and organizational time management skills, they believed that personal skill of time management has relationship with two aspects of communication management and activities' priority of six aspects of organizational skill of time management and they believed there were no relations with other four aspects (Hafezi, Naghibee, 2008; Messiah, 2010). Time management refers to those skills that lead to time's optimal control. Time management is generally defines in two aspects, personal skills and organizational skills (Chaves, Hall, 2001). Time management includes the following six components: the goals, objectives, priorities and activities, operational planning, delegation, communication management and meeting management (Fitsimmons, 2008). Some believe personal time management skill includes organizational skills, in a way if individuals can manage their time; organizational time will be managed as well but these two components are not the same (Kirk, 2001). Each Individual in his or her time management in family or at work environment has complete freedom to organize his or her time. This time ordering is based on beliefs, information, culture and each one's experience, which is different in family and work environment. Based on extent and diversity of sport plans and increasing investment in this case, it seems that managers, to have efficiency in organizational duties and responsibilities need various management skills (Naderian Jahromi, 2000). Mackenzie and Forsyth, Cately mentioned one of the main skills of these skills as a time management skill (Mackenzie, 1987; Forsyth, Cately, 2007). Simona Indreica et al., in research concluded that the efficiency of time management individualized programs (Simona Indreica et al., 2011). Evaluating his pattern, Macan, showed their of time management training leads of three types of behavior: setting objectives and regulating them based on priorities, creating structure for time management, Rating and discriminating and points for organization. The results of studies by different researchers indicate that time management behaviors (or part of them such as short-term goals) have positive relationship with

perception of control over time, work-life interference, job performance; academic ran king, academic performance, job satisfaction and health, allocating time for tasks according to the above priorities. Accordingly and since there were no articles regarding organizational skill prediction of time management based on personal skill in managers of guidance schools and high schools in Baft city, so this researcher intended to investigate the relationship between managers skills and their time management of guidance schools and high schools in Baft city.

MATERIAL AND METHODS

The statistical Population of this research are the all school managers in baft city. The common trait among these units have a formal communication from management to education and employment is one of the schools. The statistical population consisted of 78 managers of guidance and high schools in baft city. The number of boys' guidance schools managers is 18 persons and in girls guidance schools is 22 persons. In addition, The number of boys' high schools managers is 17 persons and in girls high schools is 21 persons. The method of this research is descriptive (correlational). The statistical community and participants include 78 managers (35 males and 43 females) selected totally from two levels of education at schools of baft city. The research tools include two questionnaires about the managers three-dimensional skills filled by manager and another questioner about the time management. The hypothesis discussed in this research are correlation coefficients between variables technical skills and authority conferment, correlation coefficients between variables technical skills and meetings' management, correlation coefficients between variables technical skills and communication management, correlation coefficients between variables perceptual skills and goal setting , correlation coefficients between variables perceptual skills and prioritization of objectives and activities , correlation coefficients between variables perceptual skills and meetings' management . The SPSS software were used for data analysis in this study. In addition, the inferential statistical analysis methods were used to test the hypotheses (Correlation Coefficient).

RESULTS AND DISCUSSION

The correlation coefficients between technical skills and authority conferment is shown in table 1. Based on the results of table 1 determined that the correlation coefficients between technical skills and authority conferment was not significant, so the hypothesis was rejected with 95% confidence.

The correlation coefficients between technical skills variables and communication management is shown in table 2. Based on the results of table 2 determined that the correlation coefficients between technical skills variables and communication management was not significant, so the hypothesis was rejected with 95% confidence.

The correlation coefficients between variables technical skills and meetings' management is shown in table 3. Based on the results of table 3 determined that the correlation coefficients between variables technical skills and meetings' management was not significant, so the hypothesis was rejected with 95% confidence.

The correlation coefficients between variables perceptual skills and goal setting is shown in table 4. Based on the results of table 4 determined that the correlation coefficients between variables skills and goal setting was not significant, so the hypothesis was rejected with 95% confidence.

The correlation coefficients between variables perceptual skills and prioritization of objectives and activities is shown in table 5. Based on the results of table 5 determined that the correlation coefficients between variables perceptual skills and prioritization of objectives and activities was not significant, so the hypothesis was rejected with 95% confidence.

The correlation coefficients between variables perceptual skills and meetings' management is shown in table 6. Based on the results of table 6 determined that the correlation coefficients between variables perceptual skills and meetings' management was not significant, so the hypothesis was rejected with 95% confidence.

The purpose of this study was to investigate the relationship between managers skills and their time management of guidance schools and high schools in Baft city. Findings of this study showed that there is no meaningful relationship between managers skills of managers and their time managemen. There is no meaningful relationship between technical skills of managers and their time management. Work time dimension has got a great importance. Time is the most valuable resource in hand for humans, because all other resources become valuable in case of time existence. One of the best ways to use limited and valuable time is conscious and permanent application of time management. Time management can be considered as taking into account every minute, eliminating unnecessary tasks an emphasizing the main nature of work. The basis for time management rests on effectiveness of time spending and dominance on time is the only secret of human success. In a complete system of time management, some techniques are used in which people can achieve the most results with spending the last time. Managers learn to focus on important tasks and priorities and to avoid. Everything which is obstructing for doing important works delay. The complete system of time management gives the managers the courage for empowerment. These results are consistent with findings of Karami Moghaddam (1998), Hafezi and Naghibee (2008) and Messiah (2009). Based on obtained results, time management personal skill is effective over objectives, goals and activities' priority, operational planning and meetings' management. In other term if there will be time management personal skill among studied participants, it can be predicted that there will be objectives, goals and activities' priority, operational planning and meetings‘ management. Management is also divided into three levels: first-level supervisors (managers), middle managers and top management. The changing story in management today, is that the layers and layers of middle managers that most large organizations used to have are giving way to self-empowered teams and flatter organizations. The three basic skills that managers use are technical, human, and conceptual and that the proportion of one's time spent in these areas may change as managers go up the hierarchy (Katz, 1955). Furthermore, a manager's time in each of these areas might vary due to their age, gender, and age. For example, senior managers who are often older, may not spend as much time in technical functions as those who are in first line management. Top managers tend to spend more time using their conceptual skills. Top management has been found to be an important component in enacting an organization's vision and ultimately its performance (Smircich and Stubbart, 1985; Voges et al., 2009). Time management has been referred to as a set of techniques for managing time (Macan, 1994; Jex & Elacqua, 1999; Davis, 2000); planning and allocating time (Burt & Kemp, 1994; Francis-Smythe& Robertson, 1999); the degree to which individuals perceive their use of time to be structured and purposive (Bond & Feather, 1988; Strongman & Burt, 2000; Sabelis, 2001); and self-regulation strategies aimed at discussing plans, and their efficiency (Eilam & Aharon, 2003). Time's limited nature means that it should be prioritized and used effectively. According to Britton and Tesser (1991), the way in which organisations manage their time relates to organizational profitability. Time is a fundamental asset for both individuals and organisations, and time is an important factor in performance. There is not one adopted definition of time management. Many authors referred to Lakein's (1973) description of time management, which suggested that time management involves determining needs, setting goals to achieve the needs, prioritising the tasks required, and matching tasks to time and resources by planning, scheduling and making lists. Time is a vital resource everyone possesses equally but fails to utilize at the same level due to a variety of. All the material and human resources possessed by organizations can be enhanced in the course of time or be transformed as time goes on; yet the only asset that cannot be changed or purchased or stored is "time" itself. The secret to achieving success in life is effectively managing this resource that everyone possesses equally and paying sufficient emphasis to planning. A closer look at the definition of the management concept shows that it is in reality an act of directing. Thus, management of this ever-flowing time is decidedly the ability of one to direct himself/herself, his/her own deeds and all other activities, and to use time more effectively. In other words, time management corresponds to the process of stacking greater amounts of work and activity into a certain length of time.

CONCLUSION

Findings of this study showed that there is no meaningful relationship between technical and perceptual skills of managers and their time managemen.

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Table 1. Correlation coefficients between technical skills and authority conferment

Correlations	Correlation Coefficient	p-value	Number
Spearmen	0.057	0.62	78

Table 2. Correlation coefficients between technical skills variables and communication management

Correlations	Correlation Coefficient	p-value	Number
Spearmen	0.08	0.485	78

Table 3. Correlation coefficients between variables technical skills and meetings' management

Correlations	Correlation Coefficient	p-value	Number
Spearmen	0.122	0.287	78

Table 4. Correlation coefficients between variables perceptual skills and goal setting

Correlations	Correlation Coefficient	p-value	Number
Spearmen	0.022	0.849	78

Table 5. Correlation coefficients between variables perceptual skills and prioritization of objectives and activities

Correlations	Correlation Coefficient	p-value	Number
Spearmen	-0.205	0.073	78

Table 6. Correlation coefficients between variables perceptual skills and meetings' management

Correlations	Correlation Coefficient	p-value	Number
Spearmen	- 0.052	0.653	78

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RESEARCH ARTICLE

Effect of Nano-Zinc Chelate and Nano-Biofertilizer on Yield and Yield Components of Maize(Zea Mays L.) Under Water Stress Condition

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ABSTRACT

This experiment was laid out in order to determine the effect of nano-Zinc chelate and nano-biofertilizer on yield and yield components of maize under water stress condition on a loam clay soil, in Islamic Azad University of Boroujerd, Iran, during the growing seasons 2013- 2014. The experiment was laid out in a split-factorial design based on randomized block design with three replications. The experiment was laid out in a split-factorial design based on randomized block design with three replications. Treatments were different irrigation periods (7, 14 and 21 days) in main plots and nano-Zinc chelate and nano-biofertilizer in two levels of use and non use of them as factorial in sub plots. The results showed that the effects of water stress, nano-Zn and nano-biofertilizer treatments on all traits were significant. The comparison of the mean values showed that 7 day irrigation period treatment with use of nano biofeertilizer and nano-Zn had the highest chlorophyll SPAD measurement, 100grain weight and harvest index. Application of Zn nanofertilizer and nano biofertilizer treatment had the highest and control treatment had the lowest biomass yield. Also, 7 day irrigation period treatment with use of nano-biofertilizer had the highest number of row per cob, number of grain per cob and grain yield but 21 day irrigation period treatment without use of nano-biofertilizer had the lowest of them. However, 7day irrigation period treatment with use of Zn nanofertilizer had the highest grain yield and non application of Zn nanofertilizer in 21 day irrigation period treatment had the lowest of grain yield. However, the present study concluded that maximum production of maize was recorded for normal irrigation as 7 day irrigation period and application of nano- Zn nutrient and nanobiofertilizer nutrient, while severe water stress without

application of nano- Zn nutrient and nanobiofertilizer produced minimum production. Therefore, we can increase yield and yield components of maize by decrease of irrigation period and application of nano- Zn nutrient and nanobiofertilizer as nutrient.

Key words: Biofertilizer, maize, nano-Zn and grain yield

INTRODUCTION

A lot of cereals growing areas are located in arid and semi-arid regions where nutrient deficiency exists due to high soil pH, free calcium carbonate and low organic matter, drought and salt stresses, imbalanced application of NPK fertilizers and high bicarbonate content of irrigation water (Narimani et al., 2010; Ali, 2012). Maize (Zea mays L.) is one of the major cereal crops and is a very versatile grain that benefits mankind in many ways. It is a versatile crop and ranks third following wheat and rice in world production as reported by Food and Agriculture Organization the most important cereal crops in the world. It is a versatile crop and ranks third following wheat and rice in world production as reported (FAO, 2002).

Performance reduction caused by environmental stresses such as drought and element deficiencies is a serious problem. In the U.S. 75 percent of agriculture are potentially faced with these tensions (Bennet and Creen, 1991). Several studies have also shown that optimum yield can be obtained with irrigation at branching, flowering and pod formation stages (Prihar and Sandhu, 1968). Water stress is deleterious for plant growth, yield and mineral nutrition (Garg et al., 2004; Samarah et al., 2004). Soil moisture status during the reproductive phase of crops plays an important role to determine the impact of yield component in final grain yield (Singh and Bhushan, 1980). Biglouei et al (2007) reported that the increase of drought stress in K.S.C.704 corn, led to increase of grain yield and protein percentage. They also declared that grain protein in irrigation treatments after 50, 75 and 100 percent water depletion, were relatively 5.8, 7.2 and 7.4. The studies of researchers have indicated that, lack of organic materials and existence of alkali reaction in calcareous soils can lead to lack of micronutrients in these soils (Auge, 2001).

Zinc is an essential element for plants and animals and plays an important role in plants metabolic system. This element activates enzymes and involved in protein, lipids, carbohydrates and nucleic acid metabolism (Khan et al., 2002; Zlatimira, 2002). Nearly 200 enzymes and transcription elements of zinc need it as one of the most essential components. Zinc plays an important role in protein and carbohydrates syntheses. It also has effects on growth of stem and root (Kabata-Pendias, 1999). Zinc has a major role in cell defenses against ROS and as a protective factor against several chemical compositions of oxidation such as membrane lipids, protein, chlorophyll, and enzyme having SH and DNA (Cakmak, 2000). Zinc plays an important role as a metal component of enzymes (alcohol dehydrogenase, superoxide dismutase, carbonic anhydrase and RNA polymerase) or as a functional, structural, or regulator cofactor of a large number of enzymes (Marschner, 1986). Zinc also plays a key role in controlling the production and toxicity of free radicals that can damage membrane lipids and sulphydryl groups (Alloway, 2004). Soleimani (2006) reported increase in biological yield for foliar application of zinc. Marshner (1993) reported that, by increasing consumption of Iron and zinc in corn, we can witness that the total amount of carbohydrate and grain protein is increased, and as a result the gain weight, number of grains and at last yield will be increased as well. Tahmasebi et al (2003) declared that by increasing amounts of zinc, absorption of nitrogen will be decreased by the plant, yet potassium absorption will be increased.

Nanotechnology such as using nano-scale fertilizer particles may offer new techniques in improving existing crop management (Ghafari and Razmjoo, 2013). This technology is particularly applied in chelate fertilizers such as zinc chelate. The present study aims at investigating the impact of zinc chelate fertilizer in two forms of nanochelate and non-nanochelate on growth and some biochemical processes of cotton plant (Rezaei and abbasi, 2014). Effect of nano oxide iron alone or with iron chelate and sulphate on wheat production and grain quality especially Fe content has

not been compared (Ghafari and Razmjoo, 2013). In addition, there is a little information on the accumulation of antioxidant enzymes and their possible role on yield and quality of wheat under nano oxide iron, iron chelate, and iron sulphate application (Ghafari and Razmjoo, 2013).Liu et al. (2005) reported that nano-fertilizers promoted the growth and photosynthesis of peanut. Sheykhbaglou et al. (2010) showed that application of nanofertilizers such as nano-iron oxide particles increased soybean yield. Prasad et al. (2012) reported that nano-scale zinc oxide particles increased stem and root growth and pod yield of peanut as compared with ZnSO4 application.

Therefore this study was planned to examine effect of Nano-Zinc chelate and Nano-biofertilizer on yield and yield components of maize (*zea mays* L.) SC600 cultivar under water stress condition.

MATERIALS AND METHODS

Field material and Experimental design

This study was carried out in order to evaluate the effect of nano-Zinc chelate and nano-biofertilizer on yield and yield components of maize (*zea mays* L.) SC600 cultivar under water stress condition in the faculty of agronomy and plant breeding, Islamic Azad University, Boroujerd Branch (experiment station: Hamedan), Iran during the growing seasons 2013- 2014. Soil property of experimental field showed in table1.

Treatments

The experiment was laid out in a split-factorial design based on randomized block design with three replications. Treatments were different irrigation periods (7, 14 and 21 days) in main plots and Nano-Zinc chelate and Nano-biofertilizer in two levels of use and non use of them as factorial in sub plots. Foliar application of Nano-Zinc chelate treatment was apply in two stages (4 -6 leaf and before of flowering).

Yield and yield components determination

In this field experiment there were 6 rows in each plots and rows were 6 m long with 0.75 m row spacing and plant to plant spacing was 18 cm too. At maturity, two outer rows for each plot, 50 cm from each end of the plots, were left as borders and the middle $3m^2$ of the four central rows were harvested. After irrigation SPAD was recorded by manual chlorophyll meter. Then yield components were calculated as standard methods with using 8 plant. To determine grain yield and biomass yield, we removed and cleaned all the seeds produced within middle $3m^2$ of the four central rows in each plot. Then grain yield and biomass yield recorded on a dry weight basis. Yield was defined in terms of grams per square meter and quintals per hectare. Replicated samples of clean seed (broken grain and foreign material removed) were sampled randomly and 1000-grain were counted and weighed. The harvest index was accounted with follow:

HI = (Economical yield / Biological yield)

Statistical analysis

The statistical analyses to determine the individual and interactive effects of treatments were conducted using JMP 5.0.1.2 (SAS Institute Inc., 2002). Statistical significance was declared at $P \leq 0.05$ and $P \leq 0.01$. Treatment effects from the two runs of experiments followed a similar trend, and thus the data from the two independent runs were combined in the analysis.

RESULTS AND DISCUSSION

Chlorophyll SPAD: The analysis of variance showed that, the effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between them on chlorophyll SPAD were significant only (table 2). The comparison of the mean values of the chlorophyll SPAD showed that 7 day irrigation period treatment with use of Nano biofeertilizer and Nano-Zn had the highest (55) and 21 day irrigation period treatment without Nano biofeertilizer and Nano-Zn had the lowest (30) chlorophyll SPAD measurement (figure 1).

Number of row per cob: The effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between water stress and Nano biofertilizer on number of row per cob was significant (table 2). The comparison of the mean values of the number of row per cob for interaction between water stress and Nano biofertilizer showed that 7 day irrigation period treatment with use of Nano-biofertilizer had the highest (17) number of row per cob and 21 day irrigation period treatment without use of Nano-biofertilizer had the lowest (12) number of row per cob (figure 2).

Number of grain per cob: The effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between water stress and Nano biofertilizer on number of grain per cob were significant (table 2). The comparison of the mean values of the number of grain per cob for interaction between water stress and Nano biofertilizer showed that 7 day irrigation period treatment with use of Nano biofertilizer had the highest (520) number of grain per cob and 21 day irrigation period treatment without use of Nano biofertilizer had the lowest (280) number of grain per cob (figure 3).

100 grain weight: The effect of water stress and Zn Nanofertilizer, Nano biofertilizer, interaction between water stress and Nano biofertilizer and three side interaction on100-grain weight were significant at 1% level (table 2). The comparison of the mean values of the 100-grain weight showed that 7 day irrigation period treatment with use of Nano biofeertilizer and Nano-Zn had the highest (27g) and 21 day irrigation period treatment without Nano biofeertilizer and Nano-Zn had the lowest (16g) 100-grain weight (figure 4).

Biomass yield : The effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between Zn Nanofertilizer and Nano biofertilizer on biomass yield were significant (table 2). The comparison of the mean values of the biomass yield for interaction between Zn Nanofertilizer and Nano biofertilizer showed that used of Zn Nanofertilizer and Nano biofertilizer treatment had the highest (17000kg.ha^{-1}) biomass yield and control treatment had the lowest (11000kg.ha^{-1}) biomass yield (figure 5).

Grain yield: The results showed that the effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between water stress with Zn Nanofertilizer and Nano biofertilizer on grain yield were significant (table 2). The comparison of the mean values of the grain yield for interaction between water stress and Nano biofertilizer showed that 7day irrigation period treatment with use of Nano biofertilizer had the highest (11.5ton.ha^{-1}) grain yield and non application of Nano biofertilizer in 21 day irrigation period treatment had the lowest (3.2ton.ha^{-1}) grain yield (figure 6). However, the comparison of the mean values of the grain yield for interaction between water stress and Zn Nanofertilizer showed that 7day irrigation period treatment with use of Zn Nanofertilizer had the highest (10.5ton.ha^{-1}) grain yield and non application of Zn Nanofertilizer in 21 day irrigation period treatment had the lowest (2.7ton.ha^{-1}) grain yield (figure 7).

Harvest index (HI): The analysis of variance showed that, the effect of water stress and Zn Nanofertilizer, Nano biofertilizer and interaction between them on harvest index were significant (table 2). The comparison of the mean values of the harvest index showed that 7 day irrigation period treatment with use of Nano biofeertilizer and Nano-Zn had the highest (51%) and 21 day irrigation period treatment without Nano biofeertilizer and Nano-Zn had the lowest (28%) harvest index (figure 8).

In this study the results reviled that the effect of water stress nanobiofertilizer and nano-Zn on all traits were significant (table 2). In general, 7day irrigation period and application of nanobiofertilizer and nano-Zn produced the highest chlorophyll contents (SPAD) (figure 1). Nano-Zn application increased total chlorophyll contents as compared with the control, but there was marked differences between Zn rates on these traits. That was perhaps due to the association of Zn with chlorophyll formation (Mazaherinia et al., 2010). In line with our results, Liu et al. (2005) reported that nanofertilizers such as nano-Fe2O3 application increased chlorophyll content of peanut and Amanullah et al. (2012) showed that application of iron sulphate in soil and foliar spray increased chlorophyll content of maize leaf. Increased in chlorophyll content of wheat in our experiment could be due to promotion of the absorption and utilization of nutrients such as nitrogen by nano-fertilizers compound as concluded by Liu et al. (2005).

In addition, Sheykhbaglou et al. (2010) reported that nano fertilizers increased pod and leaf dry weight and yield of soybean, but had no effects on plant height and other growth and yield parameters. Their results were in general agreement with ours. In line with our results, Sheykhbaglou et al. (2010) showed that application of nano-fertilizers increased soybean yield.

In line with our results, Habib (2009) reported that application of 150 g ha-1 Fe as Fe2O3 increased wheat grain yield. Zeidan et al. (2010) reported that application of 1% FeSO4 increased yield and yield components of wheat.
The maximum amount of yield and its components were observed in treatments of 7 day irrigation period and application of Zinc nano-chelate and nanobiofertilizer. Rezaei and abbasi (2014) founded that the application of zinc chelate and specially the nano-chelate of zinc can be considered as a measure for cotton crop improvement by increasing weight of 20 bolls and number of bolls per plant. They also told that maximum height, fresh weight, and dry weight were obtained in treatments with nano-chelate and chelate of zinc and there were no significant difference in squaring, squaring-flowering, and flowering application stages and application of chelate and nano-chelate zinc fertilizer in the present study improved physiological processes in cotton as it increased the amount of chlorophyll and antioxidant activity of peroxidase, catalase, and polyphenol oxidase as a result of increase in fresh and dry weight.

In the present study water stress in 21 day irrigation period decreased grain yield but application of nanobiofertilizer and Zn-nanofertilizer increased grain yield of soybean. Soil moisture status during the reproductive phase of crops plays an important role to determine the impact of yield component in final grain yield (Singh and Bhushan, 1980). The reduction in grain yield under water stress treatments may be attributed to the limitation of dry matter partitioning to the reproductive sink or even grain formation factors as has been reported by Turk et al (1980). The number of grain per plant in 7 day irrigation period giving over the 21 day irrigation period. However, the results showed that under 7 day irrigation period conditions and application of bio and nano fertilizers significantly gave better grain yields than 21 day irrigation period conditions. Thalooth et al (2006) reported that zinc spraying under water stress conditions, had positive effect on growth, yield, and yield components of plants. The findings of this experiment conformed to the results obtained by Sheykhbagloo et al (2009). Pandey et al (2002) stated that the maximum water consumption by the corn is almost when silk rating or immediately after that. Application of nano-Zn nutrient and nanobiofertilizer had a positive effect on the grain yield and biomass yield and yield components of maize. In maize, the final grain yield is dependent on the number of cob per plant, number of grains per cob and the extent to which grains are filled. In the present study, the reduction in grain yield under water stress and non application of nano- Zn nutrient and nanobiofertilizer were associated with dramatic decrease in all yield components. Supporting evidences were reported by many researchers (Ludlow and Mushow, 1990). Decrease biomass yield under lower soil moisture might be due to reduction of leaf area and photosynthesis rate (Sinaki et al., 2007). The biomass yield in the 7 day irrigation period and application of nano- Zn nutrient and nanobiofertilizer treatment had a 15% over the non application of any nutrient and 21 day irrigation period treatment (figure 5). Latiri-Soki et al (1998) reported that, irrigation and fertilizers increased biomass yield and grain yield.

In the present study harvest index was dramatically decreased with increased in irrigation period and application of nano- Zn nutrient and nanobiofertilizer treatments. Ziska and Hall (1983) founded that the effect of water stress on HI to the reduction in assimilate supply attributed. The present study concluded that maximum production of maize (grain yield, yield components and grain yield) was recorded for normal irrigation as 7 day irrigation period and application of nano- Zn nutrient and nanobiofertilizer nutrient, while severe water stress and non application of nano- Zn nutrient and nanobiofertilizer produced minimum production. Therefore, we can increase yield and yield components of maize by decrease of irrigation period and application of nano- Zn nutrient and nanobiofertilizer as nutrient.

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Table 1. Soil property of experiment site.

soil Texture	sand (%)	Silt (%)	Clay (%)	K (mg/kg)	P (ppm)	N (%)	pH	EC (ds/m)	Depth
LC	20	45	35	220	8.2	0.1	7.7	0.409	0-30

Table2. Analysis of variance for yield, yield components of maize under water stress , Nanobiofertilizers and Nano-Zn nutrient

treatments	df	SPAD	number of row per cob	number of grain per cob	100 grain weight	biomass yield	grain yield	harvest index
R	2	8.7	4.35	2219	0.33	5.8	0.76	13.6
Irrigation (A)	2	472**	37.9**	152412**	329**	232**	152**	1932**
Ea	4	4.9	1.8	718	2.4	2	0.42	61
Nanobiofertilizer (B)	1	414**	30.1**	32669**	87**	123**	49**	363**
Nano-Zn ©	1	103**	11.9**	19778**	20**	21**	19**	291**
A*B	2	2.8	4.3*	4540**	6.6*	0.44	6.4**	125*
A*C	2	0.55	0.43	849	2.9	0.76	2.5*	39
B*C	1	0.42	0.13	301	2.8	5.2*	0.01	34
A*B*C	2	28.9*	0.63	879	4.8*	0.52	0.6	84*
Eb	18	6.1	0.91	545	1.2	0.91	0.47	23
CV(%)		5.7	7	5.4	5.9	6.3	12.5	13.8

ns: Non-significant, * and **: Significant at 5% and 1% probability levels, respectively

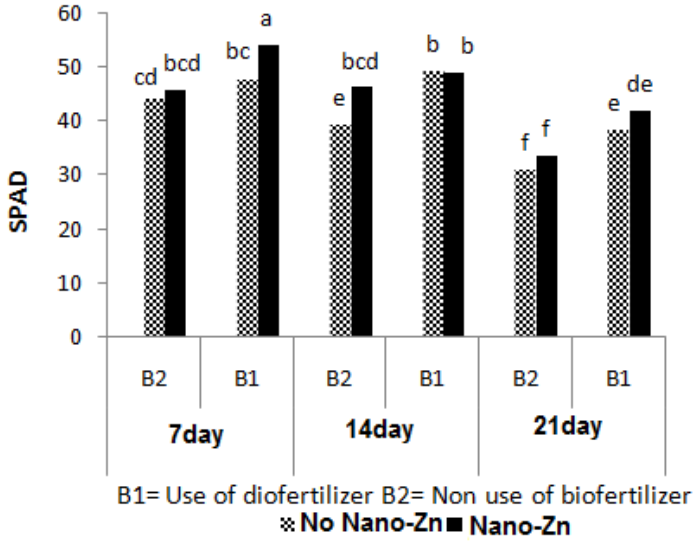

Figure 1. Effect water stress, biofertilizer and Zn nutrient on chlorophyll SPAD in maize. Means by the uncommon letter in each column are significantly different (p<0.05)

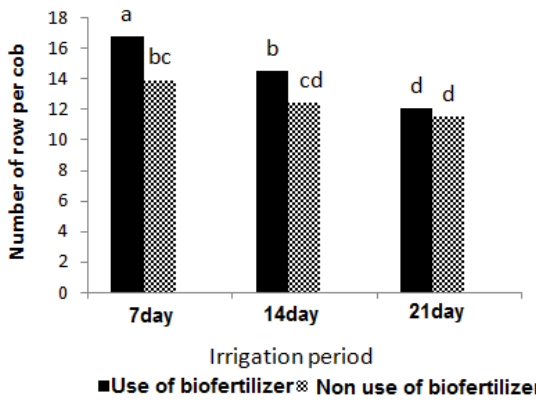

Figure 2. Effect water stress and biofertilizer on number of row per cob in maize. Means by the uncommon letter in each column are significantly different (p<0.05)

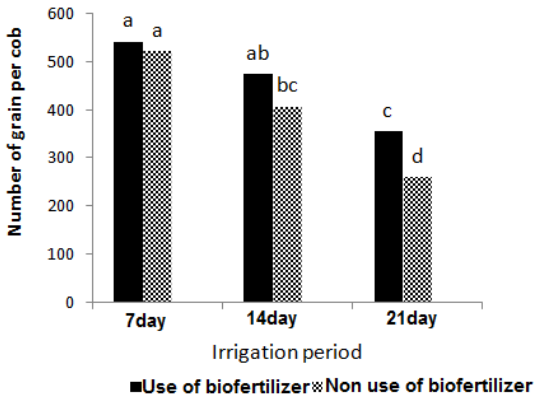

Figure 3. Effect water stress and biofertilizer on number of grain per plant in maize. Means by the uncommon letter in each column are significantly different (p<0.05)

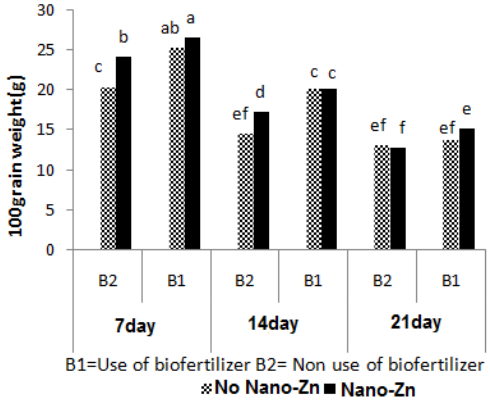

Figure 4. Effect water stress, biofertilizer and Zn nutrient on 100grain weight in maize. Means by the uncommon letter in each column are significantly different (p<0.05)

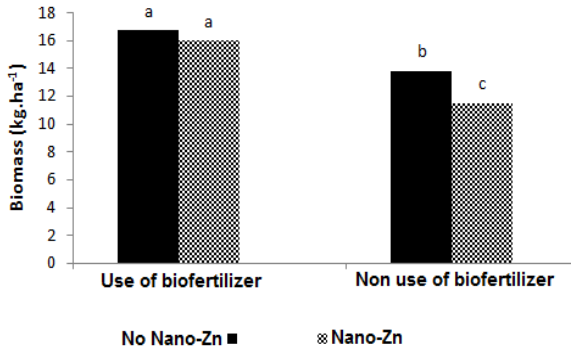

Figure 5. Effect biofertilizer and Zn nutrient on biomass yield of maize.
Means by the uncommon letter in each column are significantly different (p<0.05)

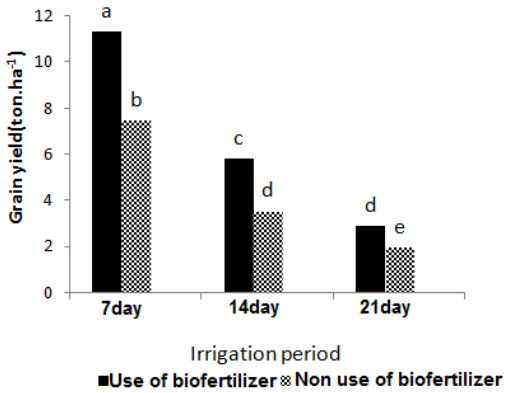

Figure 6. Effect water stress and biofertilizer on grain yield of maize.
Means by the uncommon letter in each column are significantly different (p<0.05)

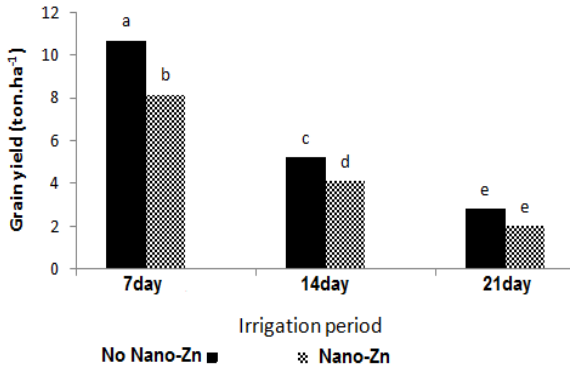

Figure 7. Effect water stress and Zn nutrient on grain yield of maize.
Means by the uncommon letter in each column are significantly different (p<0.05)

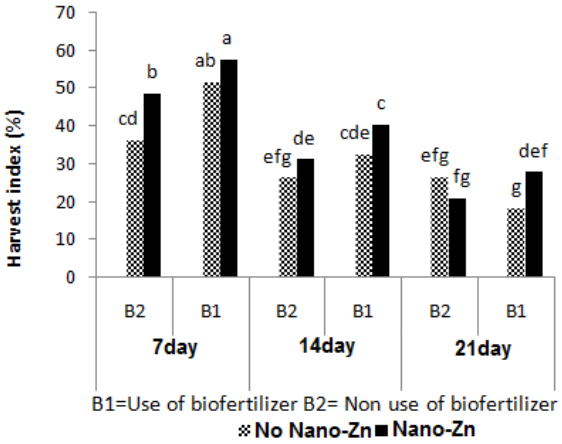

Figure 8. Effect water stress, biofertilizer and Zn nutrient on harvest index in maize. Means by the uncommon letter in each column are significantly different (p<0.05)

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RESEARCH ARTICLE

Examining the Relationship between the Health Literacy with Self- Care of the Diabetic Patients Type 2 Referred to Gorgan City Clinic in 2014.

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ABSTRACT

Introduction: Diabetes is a chronic illness that needs special lifelong self-care. Health Literacy is further than the knowledge of knowing how to read and write, and reflects the patient sanitary cares. The aim of this study is to determine the relationship between the level of self care and health knowledge in the diabetic patients type 2 referred to Gorgan city clinic.

Method: In a descriptive study, the correlational descriptive of 100 people in the form of convenience random sampling were chosen among the diabetic people in 2014. The findings were collected through demographic questionnaire, health Literacy and self-care. Data was analyzed by descriptive (tables, mean and standard deviation) and inferential analysis (linear regression, multiple regression, analysis of variance).

Findings: The health Literacy level of participants (mean and the standard deviation 86.7±21.9) the amount of their self care was approximately (mean and the standard deviation 71.32±17.73) .There is a significant relationship between the health Literacy and gender (P=0.007), education (P=0.002), job (P= 0.036) and the themes (P=0.038) in the participants. There is a significant relationship between the level of self-care and gender (P=0.009), education (P=0.001), job (P=0.004) and the themes (0.004) in the participants. The statistics results showed that there is a significant relationship between the self care and the health knowledge.

Conclusion: According to the result of this study, it is necessary for the beneficiary authorities and the sanitary iatric personnel to use more effective and better methods to transfer the information to the diabetic patients. Sanitary iatric personnel, particularly the nurses have to give scheduled instructions to the patients in order to promote the patient's self-care.

Key words: Health Literacy, self care, diabetes

INTRODUCTION

Diabetes is created due to the lack of insulin secretion and causes the unnatural increase in hyperglycemia. Diabetes type 2 is the most prevalent kind of diabetes. Besides genetic and environmental factors, family precedence, age, obesity, physical inaction, has influenced diabetes (1). According to the world health organization, diabetes is known as a silent epidemic in the world (2). According to the studies that has been done, there are 2,872,000 diabetic patients in Iran in 2010 and it is estimated that this number will grow to 5,981,000 by the year 2030 and 155,000 people are added to the number of the diabetic people in Iran yearly (3). Social and economical charge of diabetes type 2 is a concern for many countries throughout the world (4). The consequence of diabetes are diseases such as cardiovascular disease, lower extremity disease, retinopathy, nephropathy, neuropathy that devotes the most expenses of the diabetes patients to themselves. And according to the statistics report of the diabetes society in the U.S in 2007 , medicine per capita expenses has increased 33% in compare with the year 2002. Of the estimated percentage 116 milliard dollars have been used for the medical expenses of this illness and 58 milliard dollars have been spent on the indirect expanses(5). One of the most effective ways of controlling and preventing diabetes is to have enough knowledge of the disease and how to preventing it; and in fact one of the most important effective factors to control and preventing the disease is the health Literacy and it is a level in which people have the capacity and capability of acquiring, editing and perception of the information related to sanitation and the services that they need for a suitable determination for their health (6). Lots of studies have been done to control the diabetes in different countries in the world but they all showed that the diabetes control even in the developed countries is not desirable, one way of controlling diabetes is self caring (7). To succeed in treating diabetes depends on the ability of the people who suffer it in order to be able to have effective self-care (8), so considering the importance of diabetes disease in Iran and the critical importance of self management and their roles in controlling the symptoms of diabetes type 2 and according to the contradictions and the result of the previous studies, different results can be expected in different educational parts of the world. The present study has been done with the aim of determining health Literacy against patient self care of diabetic patients of type 2 who referred to the diabetic clinic in Gorgan.

METHODS

This study was done in the form of correlational descriptive. The samples were 100 diabetes type 2 patients referring to diabetes clinic in Gorgan in 2014. All the samples were the patients who had shown the symptoms of diabetes disease at least one year and they all had treatment documents in the diabetes clinic and the exclusion criteria of the

study was speaking problems, mental, hearing and also pregnancy diabetes. Selecting the patients was done through simple random sampling way. The collecting tool was the questionnaire related to demographic specification including questions linked with gender, age, marital status, job, income and... . Health Literacy questionnaire based on Montazeree and coworkers (2014) Health Literacy for Iranian Adults was prepared according to the conceptual framework was prepared and of the 35 questions based on 5-Likert an option in range of 1 to 175 was numbered, and giving mark was done in the form of the sufficient (1-58), border line (59-116), insufficient (117-175) but the lower mark was the sign of more knowledge (9). Self care questionnaire which was for determining self care in diabetic patients based on Baghaee and coworkers questionnaire (2008) was prepared and corrected according to the present conceptual framework and the total obtained marks related to the self care ability study unites, was put in three categories good (101-150), mean (51-100), and weak (1-50) and the highest mark was showing the highest ability of self care (10). To find out the validity of the health Literacy questionnaire, the self care attitude was measured through the content validity method. The first stage of this process was done by referring to the existing references and under the supervision of the guide professor and the consulter, and in the second stage for the referendum questions of the questionnaire, this tool was assigned to 10 faculties of Tehran free universities and medical schools of Golestan and after the final examining and using the final corrective ideas, the final tool was supplied and used. To determine the reliability of the health Literacy questionnaire, the cronbach's alpha method with the correlation coefficient 76% was used; and the self-care questionnaire reliability in this study was confirmed by the correlation coefficient 75%. First he researcher got the permission of the nursing and midwifery university head and then presented the introduction letter to the research assistance of medical university of Golestan and then called to the sanitary center Gorgan and from there he called to the diabetes clinic to get their permission from the related authorities. The subjects were selected from the study subjects, then introducing and aims were explained and afterwards a choice was given to the subjects and they were assured that all the information will be kept as a secret and they were also assured that their names and their last names will not be mentioned in the study at all, they were also told that the result of the results will be shown and given to them if they are eager to know. We also told them that they can leave the experiment anytime they like but none of them left. The information was collected, it should be mentioned that the researcher was present in his clinic 3 times a week and chose the patients according to the criteria and then the patients were selected every other one. The needed tool was the questionnaires which were filled in by the patients in the presence of the researchers. The researcher also answered if there were any questions related to how to fill in the questionnaire they had. The estimated time to fill in the questionnaires for each diabetic patients was approximately 30 to 40 minutes. To analyze the data, SPSS 19 and then based on the descriptive statistics (Tables, mean and standard deviation) and inferential statistics (linear regression, multiple regression, analysis of variance) was done.

FINDINGS

The average age for the experiment was 51.15 and the means and standard deviation was 12.69, the highest percentage was (31%) was in the range group of 40-49 years old,61 percent of the subjects were men 89% married, the education of 30% was diploma, 36% were employee, 42% of them started suffering diabetes at the age of 30-39 years old, 49% of them suffered diabetes less than 5 years, the most percentage (68%) were not suffering the other chronic diseases. The most percentage(71%) had the family precedence of diabetic disease, 67% were from Fars province and the highest percentage (46%) were using the eatable treatment. The highest percentage (77%) would ask the questions related to the illness from the doctors and sanitary personnel. 49% had the middle financial economy conditions and most of them (60%) had the social insurance supplement. The health Literacy Subjects border score (59-116) and the self care subjects average score was (51-100). There is a significant relationship between the health Literacy of gender (P=0.007), education (P=0.002), job (P=0.036), and the subject matters (P=0.038). No significant relationship was observed between the health Literacy and age, income, marriage, the background of family diabetes and the age that they started suffering from diabetes (table 1). There was a significant relationship between the amount of self-care with gender (P=0.009), education (P=0.001), job (P=0.004), and the subject matters (P=0.004). No significant relationship was observed between the self-care and age, income, marriage, the background of family diabetes and

the age that they started suffering from diabetes (table 2). There is a significant relationship between the health Literacy and self care (P<0.01) and when the amount of self care got 1 degree more the health knowledge also increased one degree (Table 3).

DISCUSSIONS

In Karimi et al study (2013) based on the health Literacy, the condition of the general health and the relationship between them showed that approximately 49.8 percentage of the adults had the mean knowledge of education (11). In Nekoei Moghadam studying result (2012) it was shown that most Kerman residents have the health knowledge (12). Khezerloo and et al studying result (2012) showed that 57% of the subjects had mean self care (13). In the present study, it was expressed that the regression test has a significant relationship between the health Literacy and gender, somehow that the health Literacy in females was 12 times more than the males. In Lee and et al study (2014) it was shown that females have a higher health Literacy than males, they had they had written some medical information on the medical bottles (14). The regression test showed a significant relationship between the health Literacy and the education and when the level of education comes down, the health knowledge decreases 6 times. Toci and et al study (2015) showed that health Literacy goes up goes up considerably among the educated people (15). Regression test showed a significant relationship between the health Literacy and job so the unemployed people had less knowledge of heath than the university students. In the study result of Kooshyar and et al (2013) it was shown that there is a significant relationship (P<0.05) between the health Literacy and employment (16). Regression test showed a significant relationship between the health Literacy and an availability to the information sources, so that the people who have used the Internet had 2.7 times more health Literacy. In the tim and the coworker research (2013), it was expressed that the Net is not only a means to fill in the free time of people but it is used as an informational means for patients who are worry about their health and their improvement (17). In the present study, the mean of self care in men was 9 times more than women. In Abotalebee study (2011), the study was done to determine the ability of health care in the patients who had high blood pressure and it seems that the effect of different gender on self care can be influenced by the other variables such as education, physical and mental and people behavior for example Abootalebi believes the reason of better self care ability of educated men lies in higher education level (18). In this study, the regression test showed a significant relationship between education level and self care so that the people whose education is less than diploma had the most self care that is the self care goes up when the level of education comes down. The result of Hamadzadeh and et al (2012) showed that there is a significant relationship (P=0.01) in the level of the subjects (19). In the results of the present study, the regression test showed a significant relationship between the job and self care so that the unemployed people have more self care than the other groups of people and the university students had the less self care. Parham and et al result (2012) showed that there is no significant relationship between job and self care treatment; these results may have been obtained because the majority studied subjects were almost old and were also jobless (20). In the above study, the regression test showed a significant relationship between self care and information availability. The people who got information from newspapers, magazines and friends the most level of self care and the ones who got those information from the Net, had the least level of self care. At study in Noroozi (2013) it was shown that, after the patients leaned the self care behavior from the sanitation authorities, it must be changed to function by their families and friends reinforcements and considering the low level of education in patients, this issue is known logical to them (21). This study shows that there is a significant relationship between the health Literacy and self care so that one degree increase in health knowledge causes one degree increase in self-care patients; in Leung study (2014) it was shown that the connection between health Literacy, conception capacity, communication, health knowledge and self care in diabetic patients is very complicated (22). It is suggested that as this study considered the relationship between health Literacy and self care, the connection between health Literacy with the mental physical health and social health of the diabetic patients' type 2 is to be reviewed and by a research, the relationship between health Literacy with the promoting behaviors in chronic diseases particularly diabetic type 2 be done. So it is suggested that the same study is to be done in other cities with different geographical locations in order to be compared with the result that was obtained in Gorgan diabetic clinic. The studies that have been done for health Literacy and self care on diabetic patients are not enough

so it is necessary that more variables be studied and by discovering more variables, it will be possible to increase the health Literacy.

CONCLUSION

According to the results of this study, the health Literacy was at the border line. Health Literacy can reduce the conceptions and sanitation recommendations, so it is necessary that the beneficiary authorities and sanitary-therapeutic workers use more effective methods to transfer information to the diabetic patients. The amount of self care was mean in this study because human being is a complicated creature and the more study of self care especially in chronic diseases such as diabetes can give us valuable information for better treatment and care; this study showed that there was a significant relationship between health Literacy level , gender, education, job, and subject matter. In order to increase the health Literacy of the people in the society, things such as simplifying the information can be helpful; in addition to these instances, using the communicative ways, asking for the help of experienced in teaching sanitation in order to design and schedule more effective educational programs therefore the best educational way can be chosen by evaluating the group and their abilities so the health Literacy which is a vital issue can be more increased. There is a significant relationship between self care with gender, education, job and subject matter so at the time of programming self-caring, other factors must be considered.There was a significant relationship between health Literacy and self care which clears this problem that the interventions are to be related to the health Literacy of the patients and their conception capacities to communicate with the ones who give sanitary cares. Giving the instructions to the patients must be for the purpose of the enhancement of their communicative abilities, so all the sanitation authorities must pay attention to this factor.

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Table 1: Relationship Health Literacy with some Demographic Characteristics of the diabetic patients type 2 referred to Gorgan city clinic in 2014.

P- value	CI	OR	Variable
0.15	-0.5-.08	0.2-	age
0.007 *	3.2-21	12	gender
* 0.002	-9.8-2	-6	education
*0.036	-0.7-0.2	-4	job
0.038 *	0.14-5.2	2.7	subject materials
0.08	-11.7-0.78	-5.2	income
0.75	-10.7-14.7	2	marriage
0.42	-4.9-11.6	3.3	family presedence
0.19	-0.13-0.65	0.2	starting age

Table 2: Relationship Self- care with some Demographic Characteristics of the diabetic patients type 2 referred to Gorgan city clinic in 2014.

P- value	CI	OR	Variable
0.28	-0.36-0.1	-0.12	age
0.009 *	2.3-1593	9.11	gender
0.001 *	-7.6-1.96	-4.7	education
0.004 *	-7.3-1.14	-4.36	job
0.004 *	0.97-4.95	2.96	subject materials
0.15	-8.4-1.35	-3.53	income
0.3	-4.73-15.2	5.23	marriage
0.94	-6.7-6.25	-0.2	family presedence
0.37	-0.17-0.44	0.13	Starting age

Table 3: Relationship between the Health Literacy with Self- care of the diabetic patients type 2 referred to Gorgan city clinic in 2014.

P- value	CI	OR	variable
P<0.01	0.8-1.2	1	self care

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RESEARCH ARTICLE

Efficiency of Indian Automobile and Parts Manufacturing Stocks by DEA

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ABSTRACT

Efficiency of stock market playsa significant role in transfer of invests.The most important goal of the present paper is to evaluate the efficiency of automobile and parts manufacturing branch in India. Stock Exchange (ISE), during the period 2010 to 2014. To measure their efficiencies, the output-input data consisting of a panel of 21 Automobile and Parts Manufacturing companies is utilized. We applied data envelopment analysis for ranking and evaluating the units. First, the efficiency of units presented int here different types: technical, management and scale efficiency, and in efficient units were identified. So, peergroups, their weights and grade of units introduced. Then, optimal amounts of inputs calculated for some of in efficient units. Finally, by using Anderson and Peterson ranked the companies on the basis of score of super efficiency. The Results show that the units (Amtek Auto Ltd., Sundaram-Clayton Ltd., Tata Motors Limited, Bharat Forge Limited and Bosch Ltd) are known as superior units. Unit Amtek Auto Ltd obtained the first rank of 21 units because this DMU get the highest score of super efficiency than the other units rank in three types and was introduced 5 as the peer unit for the others so called the stronger unit. The third group of companies (Motherson S. S. Ltd, Exide Industries Ltd, etc.) have surplus inputs, it means that these units have used more inputs rather than the other units which are in the same level and suggested reduce the surplus amount for achieving the same efficiency.

Key words: Data Envelopment Analysis (DEA), Efficiency, Indian Stock Exchange, Market capstocks.

INTRODUCTION

Economic growth in a modern economy hingeson an efficient financial sector that pools domestic savings and mobilizes foreign capital for productive investments. Without an effectiveset of financial institutions, productive projects may remain unexploited (A. Berger, D. B. Humphrey, 1997). The capital market in any countryis one of the major pillar sof long term economic growth and development. The market serves abroad range of clientele including different levels of government, corporate bodies, and individuals within and out side the country (M. Oluwatoyin, O. O. Gbadebo, 2009).

A. Zapranis, P. E. Tsinaslanidis (2012), stated that stock market plays a significant role in the development of the investments and growth of the financial market. The efficient market hypothesis is under academic scrutiny since it was first introduced. Astock market index is the reflection of the market as a whole. F. Mishkin (1997), claim that the efficient market theory states that "prices of securities in financial markets fully reflect all available information". The functioning of stock markets can alter the rate of economic growth. Stock markets are efficient if the stock price incorporates all available information in the market place. G. Bekaert, C. R. Harvey, (1997) stated that an efficient stock market reduces the transaction costs of trading the ownership of the physical assets and there by opens the way for the emergence of an optimal ownership structure. Inefficient stock markets reduce the incentive to enter new ventures, reducing over all long term productivity of the economy. It can be calculated by taking the number of a firm's outstanding stocks and multiplying it by the selling price of that stock.

It is unrealistic to assume every player in the stock market knows all the relevant information and how to analyze what it means. ZohdiM.et, al. (2012) Assessing the performance of investment companies is most important for investors and financial managers. Performance evaluation of investment companies has been widely studied in the literature. There are various methods that have been developed for performance evaluation of companies. Since the decision to purchase stock can include the necessary examination of several attributes, it can be thought of as amulti-criteria decision-making problem, Data Envelopment Analysis (DEA)canassist with such problems. It can be used as a tool assisting with classification of efficient and inefficient attributes for a variety of applications, when data takes one it her asubjective or empirical form. Charnes, et al, present several of these types of applications in their DEA book.

DEA is a framework well suited for performance analysis and it offers many advantages over traditional methods such as performance ratios and regression analysis. Largely the result of multi-disciplinary research during the last two decades in economics, engineering and management, DEA is best described as an effective way of visualizing and analyzing performance data. Garcia, F. A. and G. E. Shively, (2010) claim that DEA measures the efficiency of decision-making units (DMUs), typically firms. Each DMU uses one or more inputs to produce one or more outputs. The results from DEA are used to evaluate the performance of DMUs under the assumption that all inputs are equally desirable. DEA is an extreme point method and compares each DMU with the only best DMU. Chansarn, S. (2008) claimed the main advantage of DEA is that, unlike regression analysis, it doesnot require an assumption of a functional form relating inputs to outputs. Instead, it constructs the best production functions olely on the basis of observed data; hence statistical tests for significance of the parameters are not necessary.

In this study a review of DEA methodology is done and with the help of an example, the working methodology, results of DEA are explained. Section 2 deals with theoretical literature is reviewed and section 3 gives a detailed description of DEA model. Section 4 gives an illustration of DEA with the help of the data collected on a sample of Automobile and Parts Manufacturing companies andselection of inputs and outputs are described. Section 4 gives the analyzing of data is introduced and summary of findings of this empirical work. Inthelast section concluding are presented.

LITERATURE REVIEW

DEA is particularly effective in handling complex processes, where these DMUs use multiple inputs to produce multiple outputs. Technically, it represents these to non-parametric, linear programming techniques used to construct empirical production frontiers and to evaluate there lative efficiency of production units. Mansoury, A. and M. Salehi (2011) stated academics have used frontier analysis as a sophisticated way to evaluate the relative performance of production units, assessing how close the financial units are to a best practice frontier. Oliveiraet.al.,(2012) evaluated Brazilian stock market for the period 2001 to 2007 DEA-CCR modelinthecontextofapplications.Thestudyfoundsignificantresultsfortheperiodbetween2001and 2007, achieving returns about three timeshig her than those obtained by these entities when they use passive investment techniques.

Kristina V. (2005), applied the measurement of efficiency in production units and the identification of sources of their inefficiencyis a precondition to improve the performance of any productive unit in a competitive environment. Some researcher shave already been done in the field of stock market and financial institution in respect of the use of DEA to evaluate performance of companies. Berger A. and D. B. Humphrey (1997) reviewed the literature concerning the efficiency of financial institutions, including bank branches, using non-parametric (DEAandvariations) and parametric frontier analysis. For example, Zohdi M. et al, (2012) evaluated performance of Iranian companies for investingin stock exchange and the result showed, AP-DEA is an appropriate method to obtain full ranking of companies. Mansoury A. and M. Salehi, (2011) evaluated and classified Iranian banks by using DEA and graded systems based on efficiency. Alvandietal., (2013) evaluated performance of port folio firms in Iran stock exchange, with DEA approach, and the result indicated the capability of DEA approach to add value to equity port folio selection. Karimzadeh, examined the efficiency of Indian commercial banks during 2000–2010 by utilizing Data Envelopment Analysis (DEA). The results suggest that Bank of India and ICICI bank are more efficient as compare to other banks in India and result confirmed that selected Public Sector Banks are more efficient than Private sectors during the study periodin India. Recently, some models of DEA based on Malmquist index were introduced for analyzing and classification of the units with the approach of total factor productivity. For instance, Arjomandi et.al.,(2012) investigated the efficiency and productivity growth of the Iranian banking industry between 2003and2008, encompassing pre-and post-2005- reform years.

Data Envelopment Analysis

Data envelopment analysis (DEA) developd by Charnesetal, is a methodology for measuring the best relative efficiencies of a group of peer decision-making units (DMUs) that consume multiple inputs to produce multiple outputs with the most favorable input and output weights to each of the DMUs, respectively, and has found significant applications in production economics J. Xu, B. Li, D. Wu, (2009) andY. Wang, K. Chin, (2010)].AlsoL. M. ZerafatAngiz, A. Mustafa, A. Emrouznejad, (2010),have introducedDEA, asanon-parametrictechniquefor measuring there lative efficiencies of asset of decision- making units(DMUs) which consume multiple-inputs to produce multiple-outputs. Charnesetal, introduced the ratio definition of efficiency, also known astheCCRratiodefinition,whichgeneralizesthe single-outputtosingle-inputratiodefinitionusedinclassicalscienceto multipleoutputsandinputs withoutrequiringpre-assignedweights(H. Chen, 2008):

$$MAXZ_o = \frac{\sum_{r=1}^{s} u_r y_{ro}}{\sum_{i}^{m} v_i x_{io}}, \qquad \text{S.t:} \frac{\sum_{r=1}^{s} u_i y_{rj}}{\sum_{i=1}^{s} v_i x_{ij}} \leq 1, U_i \, . V_j > 0$$

One version of a CCR model aims to minimize inputs whiles atisfying atleast the given output levels. This is called the input-oriented model. Various problems, such as competitive effects, constraints, managements' weekoperations, and soon because institutions not to actin optimal scales. Therefore, Bankeretal. Extended BCC version in 1984 so that varying returns to scale (VRS) are considered (S. Borzoian S. et al., 2015). The mathematical versionis as follow:

$MAXZ_o = \frac{\sum_{r=1}^{s} u_r y_{ro} + w}{\sum_{i=1}^{m} v_i x_{io}}$, S.t: $\frac{\sum_{r=1}^{s} u_r y_{rj} + w}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1$, j=1, 2, …, n, $U_r, V_r \geq 0$, w: free in sign

Banker, R.D et al. (1984), suggested an extension of CRSDEA model to account for variable return to scale(VRS) situations. The use of theVRS specification will permit the calculation of TE devoid of these SE effects. TheCRS linear programming problem can be easily modified to account for VRS by adding the convexity constraint: $\sum \lambda_i$=1toprovide:

$$Min\ \theta \text{ S.t:} \sum_{j=1}^{n} \lambda_j x_{ij} \leq \theta x_{io}\ i = 1,2,\dots,m\ \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{ro}\ r = 1,2,\dots,s$$

$$\sum \lambda_i = 1, \qquad \lambda_j \geq 0 \quad j = 1,2,\dots,n$$

As regarded, the standard DEA models are used, usually more than one efficient DMU is obtained. For ranking efficient units in 1993, Anderson and Peterson introduced a model. It should be noted, in this paper this model is applied to efficient firms are also ranked and calculated coefficient of efficiency which is as shown below. The results will come in the analysis section.

$$Min \quad \theta \text{ S.t:} \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j x_{ij} \leq \theta x_{io}\ i = 1,2,\dots,m \quad ; \sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j y_{rj} \geq y_{ro}\ r = 1,2,\dots,s$$

$$\sum_{\substack{j=1 \\ j \neq o}}^{n} \lambda_j = 1 \quad \lambda_j \geq 0 \qquad j = 1,2,\dots,n$$

Data and Selection of Inputs and Outputs

Thisanalysis evaluates21firmsinstockmarket, which have been accepted in Indian Stock Exchange (ISE).These firms were selected based on the topof market capital in Automotive and Auto Ancillaries companies.There are 6 attributes used for this analysis. Stocks with missing data were eliminated from this analysis. Table1 illustrates the description of six attributes.

Theoutput, are considered such, because they are benefits gained from owning acertain stock. The investors would want high values for these attributes, and the inputs are al considered, because they are some thing theinvestorsmustgiveupinordertoownthatstock,i.e.highprices,highlevelsofrisk,etc. The investors would want the values of these attributes to be a slow as possible. We will consider Indian's stock market, automotive and parts manufacturing branch (21decisionmakingunits) analyse the data, evaluate efficiency, and rank the units based on minimizing the production factorsandbythewayofthe varyingreturns toscale(VRS).Theresultsofthevarying returns toscalearemorepreciseandauthentic because constant returns to scale (CRS) is operational only if institution sactin optimal point. However, institutions never actinoptimal scale in the real world because of variousproblems suchascompetitive markets, legalandjuridicalconstraints andsoon(Mansoury A., M. Salehi, 2011).Thedataanalysis in this paper is basedonthe productionfactors'input-orienting.Intheapproachofminimizingproduction factors,thesoftwarecan computethreetypesofefficiency:managementefficiency,scale efficiency,andtechnicalefficiency.

Analysis

Efficiency and Types of Returns

The efficiency in varying return to scale (VRS) is of three different types: technical, management and scale efficiency, and was presented with the types of there turns (decreasing, constant, and increasing) in the units. Table 2 represents the decision making unit efficiency and their types of return. As the table shows, 13 of the units are classified as completely efficient, and the rest of the DMU's are close to efficient and obtained high and acceptable average efficiency (94%) also, there is no inefficient units. Their inefficiency is less than 38% and these DMU's will be converted to efficient if they use their sources and increase their indices more carefully. According to the table, the average of efficiency scale, management efficiency and technical efficiency for all DMU's are: (0.772,0.944and0.731). That is, sum of the DMU's encounter scale inefficiency rate of 22.8%, management inefficiency rate of 5.6%, and technical inefficiency rate of 26.9%. With regarding to these results all of those units are inefficient, with the average coefficient of efficiency upper than %73. Finally, the (numeral) average rate of total efficiency (scale,management, andtechnical) for all units is (0.816), illustrating the all unit rather good operation concerning efficiency. Of course, all decision making units can increase its efficiency up to 18.46%, following there search strategies and suggestions and attempting to optimize the system to be completely efficient.

Peer Groups and Their Weights

For an inefficient DMU0, we define its reference set E0, based on the max-slack solution. It can be suggested that the efficiency for DMU0 can be improved if the input values are reduced radial and the input excesses recorded. Similarly efficiency can be attained if the output values are augmented by the output shortfalls (Cooper. W. W., L. M. Seiford, K. Tone, 2007). Table 3 shows the peer groups and their weights for all decision making units and specially, for inefficient units which can attain to the efficiency frontier, following the similar reference units regarding inputs and outputs. The analysis of this table is so that the references units for instance, for the unit 4 (Maruti Suzuki India Limited (BSE:532500) as an inefficient decision making unit are the units 11, 15, 6 & 1.

Ranking of Companies on the basis of Coefficients of Super-Efficiency

As mentioned earlier, DEA-CCR and DEA-BCC models are strong in identifying the inefficient units, but are weak in discriminating between the efficient units (Seiford and Zhu, 1999). These two models often rate too many units as efficient. To overcome this deficiency, we use the Super-Efficiency DEA model (Anderson and Peterson, 1993). It can give unequivocal ranking of the sample of efficient companies. Therefore, in this paper we have applied score of super efficiency estimated for selection efficient automotive and parts manufacturing branch (decision making units) in Indian's stock market.Therefore, in this section, we analyze the results after arriving at the super efficiency of coefficient for all efficient companies. This efficiency related to total outputs (Rate of return, Earning per share) and total inputs (Price to earnings ratio, Systematic risk and Standard deviation). These coefficients of super-efficiency have been analyzed by using statistical tables.

The results obtained from 13 out of 21 companies showed that the coefficients of super-efficiency are more than one. Based on the calculated average of super-efficiency coefficient(1.8404) for the 13 companies, these companies are divided two groups; the first group of companies have coefficients of super-efficiency that are higher than the average. The second group of companies has coefficients that are lower than the average super-efficiency coefficient. Automotive A. Ltd (BSE:505010) has the minimum coefficient. Amtek Auto Ltd (BSE:520077) has the maximum coefficient of super-efficiency. This result is shown in Table.4

According to the results shown in Table.5.9 on the other aspect, companies have been divided into three groups. While the first group of companies has the highest coefficient of efficiency; the third group has the lowest coefficient among the companies that efficiency coefficient of companies computed less than one.

1.The first group or Superior units: In this group of companies coefficients of efficiency are between 1.8404 and 4.5800.These companies, arranged in descending order of the coefficients are: Amtek Auto Ltd., Sundaram-Clayton Ltd., Tata Motors Limited, Bharat Forge Limited and Bosch Ltd.

2.The second group or Excellent units: In this group of companies, coefficients of super- efficiency range between 1 and 1.8404. Eight companies fell in this group. Arranged in descending order, these companies are:Amtek India Ltd., Hero MotoCorp Limited, Wabco India Limited, Wheels India Limited, Maharashtra Scooters Ltd., Mahindra & Mahindra Ltd., Bajaj Auto Limited and Sundram Fasteners Limited.

3. In the third group of companies, efficiency coefficient of companies computed less than one. These companies are inefficient which they have the lowest coefficient among the companies.

Computing Optimal Amounts of Inputs

The most important result of this paper which is based on DEA measuring version is optimal inputs or targets (a mounts of three variable inputs for the individual decision making units), are shown in table 5.

For example, concerning the MothersonSumi Systems Ltd. (BSE:517334) as a near to efficient unit, DEA method has determined (45.27) as the optimal number of P/E, (1.72) as the optimal rate of Sigma and (1.49) as the optimal rate of β. In other words, these units can reduce its inputs to this number that will be able to attain the same level of efficiency. The units (Exide Industries Ltd, Tube Investments Ltd, etc.) are similarly analysed. Organizations can follow an ascendant course and lead to more efficiency through optimal use of the extra sources.

CONCLUSION

Data envelopment analysis method is considered more significantly because it envelops all data and statistics of DMU's, it determines components of productivity and computes efficiency in three forms of management, technical and scale. AAP-DEA technique has been presented to select the most desirable securities from a list of the Mumbai stock exchange. This paper used an input-oriented DEA model to evaluate Indian's stockmarket. Inaddition we have used AP-DEA model and the variable return to scale (VRS) because constant returns to scale is operational only if institutions act in optimal level. With regarding of this analysis and assumptions, it is shown that of these 21 DMU's evaluated thirteen are found to be relatively efficient, or dominant, while other firms were found to be "inefficient". The Amtek Auto Ltd., Sundaram-Clayton Ltd., Tata Motors Limited, Bharat Forge Limited and Bosch Ltd have introduced as the most desirable firms. These units in all tables introduced as the best, efficient and the most frequent bench mark. So these firms are the stronger units among the firms.

One of the advantages of using DEA is that for the DEA-inefficient securities, information is provided disclosing how much reduction of inputs or how much augmentation is needed for these inefficient firms to become DEA-efficient. However, institutions seldomactin optimal scale in the real world because of various problems. Finally, the most important results of this paper is to use AP-DEA method in rankings and to formulate DMU's grading system based on coefficient of super efficiency, and so as we described above near to efficient units should decrease the extrasources for receiving the optimal point. Computing efficiency types and their average in the units reveal that the organization enjoys a pretty good situation concerning technical and management efficiency.

A salimitation, calculating the data from the units were some difficult. For instance, some of the DMUs hardly provided information for five years for us to calculate the average of ratio of earnings to the number of share holders or average return over the years.

For the future study we suggest that, researchers can rank and evaluate a set of companies active in stock market by the model proposed in this study using the standard DEA methods and AP-DEA model.In addition to indexes investigated here through the present study, future researchers can examine other qualitative indexes to further develop the proposed model.

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Table1: Definition ofAttribute

Attribute	Classification	Definition
Return	Output	Average return over a 1 year period in %
Average of Return	Output	Average return over a 5 year period in %
Average EPS (5 year)	Output	Average Ratio of earnings to the number of shares held
Price to earnings ratio	Input	Stock price divided by earnings per share
Beta (risk)	Input	Relationship to the rest of the market
Sigma (5 year)	Input	5-year standard deviation of returns

SourceJ. Powers, P. R. McMullen, (2000)

Table2:Efficiency andthetypes of thereturnin (VRS)

DMUs	BSE. No.	Technical Efficiency	Management Efficiency	Efficiency Scale	Efficiency average	Type of Return
Tata Motors Ltd	BSE:500570	1	1	1	1	Crs
Bajaj Auto Ltd	BSE:532977	0.448	1	0.448	0.632	Irs
Mahindra & M Ltd	BSE:500520	0.473	1	0.473	0.649	Irs
Maruti Suzuki Ltd	BSE:532500	0.871	0.94	0.926	0.912	Irs
Hero MotoCorp Ltd	BSE:500182	0.639	1	0.639	0.759	Irs
Bosch Ltd	BSE:500530	1	1	1	1	Crs
Exide Industries Ltd	BSE:500086	0.485	0.963	0.504	0.651	Irs
Motherson S. S. Ltd	BSE:517334	0.902	0.972	0.927	0.934	Irs
Bharat Forge Ltd	BSE:500493	1	1	1	1	Crs
Tube Investments Ltd	BSE:504973	0.605	0.941	0.643	0.73	Irs

Wabco India Ltd	BSE: 533023	1	1	1	1	Crs
Amtek India Ltd	BSE:532282	0.476	1	0.476	0.651	Irs
Amtek Auto Ltd	BSE:520077	1	1	1	1	Crs
TVS Motor C. Ltd	BSE:532343	0.672	0.741	0.907	0.773	Irs
Sundaram-C. Ltd	BSE:520056	1	1	1	1	Crs
Federal-Mogul G. Ltd	BSE:505744	0.614	0.921	0.667	0.734	Irs
Sundram Fasteners Ltd	BSE:500403	0.774	1	0.774	0.849	Irs
Asahi India G. Ltd	BSE:515030	0.459	0.713	0.644	0.605	Irs
Wheels India Ltd	BSE: 590073	1	1	1	1	Crs
Maharashtra S. Ltd	BSE:500266	0.482	1	0.482	0.655	Irs
Automotive A. Ltd	BSE:505010	0.447	0.644	0.694	0.595	Irs
Average		0.731	0.944	0.772		

Table3: Peer Groups and the weights for all units

firm		**peers:**				**peer weights**			
1	Tata Motors Ltd	1				1			
2	Bajaj Auto Ltd	2				1			
3	Mahindra & M Ltd	3				1			
4	Maruti Suzuki Ltd	11	15	6	1	0.076	0.029	0.227	0.668
5	Hero MotoCorp Ltd	5				1			
6	Bosch Ltd	6				1			
7	Exide Industries Ltd	1	6	5		0.294	0.125	0.581	
8	Motherson S. S. Ltd	19	6			0.709	0.291		
9	Bharat Forge Ltd	9				1			
10	Tube Investments Ltd	1	15	20	6	0.324	0.059	0.464	0.153
11	Wabco India Ltd	11				1			
12	Amtek India Ltd	12				1			
13	Amtek Auto Ltd	13				1			
14	TVS Motor C. Ltd	15	19	6		0.013	0.624	0.363	
15	Sundaram-C. Ltd	15				1			
16	Federal-Mogul G. Ltd	6	1	5		0.211	0.751	0.038	
17	Sundram Fasteners Ltd	17				1			
18	Asahi India G. Ltd	6	5	12		0.582	0.338	0.08	
19	Wheels India Ltd	19				1			
20	Maharashtra S. Ltd	20				1			
21	Automotive A. Ltd	6	3	5		0.866	0.008	0.126	

Table4:Ranking of companies based on super efficiency (AP-VRS-DEA)

No.	Name of Companies	BSE Number	Coefficient of efficiency (AP)	Ranks	Firms Status	Ranks
1	Amtek Auto Ltd	BSE:520077	4.5800	1	Superior units	1
2	Sundaram-C. Ltd	BSE:520056	3.2052	2		2
3	Tata Motors Ltd	BSE:500570	2.7938	3		3
4	Bharat Forge Ltd	BSE:500493	2.4646	4		4
5	Bosch Ltd	BSE:500530	2.1007	5		5
6	Amtek India Ltd	BSE:532282	1.2700	6	Excellent units	1
7	Hero MotoCorp Ltd	BSE:500182	1.1274	7		2
8	Wabco India Ltd	BSE: 533023	1.1213	8		3
9	Wheels India Ltd	BSE: 590073	1.0939	9		4
10	Maharashtra S. Ltd	BSE:500266	1.0757	10		5
11	Mahindra & M Ltd	BSE:500520	1.0608	11		6
12	Bajaj Auto Ltd	BSE:532977	1.0216	12		7
13	Sundram Fasteners Ltd	BSE:500403	1.0107	13		8
14	Motherson S. S. Ltd	BSE:517334	0.9721	14	Inefficient groups	1
15	Exide Industries Ltd	BSE:500086	0.9596	15		2
16	Maruti Suzuki Ltd	BSE:532500	0.9413	16		3
17	Tube Investments Ltd	BSE:504973	0.9403	17		4
18	Federal-Mogul G. Ltd	BSE:505744	0.9240	18		5
19	TVS Motor C. Ltd	BSE:532343	0.7403	19		6
20	Asahi India G. Ltd	BSE:515030	0.7117	20		7
21	Automotive A. Ltd	BSE:505010	0.6445	21		8

Table5: Input targets

No.	Name of Companies	P/E	Beta	Sigma
1	Motherson S. S. Ltd	45.27	1.72	1.49
2	Exide Industries Ltd	17.27	1.81	1.09
3	Tube Investments Ltd	13.87	1.72	1.39
4	Maruti Suzuki Ltd	12.63	2.29	1.19
5	Federal-Mogul G. Ltd	11.27	2.25	1.15
6	TVS Motor C. Ltd	43.62	1.70	1.46
7	Asahi India G. Ltd	27.66	1.46	1.15
8	Automotive A. Ltd	32.80	1.50	1.12

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RESEARCH ARTICLE

Evaluation of the Individual, Family, and Environmental Factors on People's Tendency to Drug Trafficking and Addiction

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ABSTRACT

Nowadays, drug trafficking is an international phenomenon that most communities are involved with it and in other words, this crime has abducted the international borders and caused the formation of transnational organizational bonds. Thus, this research has evaluated the causes and risk factors for drug trafficking in Shiraz city given the importance of this issue. This research was a practical study and descriptive-correlation method is used for its implementation. A researcher made questionnaire is applied in order to collect data. Researcher made questionnaire consisted of four components (the individual, family and cultural crises, and social crises), respectively. The statistical population in the research consists of all drug trafficking prisoners in Shiraz and the statistical sample has estimated158 people using Cochransampling method.Pearson and regression correlation test were used in inferential statistics to analyzedata through SPSS 16. The results showed thatall components of this research (geographical situation, cultural and family crises, social crises, mundane poverty and inability to meet the mundane needs) were effective on drug trafficking and each of these factors have different level of impact on people's tendency to drug trafficking and addiction. Thus, these factors should be considered to preventyoung people tocome to the jeopardy of trafficking in all types of drugs and attempts should be performed to solve the problems of the people in these areas. Then, it can be expected to reduce drug trafficking.

Key words: Trafficking, Drugs, Shiraz

INTRODUCTION

Today, manycommitted crimes in the world have become a trade, in whichdrug trafficking is one of the most profitable businesses. So that, when the term of trafficking is used, inevitably the listener's mind attend to thedrug traffickingmore than anything. Today, drug trafficking can be considered as a global problem that all countries are suffering the effects of those and even, it can be the century's problem and difficulty.

Drugs history and its evolutionary path and international cooperation and actions that have been taken against this phenomenon in 1909 suggest this fact that drugs make countries vulnerable and human society is seriously threatened (Mortazavi, 2003: 9).

Drug trafficking is considered as the most problematic issue for countries and it is the most profitabletrafficking for traders. The personal and social losses of this phenomenon are not covered for anybody; because a person is addicted, the society is faced with the loss of the active force and furthermore, they should tolerate them and their families' difficulties and costs of maintenance. Also, like the other organized crimes, it causes political and economic instability andcorruption in the societies (Mir Mohammad Sadeghi, 2007: 257).

"According to current estimates, five hundred billion dollars is spending annually in the world buy drugs. This amount is more than the gross domestic product (or GDP) of all countries with the exception of the seven richest countries in the world "(Mir Mohammad Sadeghi, 2007: 258).

Drugs have always existed at all times and centuries and this problem is not related to the present time. This opiate substance could capture active human's mind and body and makes them inefficient.Nevertheless, regulations are considered in the various countries to eliminate this substance and practical action to prevent youths from this substance and have some results. But, it requires more and wider attention of regional authorities and experts (Khaleghipour and YarMohammadian, 2008: 29).

Thus, although the drug problem has historical background in all countries; but addiction and drug abuse is a new phenomenon in the current era that expanding by progressing industry and countries development (Mortazavi, 2003: 14).

Trafficking and drug distribution in our country is a major problem due to its proximity to some of the drug-producing countries. Despite the heavy penalties envisaged by the law, according to the statistics, most of the prisoners were arrested in this relation.The negative effects of this issue are undeniable in our country in term of mundane and spiritual. And the necessity of familiarity with the transnational dimension of this phenomenon is dangerous and requires a comprehensive fight against it. (Mir Mohammad Sadeghi, 2007: 258).

With a quick look at some of the world's countries, it can be found that each country has applied policies and measures in the fight against drugs appropriate to the cultural, economic and political conditions, but unfortunately, the drug's root is not dried in any of the countries (Khaleghipour&YarMohammadian, 2008: 210).In this context, it should be mentioned that due to the efforts and many approaches that have been done in the Islamic Republic of Iran in the legislative policy it could not able to prevent the phenomenon of drug trafficking. Combating the phenomenon of drugs was the long-term policy with a non-policy view for 68 years before the Islamic Revolution. In this regard, about 52 adopted bylaws were approved from 1910 to 1980 due to international and internal pressure that had conflicts with each other in terms of attitude and deal with the production, distribution and consumption of drugs and was unsuccessful in preventing crime (Mortazavi, 2003: 103). One of the failure reasons for being unsuccessful in fighting against this phenomenon can be too much attention to the issue of criminal punishment and retribution. In this regard, it should be acknowledged that heavy penalties are not successful lonely in this regard; because, if it was

successful penalties such as death, life imprisonment or long prison terms and fines would reduce the number of crimes, while the reality suggests something else.

Mousaei and Garshasbi (2010) in their study titled evaluation the relationship between unemployment and drug trafficking in Iran concluded that there is a positive relationship between unemployment rate and drug trafficking and also there is a positive relationship between monthly household expenditure and the proportion of urbanism with drug trafficking and there is a negative relationship between monthly household expenditure and divorce rate with drug trafficking and unemployment in addition to impose expenses such as the cost of unemployment insurance and costs related to a reduction in workforce skills and expertise and other direct and indirect costs on the societyinclude other costs as well and this is increasing in crimes such as drug trafficking which would have devastating consequences for the society.

Kalantari et al. (2010) in their study titled the effect of wireless informal settlement area in the formation of spatial patterns of drug crime in Zanjan cityexpressed that formation and expansion of unusual settlements with undesirable physical, economic and social characteristics were the consequences of urban growth in this city. Wireless informal settlement area was one of the large areas of informal settlements in this city which is formed and expanded by indiscriminate and uncontrolled migration. This is faced with a lot of physical problems and deficiencies. These physical characteristics along with demographic and social characteristics caused that this area is the focus of a considerable amount of crime in Zanjan. This research was conducted with the aim of evaluating the effects of wireless informal settlements in data of crime patterns in Zanjan and explain the risk factors of crime in this area. The research method of this study is analytic and comparative. The mean center test, standard deviation ellipses, clustering test, the nearest neighbor index and Kernel density estimation were used in order to analyze the spatial patterns of crime. The statistical population of this study was drug trafficking crimes in a one year period in Zanjan.

YavariOfoghi et al (2010) in their study titled "determining the impact of drug trafficking on the national security of the Islamic Republic of Iran" expressed the effects of drug trafficking on the political, economic, social and national security. The results of this research reflect this fact that there is a relationship between drug trafficking and national security. This issue becomes obvious by affecting economic security by increasing security-justice costs and preventing the development of human resources and increasing the crimes in the social dimension and distorting the political and the political credibility of the region in the political dimension.

Therefore, as some have imagined thatsocial and criminal punishment therapy should not be considered as the treatment of social pain. It should be believed that “punishment does not correct the criminal, but also it makes hatred in his heart and makes him a serious enemy to society. Thus, punishment is encouragement to repeat the offense (Keynia, 2007:35). Thus, it is obvious that prevention of the disease is much easier than treating it.Especially in the fight against drug trafficking needs a lot of costs. Thus, it seems that it should not rely just on the low-impact weapons and sometimes ineffective punishment or penalty to prevent and combat crime and criminals, but also the causes of the crime must be identified to avoid this criminal phenomenon, so that crimes be reduced after removing them.

Therefore, it must be acknowledged that approaches can be conducted for prevention and reduction of crime by evaluating and identifying crime factors. "Obviously, precise information on the extent and forms of crime and its causesmake decisions easy for controlling it and this provide the possibility to implement the crimes by identifying the quantity and quality of delinquency (NajafiTavana, 2010:99). Thus, to have a proper, efficient and comprehensive encounter to the drug problem, basic and scientific fight should be done along with other measures carried out by the police and judicial systems (Shambayati, 2010:155). Thus, by researching in this area, the crime factors in this area and their effects can be realized and solutions can be acted with recognition of these factors to eliminate or reduce these crimes.

RESEARCH METHODOLOGY

This research was a practical study and a descriptive-correlation method is used for its implementation. A researcher made questionnaire is applied in order to collect data. Researcher made questionnaire consisted of four components (the individual, family and cultural crises, and social crises), respectively. The statistical population in the research consists of all drug trafficking prisoners in Shiraz and the statistical sample was estimated158 people using Cochransampling method.Pearson and regression correlation test were used in inferential statistics to analyzedata through SPSS 17.

Research hypotheses:

1. There is a relationship between the education level of drug traffickers and commitmentto drug trafficking.
2. There is a relationship betweengeographical situation and tendency to drug trafficking.
3. There is a relationship betweencultural and family crises and tendency to drug trafficking.
4. There is a relationship between social crises and tendency to drug trafficking.
5. There is a relationship between mundanepoverty and inability to meet the mundane need in legitimate ways and tendency to drug trafficking.

RESEARCH FINDINGS

1. Is there a relationship between drug traffickers' education and commitmentto drug trafficking?

According to the information in the following table, there is a relationship between commitmentto drug trafficking and education level of committers.

The data in Table (1) shows that most of the drug offenders have diploma and below. Based on these data 5.06percent were illiterate, 16.45 percent had elementary, 26.58 percent had cycle, 27.84 percent had Diploma, 11.39 percent had Associate Degree, and 12.68 percent had Bachelor degree. Thus, according to the obtained data there is a relationship between drug traffickers' education and commitment to drug trafficking. That means that whatever the people's education be higher than diploma and Bachelor, drug trafficking crime rate decreases and whatever the people's education be lower than diploma and below drug trafficking crime rate increases.

The results of table about second hypothesis shows that the amount of significance level (p-value) is equal to 0.000 and as this amount is lower than 0.01, the correlation between these two variables is significant. In other words, there is a relationship betweengeographical situation and tendency to drug trafficking. The amount of this relationship for 158 data is equal to 0.385 that indicates there is a correlation between the two variables.

Also amount of significance level for third hypothesis (p-value) is equal to 0.000 and as this amount is lower than 0.01, the correlation between these two variables is significant. In other words, there is a significant correlation between cultural and family crises and tendency to drug trafficking. The amount of this relationship for 158 data is equal to 0.271 that indicates there is a correlation between the two variables.

Amount of significance level for fourth hypothesis (p-value) is equal to 0.002 and as this amount is lower than 0.01, the correlation between these two variables is significant. In other words, there is a significant correlation between social crises and tendency to drug trafficking. The amount of this relationship for 158 data is equal to 0.204 that indicates there is a correlation between the two variables.

The results of correlation test for fifth hypothesis also shows that the amount of significance level (p-value) is equal to 0.000 and as this amount is lower than 0.01, the correlation between these two variables is significant. In other words, there is a significant correlation between mundanepoverty and inability to meet the mundane need in legitimate ways and tendency to drug trafficking. The amount of this relationship for 158 data is equal to 0.259 that indicates there is a correlation between the two variables.

CONCLUSION

Today we are witnessing the fact that the more time passes the 21st century,psychosocial-social problems and injuries widely arise in the societies in various forms in socio-economic and political structures.Drug trafficking is one of the most problematic factors that have a largely overlapping with other social pathologies and day to day its complexity is adding and makes ways hard to tackle. Therefore, it seems that given the social nature of the anomalous phenomena and considering that these phenomena are forming in a defective structure, identification, and assessment and planning to fight it has a special importance.

There is an adverse relationship between drug traffickers' education and commitment to drug trafficking. That means that whatever the people's education be higher than diploma and bachelor, drug trafficking crime rate decreases and whatever the people's education be lower than diploma and below drug trafficking crime rate increases.

Based on the research, 89.87% of drug offenders had delinquent fathers and 10.13% did not have the criminal record.These data suggest that the behavior of fathers in families is effective in children delinquency.But the delinquency of mothers did not have an effect on children delinquency (drug trafficking).

Also by increasing the value of geographical situation, the predicted value of the dependent variable(the tendency of the drug trafficking) increases. This means that by changing one unit in geographical situation variable, tends to drug trafficking (0.515) increases and the coefficient of determination is equal to 14.82%. This shows that 14.82 percent of changes in the tendency to drug trafficking in prisoners of Shirazis justifiable through geographical situation by a linear relationship.This result means that the geographical situation is one of the issues that makes the tendency to drug trafficking and whatever the geographical situation get worthier, the tendency to drug trafficking increases. The results of this study are consistent with the research results of Kalantariet al. (2010).

By increasing the independent variable of cultural and family crisis, the predicted value of the dependent variable(the tendency of the drug trafficking) increases. This means that by changing one unit in cultural and family crisis variable, tends to drug trafficking (0.515) increases and the coefficient of determination is equal to 7.34 percent which shows that 7.34 percent of changes in tendency to drug trafficking in prisoners of Shirazis justifiable through cultural and family crisis by a linear relationship.This result means that cultural and family crisis is one of the issues that makes the tendency to drug trafficking and whatever the cultural and family crisis get worthier, the tendency to drug trafficking increases. The results of this study are consistent with the research results of LashgarBeygi (1997), Saadatmand (1996).

Alsoby increasing the social crises, the tendency to drug trafficking increases. This means that by changing one unit in social crisis variable, tends to drug trafficking (0.204) increases and the coefficient of determination is equal to 4.16 percent which shows that 4.16 percent of changes in tendency to drug trafficking in prisoners of Shirazis justifiable through social crisis by a linear relationship. Thus, social crisis is one of the issues that makes the tendency to drug trafficking and whatever the social crises get worthier, the tendency to drug trafficking increases. The results of this study are consistent with the research results of Kothari (2001).

By increasing the mundanepoverty and inability to meet the mundane need in legitimate ways, the tendency to drug trafficking increases. This means that by changing one unit in mundanepoverty and inability to meet the mundane need in legitimate ways variable, tends to drug trafficking (0.189) increases and the coefficient of determination is equal to 6.70 percent which shows that 6.70 percent of changes in tendency to drug trafficking in prisoners of Shirazis justifiable through mundanepoverty and inability to meet the mundane need in legitimate ways by a linear relationship. Thus, mundanepoverty and inability to meet the mundane need in legitimate ways is one of the issues that makes tendency to drug trafficking and whatever the mundanepoverty and inability to meet the mundane need in legitimate ways get worthier, the tendency to drug trafficking increases. The results of this study are consistent with the research results of Mousaei and Garshasbi (2010).

Thus, the research result indicates thatall components of this research (geographical situation, cultural and family crises, social crises, mundane poverty and inability to meet the mundane needs) are effective on drug trafficking and each of these factors had different level of impact on people's tendency to drug trafficking. Thus, the above factors should be considered to preventyoung people to come to the jeopardy of trafficking in all types of drugs and attempts should be performed to solve the problems of the people in these areas. Then, it can be expected to reduce drug trafficking.

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Table 1. There is a relationship between commitmentto drug trafficking and education level of committers

Education	Sample size	Percentage
Illiterate	8	5.06
Elementary	26	16.45
Cycle	42	26.58
Diploma	44	27.84
Associate Degree	18	11.39
Bachelor	20	12.68
Higher than Bachelor	0	0
Total	158	100

Table 2. The results of the Pearson correlation test for research hypothesis

Hypothesis	Dependent Variable	Independent Variable	α	N	Sig	R	R^2
2	geographical situation	tendency to drug trafficking	0.01	158	0.00	0.385	14.82
3	cultural and family crises	tendency to drug trafficking	0.01	158	0.00	0.271	7.34
4	social crises	tendency to drug trafficking	0.01	158	0.00	0.204	4.16
5	mundanepoverty	tendency to drug trafficking	0.01	158	0.00	0.259	6.7

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RESEARCH ARTICLE

Thermal Analysis of Nonlinearly Porous Fin with Temperature-Dependent Heat Generationby using Analytical Approach

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ABSTRACT

In this study, the aim of this paper is to obtain the approximate analytical solution of a temperature distribution in a porous fin with temperature-dependent heat generation by using HAM, HPM and CM. The obtained result from CM, HPM and HAMis compared with boundary value problem (BVP) as a numerical method for validation. The Maxwell equations have been used, and Roseland approximation for radiation heat transfer and Darcy model for simulating the flow in porous medium have been adapted. The results demonstrate reasonable agreement with those provided by other numerical methods and good accuracy of the obtained analytical solutions.

Key words: Collocation Method,Homotpy Analysis Method,Homotopy Perturbation Method,Porous fin, Temperature-dependent heat generation

INTRODUCTION

Fins are frequently used in many heat transfer applications to improve performance. In the other hand, for many years, High rate of heat transfer with reduced size and cost of fins are main targets for a number of engineering applications such as heat exchangers, economizers, super heaters, conventional furnaces, gas turbines, etc. Some engineering applications such as airplane and motorcycle also require lighter fin with higher rate of heat transfer. Increasing the heat transfer mainly depend on heat transfer coefficient (h), surface area available and the temperature difference between surface and surrounding fluid. However, this requirement is often justified by the high cost of the high-thermal-conductivity metals, that cost of high thermal conductivity metals is also high.Fin is porous to allow the

flow of infiltrate through it.Extensive research has been done in this area and many referencesare available especially for heat transfer in porous fins.The concept of using porous fins in heat transfer applications with introducing the Darcy model is firstly introduced by Kiwan et al. [1, 2]. Nonlinear problems and phenomena play an important role in applied mathematics, physics, engineering and other branches of science specially some heat transfer equations. Except for a limited number of these problems, most of them do not have precise analytical solutions.Therefore, these nonlinear equations should be solved using approximation methods. Perturbation techniques are too strongly dependent upon the so-called ‘‘small parameters’’ [3]. Other many different methods have introduced to solve nonlinear equation such as Adomian’s decomposition method [4], Homotopy Perturbation Method (HPM) [5–9] and Variational Iteration Method (VIM) [10–12]. Homotopy analysis method is another technique, which was introduced by Liao [13-15]. This method has been successfully applied to solve many types of nonlinear problem [16-20] and Collocation Method (CM)[21-23].

In this work, we have appliedCM, HPM and HAM to find the approximate solutions of nonlinear differential equations governing on porous fin.Results demonstrate that CM, HPM and HAM are simple and accuracy compared with the BVP as a numerical method. Also,it is found that this method ispowerful mathematical tools and that they can be applied to a large class of linear and nonlinear problems arising in different fields of science and engineering.

Problem and statement

As shown in Fig. 1, a rectangular fin profile is considered. The dimensions of the fin are length L , width W and thickness t . The cross section area of the fin is constant. This fin is porous to allow the flow of infiltrate through it [24]. For the sake of simplify of the solution. The following assumptions are made to solve this problem.

The porous medium is homogeneous, isotropic, and saturated with a single-phase fluid. Both the fluid and the solid matrices have constant physical properties except the density in the buoyancy term where Boussenesq approximation is used. The temperature inside the fin is only a function of x . The interactions between the porous medium and the clear fluid can be simulated by the Darcy formulation. In order to reduce the complexity of the problem of radiative heat flux, the porous medium is assumed to behave as an optically thick gasNow applying energy balance equation at steady state condition[24, 25]to the slice segment of the fin of thickness ΔX

$$q(x)-q(x+\Delta x)+q^{*}A\,\Delta x=\dot{m}\,c_p\left(T-T_\infty\right)+h\,p\,\Delta x\left(1-\phi\right)\left(T-T_\infty\right)$$
$$+\sigma\,\varepsilon\,(p\,\Delta x)(T^4-\frac{\alpha}{\varepsilon}T_\infty^4) \qquad 1)$$

The mass flow rate of the fluid passing through the porous material can be written as:

$$\dot{m}=\rho\,\overline{\vartheta_w}\,\Delta x w \qquad 2($$

The value of $\bar{\vartheta}_w$ should be estimated from the consideration of the flow in the porous medium. From the Darcy’s model we have:

$$\overline{\vartheta_w}=\frac{g\,k\beta}{\upsilon}\left[T(x)\text{-}T_\infty\right] \qquad 3($$

The energy flux vector of combined radiation and conduction at the base of the fin can be expressed as

$$q_{fin\ base} = q_{conduction} + q_{radiation}\ , \tag{4}$$

Where the conduction term can be expressed, using Fourier's law of conduction, as

$$q_{conduction} = -k_{eff}\ A_b \frac{dT}{dx}\ , \tag{5}$$

Where k_{eff} is the effective thermal conductivity of the porous fin that can be obtained

$$k_{eff} = \phi.k_f + (1-\phi).k_s \tag{6}$$

From following equation and the radiation heat flux term is expressed, based on the Rosseland diffusion approximation proposed, as

$$q_{radiation} = -\frac{4\sigma_{st}}{3\beta_R}\frac{dT^4}{dx} \tag{7}$$

Also, by assuming that heat generation in the fin varies with temperature as Eq.(9) [16]:

$$q^* = q^*_\infty \left[1+\xi\left(T-T_\infty\right)\right] \tag{8}$$

Substitution of Eqs.(2) to (8) into Eq. (1) gives

$$\frac{d}{dx}\left[\frac{dT}{dx}+\frac{16\sigma T_\infty^4}{3\beta_R\, k_{eff}}\frac{dT}{dx}\right]+q^*_\infty\left[1+\xi\left(T-T_\infty\right)\right]=\frac{\rho c_p g K\beta}{\upsilon b\, k_{eff}}(T-T_\infty)^2+\frac{h\,p(1-\phi)}{k_{eff}A}(T-T$$
$$+\frac{\sigma\,\varepsilon\,p}{k_{eff}A}(T^4-T_\infty^4) \tag{9}$$

In the situation where the temperature differences within the flow are assumed to be sufficiently small, then the term T^4 may be expressed as a linear function of temperature

$$T^4 = T_\infty^4 + 4T_\infty^3(T-T_\infty)+6T_\infty^2(T-T_\infty)^2+\ldots \cong 4T_\infty^3 T - 3T_\infty^4 \tag{10}$$

Using some simplifications and introducing the following dimensionless parameters:

$$\theta=\frac{(T-T_\infty)}{(T_b-T_\infty)},\quad X=\frac{x}{l},\quad \varepsilon_G=\xi(T_b-T_\infty),\quad Da=\frac{K}{b^2},$$
$$G=\frac{q^*_\infty}{h\,p(T-T_\infty)},\quad S_h=\frac{Ra\,Da}{k_r}\left(\frac{b}{L}\right)^2,\quad R=\frac{4\sigma T_\infty^3 p\varepsilon^{\,2}}{k_{eff}A} \qquad (11)$$
$$\varepsilon_G=\xi(T_b-T_\infty),\quad M=\frac{hp(1-\phi)}{k_{eff}A},\quad k_r=\frac{k_{eff}}{k_f},\quad Rd=\frac{4\sigma T_\infty^3}{3\beta_R k_{eff}}$$

By substituting them into Eq. (9) and using Eq. (11) yields

$$\frac{d^2\theta}{dX^2}+4Rd\frac{d^2\theta}{dX^2}+G\left(1+\varepsilon\,\theta(X)\right)-S_h\theta^2+\left(Nc+Nr\right)\theta=0 \qquad (12)$$

Where Sh is porous parameter, Nc is a convection–conduction parameter, Nr is a Surface-ambient radiation parameter, G is a generation number, e is a internal heat generation parameter and Rd is a Radiation–conduction parameter. The above equation is a second-order nonlinear ordinary differential equation which is subject tothe boundary conditions:

$$\theta(1)=1\quad,\quad \theta'(0)=0 \qquad (13)$$

Application of analytical solutions

Principles of collocation method

Suppose we have a differential operator D acting on a function u to produce a function p [22,23]:

$$D(u(x))=p(x) \qquad (14)$$

We wish to approximate u by a function $\tilde{u}$, which is a linear combination of basic functions chosen from a linearly independent set. That is:

$$u\cong\tilde{u}=\sum_{i=1}^{n}C_i\varphi_i \qquad (15)$$

Now, when substituted into the differential operator, D, the result of the operations is not, in general, $p(x)$. Hence an error or residual will exist:

$$E(x)=R(x)=D(\tilde{u}(x))-p(x)\neq 0$$

16)

The notion in the collocation is to force the residual to zero in some average sense over the domain. That is:

$$\int_x R(x)\, W_i(x) = 0 \qquad i = 1, 2, \ldots, n \tag{17}$$

Where the number of weight functions W_i are exactly equal the number of unknown constants C_i in $\tilde{u}$. The result is a set of n algebraic equations for the unknown constants C_i. For collocation method, the weighting functions are taken from the family of Dirac δ functions in the domain. That is, $W_i(x) = \delta(x - x_i)$. The Dirac δ function has the property that:

$$\delta(x - x_i) = \begin{cases} 1 & if\ x = x_i \\ 0 & Otherwise \end{cases} \tag{18}$$

And residual function in Eq.(26)must force to be zero at specific points.

Application

Consider the trial function as:

$$\theta(X) = 1 + C_1\left(1 - X^2\right) + C_2\left(1 - X^3\right) + C_3\left(1 - X^4\right) + C_4\left(1 - X^5\right) + c_5\left(1 - X^6\right) + c_6\left(1 - X^7\right) + c_7\left(1 - X^8\right) + c_8\left(1 - X^9\right) \tag{19}$$

Witch satisfies the boundary condition in Eq.(13)and set it into Eq.(12), residual function, $R(c_1, c_2, x)$, is found as:

$$\begin{aligned} R(X) = {} & -2Shc_6 - 2Shc_7 - 2Shc_8 - Shc_1^2 + Shc_2^2 - Shc_4^2 + 2Shc_2X^3c_8 - Shc_5^2 - Shc_6^2 \\ & + 2Shc_3X^4c_4 - 2Shc_3X^9c_4 - 2Shc_6X^{16}c_8 + 2Sh\,c_7\,c_8X^9 + 2Sh\,c_7X^8c_8 - 2Sh\,c_7X^{17}c_8 \\ & - Nc - Nr - 288\,Rd\,c_8\,X^7 - 24\,Rdc_2\,X - 120Rdc_5X^4 - 168Rd\,c_6\,X^5 - 48Rd\,c_3X^2 \\ & - 80Rdc_4X^3 + \ldots - Shc_8^2 - Ncc_1 - 224Rdc_7X^6 + 2Shc_2^2X^3 - 2Shc_2c_3 - Sh = 0 \end{aligned} \tag{20}$$

On the other hands, the residual function must be close to zero. For reaching this importance, two specific points in the domain $t \in [0,1]$ should be chosen. These points are:

$$R\left(\frac{1}{9}\right)=0,\quad R\left(\frac{2}{9}\right)=0,\quad R\left(\frac{3}{9}\right)=0,\quad R\left(\frac{4}{9}\right)=0,\quad R\left(\frac{5}{9}\right)=0,\quad R\left(\frac{6}{9}\right)=0,\quad R\left(\frac{7}{9}\right)=0,$$
$$R\left(\frac{8}{9}\right)=0, \qquad 21)$$

Finally by substitutions these points into the residual function, $R(c_i, x)$, a set of four equations and four unknown coefficients are obtained. After solving these unknown parameters (c_i), the temperature distribution equation will be determined. Using collocation method, the temperature formulation is as follows:For example when Rd =0 .6,Sh=0.4, G=0.2,ε =0 .5 , Nc =0 .3, Nr =0 .1:

$$\theta(X)=0.9585116350+0.04067625305X^2+1.35004630810^{-8}X^3+0.0008008006002X^4$$
$$+1.44942267010^{-7}X^5+0.00001087415083X^6+2.20376435910^{-7}X^7+2.69038816710^{-8}X^8$$
$$+3.15294794310^{-8}X^9 \qquad 22)$$

Application of homotopy perturbation method

In this section, we employ HPM to solve Eq. (2) subject to boundary conditions Eq.(3).We can construct Homotopy function of Eq. (2) as described in [7]:

$$H(\theta,\ p)=(1-P)\left[\theta''(X)-\theta(X)-g_0(X)\right]$$
$$+\ p\left[\theta''(X)+4Rd\,\theta''(X)-S_h\theta''(X)^2+G\left(1+\varepsilon\theta(X)\right)+(Nc+Nr)\theta(X)\right]=0, \qquad 23)$$

Where $p\in[0,1]$ is an embedding parameter. For $p=0$ and $p=1$ we have:

$$\theta(X,0)=\theta_0(X) \qquad , \qquad \theta(X,1)=\theta(X) \qquad 24)$$

Note that when p increases from 0 to 1, $\theta(X;p)$ varies from $\theta_0(X)$ to $\theta(X)$ .By substituting:

$$\theta(X)=\theta_0(X)+p\,\theta_1(X)+p^2\theta_2(X)+\cdots=\sum_{i=0}^{n}p^i\,\theta_i(X) \quad , \quad g_0=0 \qquad 25)$$

Into Eq. (33) and rearranging the result based on powers of p-terms, we have:

$$P^0:\quad (1+4Rd)\,\theta_0''(X)=0$$
$$\theta_0(1)=1,\quad \theta_0'(0)=0 \qquad 26)$$

$$P^1: \quad \theta_1''(X) - Sh\,\theta_0(X)^2 - Nr\theta_0(X) - Nc\,\theta_0(X) + 4Rd\,\theta_1''(X) + G + G\varepsilon\,\theta_0(X) = 0$$
$$\theta_1(1) = 0, \quad \theta_1'(0) = 0 \tag{27}$$

$$p^2: \quad 4Rd\,\theta_2''(X) - Nr\theta_1(X) - Nc\theta_1(X) + \theta_2''(X) - 2Sh\theta_0(X)\theta_1(X) + G\varepsilon\theta_1(X) = 0$$
$$\theta_2(1) = 0, \quad \theta_2'(0) = 0 \tag{28}$$

Solving Esq. (26) – (28) with boundary conditions, we have:

$$\theta_0(X) = 1 \tag{29}$$

$$\theta_1(X) = \frac{1}{2}\frac{(-G + Nc + Nr + Sh - G\varepsilon)X^2}{1+4Rd} + \frac{1}{2}\frac{G - Nc - Nr - Sh + G\varepsilon}{1+4Rd}, \tag{30}$$

$$\theta_2(X) = \frac{1}{2}\frac{(G - Nc - Nr - Sh + G\varepsilon)(-Nc - Nr - 2Sh + G\varepsilon)}{(1+4Rd)^2}\left(\frac{1}{12}x^4 - \frac{1}{2}x^2\right)$$
$$+\frac{5}{24(1+8Rd+16Rd^2)}\left[G^2\varepsilon^2 + 3ShNr - 2NcG\varepsilon - NcG + 2NcNr - 2G\varepsilon Nr\right. \tag{31}$$
$$\left. +G^2\varepsilon + 2Sh^2 - 3G\varepsilon Sh - 2ShG + Nr^2 - NrG + Nc^2 + 3NcSh\right]$$
$$\vdots$$

The solution of this equation, when $p \to 1$, will be as follows:

$$\theta(X) = \sum_{i=0}^{N} \underset{p\to 1}{Lim}\; p^i\,\theta_i(X) \tag{32}$$

Homotopy analysis method (HAM)

For HAM solutions, we choose the initial guess and auxiliary linear operator in the following form:

$$\theta_0(x) = 1, \tag{33}$$

$$L(\theta) = \theta'', \tag{34}$$
$$L(c_1 x + c_2) = 0, \tag{35}$$

Where $c_i (i=1,2)$ are constants. Let $P \in [0,1]$ denotes the embedding parameter and $\hbar$ indicates non –zero auxiliary parameters. We then construct the following equations:

Zeroth –order deformation equations

$$(1-P)L[\theta(x,p)-\theta_0(x)] = p\hbar H(x)N[\theta(x,p)] \quad (36)$$

$$\theta(0;p)=1; \qquad \theta'(1;p)=0 \quad (37)$$

For $p=0$ and $p=1$ we have:

$$\theta(x;0)=\theta_0(x) \qquad \theta(x;1)=\theta(x) \quad (38)$$

When p increases from 0 to 1 then $\theta(x;p)$ varies from $\theta_0(x)$ to $\theta(x)$. By Taylor's theorem and using Eqs. (38) $\theta(x;p)$ can be expanded in a power series of p as follows:

$$\theta(x;p)=\theta_0(x)+\sum_{m-1}^{\infty}\theta_m(x)p^m \quad , \quad \theta_m(x)=\frac{1}{m!}\frac{\partial^m(\theta(x;p))}{\partial p^m}\Big|_{p=0} \quad (39)$$

In which $\hbar$ is chosen in such a way that this series is convergent at $p=1$, therefore we have through Eq. (39) that,

$$\theta(x)=\theta_0(x)+\sum_{m-1}^{\infty}\theta_m(x), \quad (40)$$

mth –order deformation equations

$$L\left[\theta_n(x)-\chi_n\,\theta_{n-1}(x)\right]=\hbar\,H(x)R_n(x) \quad (41)$$

$$\theta(0;p)=0; \qquad \theta'(1;p)=0 \quad (42)$$

Where

$$R_n(X)=(1+4Rd)\,\theta''_{m'-1}+G\left(1+\varepsilon\;\theta_{m'-1}\right)-(Nc+Nr)\;\theta_{m'-1}-\sum_{k=0}^{m'-1}\left[Sh\;\theta_{m'-1-k}\;\theta_k\right] \quad (43)$$

Now we determine the convergency of the result, the differential equation, and the auxiliary function according to the solution expression. So let us assume:

$$H(x)=1 \quad (34)$$

We have found the answer by maple analytic solution device. For three deformation of the solution are presented below

$$\theta_1(\mathrm{X})=\frac{1}{2}\hbar\left(-Sh+G(1+\varepsilon)-Nc-Nr\right)X^2+\frac{1}{2}\hbar Sh-\frac{1}{2}\hbar G-\frac{1}{2}\hbar G\,\varepsilon+\frac{1}{2}\hbar\ Nc+\frac{1}{2}\hbar\ Nr \quad (35)$$

The solutions $\theta(X)$ were too long to be mentioned here, therefore, they are shown graphically

Convergence of the HAM solution

We have the freedom to choose the values of the auxiliary parameters $\hbar$. This parameter provides a simple way to adjust and control the convergence region and as well as the rate of convergence of the series solution, as shown by Liao [13-15]. By plotting the curves of $\theta'(1)$ versus $\hbar$, it is possible to choose the proper values of $\hbar$ so as to ensure that the series solution converges. A sample of these calculations is shown in Figs. (2) and (3). The flat regions of the curves establish the convergence region of the auxiliary parameter.

RESULTS AND DISCUSSION

In this study, the heat transfer investigation of a rectangular porous fin with temperature-dependent heat generation is considered using analytical methods. CM, HPM and HAMare used for solving the current problem. The effects of porosity parameter Sh, convection–conduction parameter Nc, Surface- ambient radiation parameter Nr and internal heat generation parameter e are investigated on the heat transfer.

To validate the analytical results, the temperature distribution through porous fin is compared with the numerical solution. The numerical solution is performed using the algebra packageMaple 17.0, to solve the present case. The package uses a fourth–fifth order Runge– Kutta–Fehlberg procedure for solving nonlinear B–V problems. The algorithm is proved to be precise and accurate in solving a wide range of mathematical and engineering problems especially heat transfer cases [26]. It can be seen from Fig. 4 and 5 and Table 1 that the results show high accuracy in comparison among present analytical and numerical solution.

This study is completed by depicting the effects of the porosity parameter, convection–conduction parameter; Surface- ambient radiation parameter and internal heat generation parameter are investigated on the temperature gradient distribution from an insulated tip fin. As can be seen clearly in figures 6-9, by increasing the porosity parameter, convection–conduction parameter; Surface- ambient radiation parameter and decreasing internal heat generation parameters, the local gradient temperature of insulated tip fin is increasing.

CONCLUSION

In this paper, two methods are applied to derive approximate analytical solution of Porous Fin to a Vertical Isothermal Surface which is called Collocation Method and Homotopy Analysis Method. These methods enable to convert a difficult problem into a simple problem which can easily be solved. Besides, HAM, HPM and CM does not require small parameters, thus the limitations of the traditional perturbation methods can be eliminated, and the calculations are also simple and straightforward. Also, temperature profiles were obtained as a function of X, and various values of physical parameters. In comparison with forth-order runge-kutta method which is powerful numerical solution, the results demonstrate that these methods are very convenient for solving nonlinear equations. Finally, it has been attempted to show the capabilities and wide-range applications of the CM, HPM and HAM in comparison with the numerical solution of problem.

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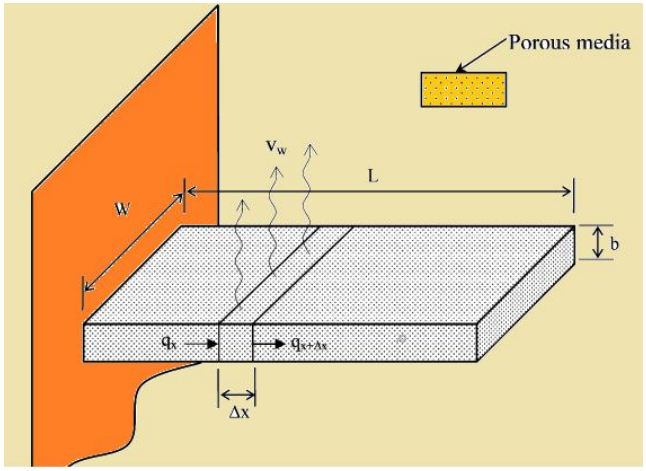

Figure1. Schematic diagram for the problem under consideration

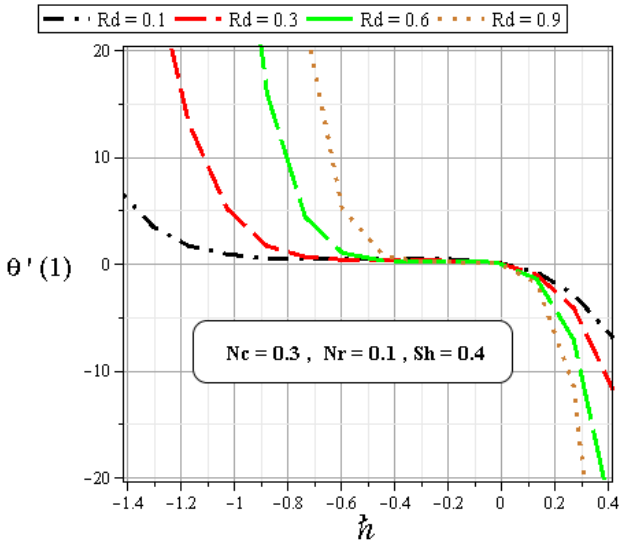

Figure 2.The $\hbar$ - validity for $X = 1$ and different value of Rd .

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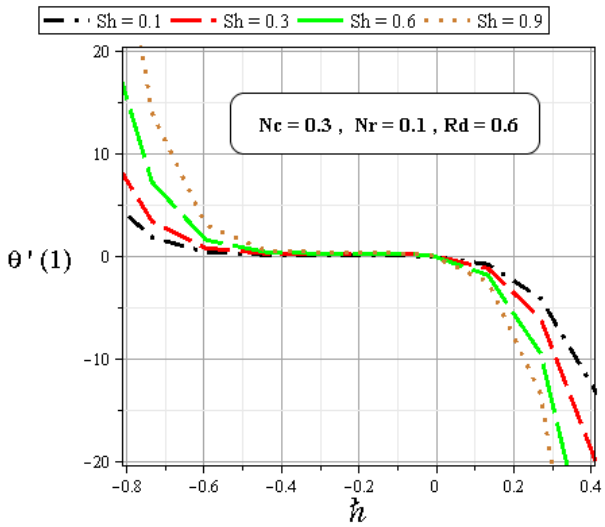

Figure 3.The $\hbar$ - validity for $X = 1$ and different value of Sh .

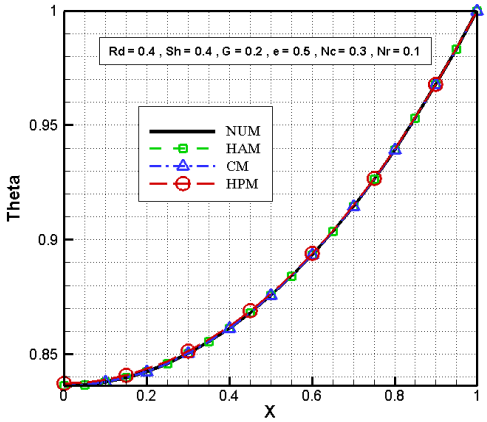

Figure 4.Temperature validation among CM, HPM, HAM and numerical methods

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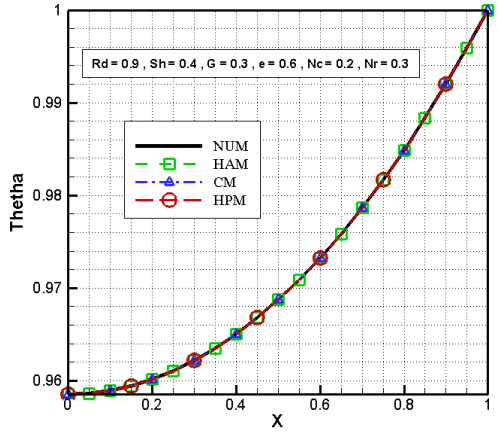

Figure 5.Temperature validation among CM, HPM, HAM and numerical methods

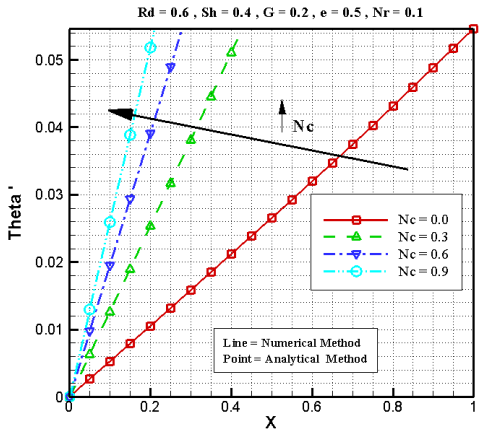

Figure 6.Temperature distribution versus convection–conduction parameter Nc variation

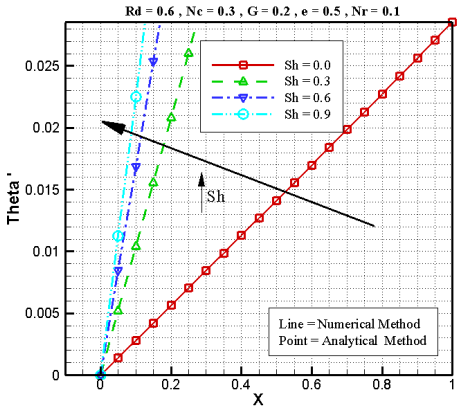

Figure 7.Temperature distribution versus radiation parameter Nr variation

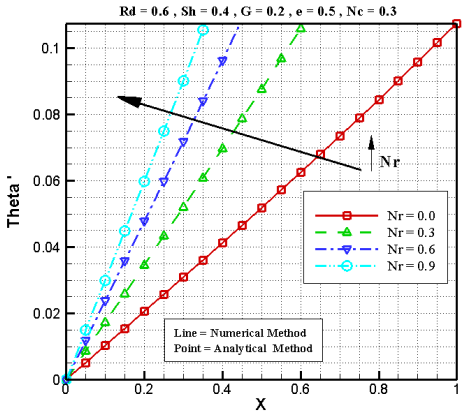

Figure 8.Temperature distribution versus porousity parameter Sh variation

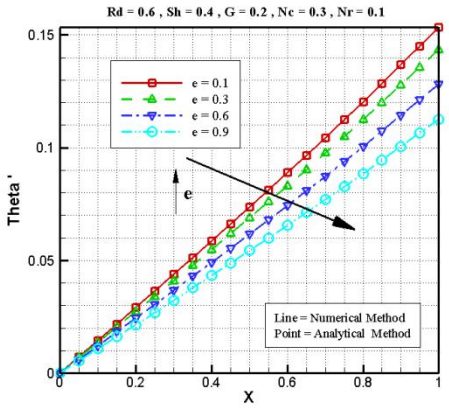

Figure 9.Distribution versus temperature dependent internal heat generation parameter

Table1:The results of HAM, HPM, CM and Numerical methods for $\theta(X)$ for $Rd = 0.6, Sh = 0.4, G = 0, Nc = 0.3$, $Nr = 0.1$

X	HAM	CM	HPM	NUM	Error of HAM	Error of CM	Error of HPM
0.00	0.897079121	0.89707909	0.897077821	0.897079127	5.90E-09	3.62000E-08	1.3053E-06
0.10	0.898080472	0.898080441	0.898079189	0.898080471	1.00E-09	2.94474E-08	1.2819E-06
0.20	0.901087819	0.901087788	0.901086585	0.901087821	2.00E-09	3.28237E-08	1.2361E-06
0.30	0.906111073	0.906111042	0.906109919	0.906111076	2.40E-09	3.36356E-08	1.1569E-06
0.40	0.913166834	0.913166802	0.913165787	0.913166833	1.00E-09	3.06023E-08	1.0456E-06
0.50	0.922278518	0.922278486	0.922277604	0.922278514	4.20E-09	2.74392E-08	9.0967E-07
0.60	0.93347654	0.933476509	0.93347578	0.933476535	5.30E-09	2.54704E-08	7.5445E-07
0.70	0.946798546	0.946798518	0.946797958	0.946798537	8.60E-09	1.96598E-08	5.7939E-07
0.80	0.962289706	0.962289683	0.962289304	0.962289701	5.50E-09	1.78223E-08	3.9685E-07
0.90	0.980003073	0.980003058	0.980002867	0.980003079	6.20E-09	2.07769E-08	2.1193E-07
1.00	1.000000000	1.000000000	1.000000000	1.000000000	0.000000	0.000000000	0.00000000

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RESEARCH ARTICLE

Studying the Competency of Court of Administrative Justice Jurisdiction Based on Passed Act in 2013

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ABSTRACT

Court of Administrative Justiceis the highest authority to investigate the administrative proceedings.Information on eligibility of Court of Administrative Justiceand identifying persons who can claim in this judicial body is one of the fundamental problems in preventing the violation of individual rights and how to restore it. Approving new law of Court of Administrative Justice organization and procedurepassed in 25.06.2014 inExpediency DiscernmentCouncil of the System, reviewing complaints of decisions and actions of the Social Security Organization, regulations and rules of non-governmental institutions are placed within the jurisdiction of branches andthe General Committee of the Court, respectively, andspecialized Committees were formed. Also, dealing with resolutions of the Supreme Council of the Cultural Revolution and regulations and circulars and decisions of the judiciary chief are excluded from jurisdictionof General Committee of Court of Administrative Justice that are considered the most important developments in branches and General Committee of the Court jurisdiction.

Key words: Court of Administrative Justice, jurisdiction, Guardian Council, Court of Administrative Justicebranches, General Committee of Court of Administrative Justice.

INTRODUCTION

First law of Court of Administrative Justicewas passed in 1981. After a period of time, above lawwas reviewed and total reform was happened and it was approved in Islamic Parliament of Iranin 30.05.2006 and it was confirmed with some changes in Expediency Discernment Council of the System. Then above law was once again reviewed because of ambiguities and gaps that lead to disagreements and differing interpretations of the law, and it was passed in Islamic Parliament of Iran entitled Court of Administrative Justice procedure and organizations dated 12.01.2012 but some of its articles (10, 12, 89, 90, 94) was approved in Expediency Discernment Council of the Systemdue to differences between Parliament and Guardian Council on 15.06.2013. SinceCourt of Administrative Justiceact experienced special changes from the beginning of its adoption until now, it leads authors to use analytic- descriptive study to establish changes in Court Jurisdiction in new law of Court of Administrative Justice procedure and organization enacted in 2013 and they found that whether these evolutions in new law lead to increase or decrease the competent authority of the Court of Justice of administrative. So in this article, Court of Administrative Justiceauthorities are reviewed under three headings of jurisdiction extension and scope of the authorities and jurisdiction of Court of Administrative Justicebranches and jurisdictionrange changes and scope of General Committee of Court of Administrative Justice and specialized Committee s' jurisdiction.

Developments in jurisdiction range and authority scope of Court of Administrative Justicebranches

Pursuantto Article 10 of the new law of Court, Court of Administrative Justicebranches jurisdictionhas changed in some cases as we called it under Court of Administrative Justice branches jurisdiction in conjunction with case topic and we examined it.

Court's jurisdiction related toDefendant in Court of Administrative Justice:

There are different views about which people can be sued in Court of Administrative Justice. Some lawyers believe that only the executive can be defendant in Court of Administrative Justice but another group believes that absolute units of state can be defendant in Court of Administrative Justice due to their type of actions.

The Social Security Organization and otherstipulated non-governmental public institutions and bodies

During approved law of Court of Administrative Justice in 1981 prior to the adoption of Act 2006, adopting article 11 interpretation law of Court of Administrative Justice related to institutions list law and non-governmental public institutions, legislature identified Court's jurisdiction over these institutions. This was discussed in Act 2006 and it became under the jurisdiction of the Court in draft of paragraph 1 of article 13 "investigation of complaints, grievances and protests by natural and legal individuals regarding decisions and actions of public institutions in non-governmental public institutions and bodies' list law and its later amendments (HosseinipourArdkani, 2010, 271). Due to this article includes Court jurisdiction regarding decisions and actions of non-governmental public units, Guardian Council declared this article contrary to Article 173 of the constitution, but Islamic Parliament of Iran still insisted on their legislation and the legislation referred to Expediency Discernment Council of the System and according to Guardian Council opinion, Expediency Discernment Council of the System also removed Court's jurisdiction to investigation of decisions and actions of these institutions.

After approving above law, Court of Administrative Justice procedure was based on this way that this Court sees itself competent over protests and complaints from regulations and systems of these institutions and in numerous cases, it pronounced regarding complaint about these institutions including Social Security Organization. But there was a disagreement over Court branches jurisdiction regarding actions and decisions of institutions and non-governmental public bodies and their agents and their employment complaints until The General Committee of the

Court issued a procedural unit on 16.08.2009 as follows "Since Article 11 interpretation law of Court of Administrative Justice adopted in 1981 related to non-governmental general organizations and bodies list law passed in 1994 for investigating complaints of decisions and actions and restraining mentioned non-governmental public institutions is in Court of Administrative Justicecompetency, thus petition No. 1454 dated 10.10.2008 of third branch of the Court that considered plaintiffs' complaint and consequently declared the court as a competent authority to investigated filed complaints, it is correct and according to law in this way (HosseinipourArdkani, 2010,276).Therefore, legislature in Paragraph 1 of Article 10 of the Court of Administrative Justice Law passed in 2013 stipulated complaints of Social Security organizations, as well as municipal and revolutionary institutions in jurisdiction of primitive Court branches**.** Paragraph 1 of Article 10 of new law of the Court tired to express jurisdiction range of Court branches by some evidences of government departments, municipalities, the Social Security organization and revolutionary institutions and bodies and their affiliates. But the question is that what is the purpose of government departments and non-governmental public institutions, is the purpose merely examples and cases are expressed and its basis is institutions referred to in Article 5 of the Law on Civil Service Management law or criteria contained in the list of non-governmental public institutions and bodies or Court's jurisdiction includes institutions that are formed based on law or their articles of association are non-governmental general organizations, and whether specific cases in Article 10 of new law of Court has reckoning dimension or allegorical dimension and if these articles are reckoning whereisthe examination source for excluded cases and which measure and criteria are followed.

In response, we should say that it is not clear by which target and document and legal logic, legislature limits complaints from non-public institutions only to the municipality and the Social Security organization. If legislature wanted to follow Guardian Council interpretive opinion based on limiting Court of Administrative Justice merely to executive and it did not consider other institutions including non-public institutions under Court jurisdiction, thus referring to municipalities and Social Security organization was also inconsistent with the theory and if the intention of government was all public institutions, so limiting non-governmental general institutions to two institutions isincompatiblewith this interpretation.

However, the legislature did not follow a fixed and clear basis in passing mentioned decree (Molabeygy, 2010: 30). Thus, if these evidences have allegoricaldimension, the examination reference for complaints and protests against them in other similarcasesis Court of Administrative Justice, and if the evidences are reckoning, due to examination reference to complaints and complaints is the Court of Justice, examination reference for other cases is public courts. Legislature made Court branches competent for examining complaints of Social Security organization and its affiliates while Social Security organization has a lot of affiliated companies and in terms of legal the natureof company is different from institution and Court, based on legislator stipulation, merely deals with complaint of institutions affiliated to governmental departments and institutions referred to in paragraph 1 of Article 10 in new law of the court and complaints from other related organizations other than the above topics ranging from the company, etc. in not in Court of Administrative Justice jurisdiction; but it is in the jurisdiction of the courts of justice, thus the legislator should make Court competent for investigating complaint of affiliated companies because a lot of affiliatescompaniesactivities are in line with their main goals organization and this cause duality of judicial address. Thus, due to the fact that the legislature only makes Court of Administrative Justice competent for complaint ofmunicipal and Social Security organization and revolutionary organizations, the current practice of Court of Administrative Justice is that only it deals with complaints of non-governmental general institutions and they do not consider themselves competent for handling complaints of non-governmental public institutions.

Court of Administrative Justicejurisdiction in relation with the claim

Under the new law of Court of Administrative Justice, some developments were made regardingsubject of lawsuit that we will discuss them.

Complaining definitive verdicts of exclusive administrative references

In paragraph 2 of Article 10 of new law, legislator removed competency of Court branches for workshop council and the Commission under Article 56 of the Law on the Protection of Forests and Natural Resources and the reason is that according to the law enacted in 1990, workshop council name was changed into Discernment Committee that is reference primitive to deal with dispute settlement and this Committee itself is subset of employer and employee dispute settlement that is revision reference for verdicts issued by Discernment Committee mentioned in this article and the reason for removal of Commission Article 56 of Protection of Forests and Natural Resources Law is that due to law for determining land dispute enacted in1988 in Expediency Discernment Council of the System, a panel with judicial nature replaced abovementioned Commission and its verdicts revision is in competency of judicial references so mentioning above cases in the current law were waste and legislature has properly eliminated Court branchesjurisdictionfor them.

Under paragraph 2 of Article 10 of the new law, dealing with protests and complaints from judgments and decisions are solely mentioned in terms of rules and regulations violation or opposition to them. So this paragraph means that Court`s dealing with abovementioned references are only arbitrary and Court is only recognized that whether regulations and rules order is a basis for dealing with and it violate or approve in case of proving violation of peremptory regulations and rules and in accordance with Article 63 of the new law of Court, in case of issuing the verdict based on infringement of office specific references verdict by Court branches and non- solving the problem, in case of re-issued appeal and if the verdict is incompatible with regulations and rules, these provisions will be dealing with in terms of form and nature.

Before the approval of procedure and organizations Court of Administrative Justice Act of 2013, branches of Court dealt with decisions and verdicts of Committee s and commissions in terms of expert, scientific and technical issues only based on compliance with forms of regulations and rules and they did not enter to decide about nature and content, but by approving Article 64 of the new law that requires:"In the event that according to law or binding resolution, topics such as academic and specialized and security and selectivequalificationsare allocated to a commission or Committee, in case of plaintiff's complaint in terms of subject diagnosis, investigated branch is obliged to compose verdict after referring case to related expert Committee that is determined by branch." Contrary to Act 2006, Court branches have a right to enter technical and expert issues and they can investigate commissions and Committee s decisions in terms of non-compliance with legal regulations in terms of form or nature and also in terms of subject diagnosis for protestingdefinitive verdicts of exclusive administrative references. Another development that is made regarding investigating verdicts of exclusive administrative references in new law of Court compared to former law is that in law enacted in 2006 of Court of Administrative Justice, no period was determined for complaining exclusive administrative references and there was no determined deadline for filing the claim and people could file whenever they want; but according to Clause 2 of Article 16 of Court new law a deadline for submitting, concerning paragraph 2 of Article 10 of this law, is three months for people who live inside the country, and it is six months for those residing outside the country, from the date of pronouncing verdict or definite decision of related reference according to Revolutionary General Courts procedures (in civil affairs).

Complaint of employment rights violation

A) Complaint of non-state public institutions and public units' officers employment, in accordance with paragraph 3 of Article 10 for complaint of units and institutions referred to in paragraph 1 of this Act is the jurisdiction of Court branches in terms ofemployment rights violation. Also, complaint of allofficers' employmentof non-public institutions is not plausible in Court of Administrative Justice.

B) Complaint of the judiciary and the legislature administrative employees: as it is mentioned in paragraph 2 of the new Court law, investigating complaint of judges can be done in Court of Administrative Justice. But the question is that can administrative employees of Judicial file in the Court the same as judges in terms of employment rights violation, and if the answer is yes is the jurisdiction expandable for legislature staff? The answer is that with respect to Article 12 of new law that investigating judicial decisions are not in jurisdiction of the Court, so, according to opposite concept of this statement and that justice system employees are subject to the civil service management, it can be said that the decisions of this system can be sued in the Court. About administrative employees of the executive it can be said that due to excluding executive from executing systems of Article 117 of civil service management and legislature silence it can be said that administrative staff of Islamic Parliament of Iran and affiliated institutions such as the Parliament Research Center can complain about their employment rights in Court of Administrative Justice.

C) employees of other agencies and departments: As it was mentioned in paragraph 3 of Article 10 of the new Court Act, investigating complaints of employment of other servants of the units and institutions referred to in paragraph 1 that including law for them requires naming including country and military are in Court's branches jurisdiction.

Claim

Acknowledging the damage was one of the Court's jurisdiction in Paragraph 1 of Article 13 enacted 2006 provides that: determining the amount of damages incurred by the institutions and persons referred to in paragraphs 1 and 2 of this Article is the responsibility of the General Court after acknowledging the Court, so at first, plaintiff should refer to the Court to claim damages resulted from the institutions and persons referred to in paragraphs 1 and 2 and the court should confirm and approve the principle of damage and violation that includes civil public responsibility components, and then he/she should refers to General Court for the extent of damage and its delivery.

Acknowledging damage by the Court requires expert attention in order to firstly the principle of damage and secondly dimensions and quality and quantity of accurate and complete damage is determined, so to identify this in terms of requirement cases we need to enter the details. According to investigating complaint of Administrative issues and the violation of laws and regulations by the Court that cause to substantial investigation and it was contrary to the Court's jurisdiction and this uncertainty made different ideas in this issue pursuant to Article hundred and seventy-three of constitution. However, Paragraph1 of Article 10 of the new Act of Court procedure and organizations was changed compared with former law; "determining the extent of damage caused by the institutions and persons referred to in paragraphs 1 and 2 of this Article after issuing this verdict in the Court is in General Court jurisdiction." As it is observed the legislator declared in above article that plaintiff should complain in Court to provethe damage of the institutions and persons referred to in paragraphs 1 and 2 of article 10 and the Court should acknowledge infringement and after authenticating infringement, plaintiff should refer to the General Court to determine the extent of damage and the receipt of the referral, while under Paragraph 1 of Article 13 of the Act 2006 plaintiff who claim compensation under the activity of executive systems including act or omission and their decisions should refer to the Court, and in case of damageacknowledgement by the Court he/she should refer to the General Court to determine its amount.This leads to a change in Court branches jurisdiction in damage claim. So according to new law, Court of Administrative Justice branch has no jurisdiction over other damage dimensions including verification of compliance with the losses incurred and causality relation to whether the act is done or not, and which result is get, and the Court only diagnose infringement occurrence and determining other dimensions of damage is the General Court responsibility.

Qualification and duties of the General Committee ofCourt of Administrative Justice

Some developments are happened in Court of Administrative Justice General Committee qualifications and duties that we discuss about them.

Non-governmental public institutions regulations

According to paragraph 1 of article 12 of the new law of the Court, investigating complaints from NGOs public institutions is Court's General Committee jurisdiction. Considering the fact that the complaint of regulations issued by non-governmental public institutions is in the Court General Committee jurisdiction and municipal is one example of NGO public institutions, it does not seem right that the legislator make it separately in the General Committee Courtjurisdiction and re-mentioning municipality is waste is in this article. It should be mentioned that despite the fact that complaint of legislation of revolutionary organizations in paragraph one of Article 10 is within the branches jurisdiction, complaints of these institutions are not mentioned in paragraph one of Article 12 and this negates the jurisdiction of the General Committee in investigating complaints of resolutions of these institutions because most of these institutions are mentioned as NGO public institutions and because they are accounted for NGO public institution; therefore they subject to the jurisdiction of General Committee of Court of Administrative Justice., for example, Martyr Foundation and the Poor Foundation (MolaBeygy, 2014: 114)

Creating a judicial procedure

Some changes are made in creating procedure in new law regarding former law that we explain them.

Article 44 of law enacted 2006 stipulates that "whenever at least five different verdicts are issued about a single topic from different Court branches, then it will be presented in General Committee and unity verdict will be issued under chief Court opinion..." But in Article 90 of new law it was stipulated that: "whenever at least five similar verdicts were issued about a topic, then Court chief can present case in general Committee and he can wants to extend this toward topics. If the General Committee recognizesverdicts right, they will approve it for making approach.This verdict is binding for other Court branches and legal persons."

So for issuing a verdictfor an issue at first at least 5 verdicts should issue from 2 or more Court branches, while in former law, the number of branches was not determined and only 5 similar verdicts were referred and this ambiguity has been resolved. Secondly, in 5 verdicts issued from branches, whether in two or more branches, similarity in topic should be existed.

Excluded institutions fromCourt of Administrative Justice General Committee competency

according to Article 12 of Court of Administrative Justice, investigating judicial decisions of the judiciary and merely regulations and resolutions and decisions of judiciary chief is excluded from Court of Administrative Justice and also Supreme Revolutionary Cultural Council that were excluded from institutions of Court General Committee jurisdiction was removed from excluded institutions; therefore some changes was happened comparing Article 19 of enacted law 2006 that we will discuss.

Judicial decisions, regulations, circulars and decisions of the Head of the Judiciary

In Article 12 of the new Court law, "regulations, directives and decisions of Head of the Judiciary" was excluded from jurisdiction of the General Committee of the Court. This paragraph require that "investigating judiciary

decisions of the judicial and solely regulations, directives and decisions of Head of the Judiciary and resolutions and decisions of the Guardian Council, Expediency Discernment Council of the System, Assembly of Experts and the National Security Council is out of scope of this article." The term of judiciary decisions of the judicial seems waste in Article 12, because decisions issued from military, judicial courts and judges disciplinary and armed forces courts are mentioned as implausible cases in Court of Administrative Justice due to paragraph 2 Article 10. About this topic whether phrase of judiciary decisionswith "judicial" bond and regulations, directives and decisions of Head of Judicial for allowing complaint of its non-judicial decisions of Judiciary and its Head and whether enacting this phrase show interpretive theory manuscript dated 10.01.2005no. 83/30/9387 of Guardian Council[1] that investigating complaints of regulations passed by judiciary officials is not Court jurisdiction? The answer is that considering the fact that purpose of above decisions according to stipulating article includes administrative decisions it seems that the concept of referred phrase is interpreted in line to get closer to the ideals of the hundred and seventy-third principle and more insuring for national rights. Therefore, non-judiciary decisions including resolutions and regulations of judiciary head and assistants should be considered in Court of Administrative Justice General Committee jurisdiction (Mahmoudi, 2007: 236). Because creating special authority for the head of the judiciary would cause to undermine the rule of law and it doubt to threaten the independence principle of judge according to issue circulars.

Removing investigating against the Supreme Council of the Cultural Revolution resolutions

Thelegislature had different procedures regarding decisions of the Supreme Council of the Cultural Revolution from the beginning of this law establishment. Court of Administrative Justice has investigated complaint of this Council`s resolutions in terms of violations religious law or law from 1993 to 2006. In paragraph 2 of Article 19 Act of 2006, investigating to the Supreme Council of the Cultural Revolution resolutions was in jurisdiction of Court of Administrative Justice General Committee and complaints of this institution was not examined in Court of Administrative Justice. But legislature in Article 12 of procedure and organizations new Law enacted 2013, removedthe Supreme Council of the Cultural Revolution from Court of Administrative Justice excluded list; it causes confusion about investigating the decisions of the Supreme Council of the Cultural Revolution that whether resolutions of the council could be complained and canceled in Court of Administrative Justice or not. However, the current trend of Court of Administrative Justice is that it does not investigate resolutions and decisions of this institution and for complaining from resolutions of this institution, it issue topic of Article 85[2] of this Act.

SpecializedCommittees

Court of AdministrativeJustice specialized Committeeswere established by law in 2013. Pursuant to Article 84 of this Law that is in accordance with the law of the jurisdiction of the General Committeeof the Court, at first it is refer to specialized Committees consisting of fifteen judges of the Court and formalizing these meetings of specialized Committees depended on presence of two thirds of the members. If a complaint from resolutions, regulations and other systems and governmental regulation or non-governmental public institutions in Court of Administrative Justice, this issue will be referred to specialized Committees[3]. This is from admirable dimensions of Court's new law.

CONCLUSION

The resulting changes in the new law of Court procedure and organizations passed in 2013 in two areas of branches competency and Court General Committees areconsidered in this paper. The Social Security organizations in addition to the municipality as an example of non-governmental public institutions are in Court of Administrative Justice branches jurisdiction.Due to the fact that investigating complaints of governmental grievances and regulations of these institutions are in Court of Administrative Justice General Committee jurisdiction, thus examples cited in the reckoning current law does not seem correct. Also regarding the fact that judges employment complaint and draftees

of civil service management and employees of government departments are investigable in the Court branches, investigatingcomplaints of other administrative staff fromLegislature and the Judiciary are also investigable, in other hand, Court merely establishes a violation in order to make plaintiff entitled to claim damages, and investigating complaints of regulations and resolutions of non-governmental public institutions are in Court General Committee jurisdiction that should be in branches jurisdiction and issuing verdict by specialized Committees make mistake coefficient in verdicts issued by Court of Administrative Justice low and also by removing investigating for the Supreme Council of Cultural Revolution from exclusions of Court General Committee , in fact, resolutions of this institution are not investigated and due to being excluded for investigating resolutions and directives and decisions of Head of Judiciary from Court General Committee competency, it can be said that Court of Administrative Justice jurisdictions range was decreased due to resulted developments in new law of Court procedure and organizations.

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RESEARCH ARTICLE

Mineral Profiling of Brewer's Spent Grain

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ABSTRACT

Barley grain is excellent source of minerals which are not affected during brewing process and available in BSG for animals use. The combination of germination and fermentation is a potential process for decreasing the anti-nutrient levels and enhancing digestibility of grains. Brewer's Spent Grain samples were tested for mineral composition. The sun dried BSG were analyzed for Calcium, Phosphorus, Magnesium, sulphur, sodium and potassium.The total ash content of this material is having 3.07 percent and Acid Insoluble ash content is 1.59 per cent. The higher sulphur content (0.26 to 0.39 per cent on wet basis) was reported in this study like other researchers.

Key words: Brewers spent grains, Minerals

INTRODUCTION

A wide range of local agro-industrial byproducts are available in large quantities which have considerable nutritional potential in Kerala are Rubber seed meal, Tea waste, spice processing unit waste, De-oiled rice bran (Red), Jackfruit waste, pineapple industry waste, cashew nut shell waste, brewery industry waste etc. Among them, brewery waste (Brewer's grains) and De-oiled Rice Bran red variety are typical example of such unrealized potential. To overcome the shortage of feed resources in India, current research is primarily focused on identifying locally available agro-industrial by products/agricultural wastes (un-conventional feedstuffs) as newer feed resources and improving the feeding value by different treatments/technologies.

Brewers Spent Grains (BSG) is a byproduct of brewery industry which uses malted barley grains as feed stock. When grain is fermented to produce ethanol, primarily the starch is utilized, leaving behind a protein rich residue that can be used in livestock diets.Khidzir, et al. (2010) stated that for every 100 litres of beer produced, 14 -15.6 kg of BSG was generated. Berto, (2003) reported that during year 2002, around 1.7 million tonnes of spent grain was generated throughout the world. In India during year 2011, about 10 million hecto-litres of beer were produced from logistically located 38 breweries. In Kerala, two brewery units, one owned by United Breweries (UB) group at Kanjikode, Palakkad and the other SAB Miller group at Chalakudy, Thrissur put together generate 20-25 tons of wet brewers spent grain per day. As the ethanol industry grows, greater quantities of BSG will become available for use as animal feed at a reasonable cost throughout the year.The mineral profiling study was planned to study in dried BSG which would help in Livestock and Poultry feed formulations.

MATERIALS AND METHODS

Brewer's Spent Grains (BSG) was collected in wet condition from Malabar Breweries Ltd ,Chalakkudy and United Breweries Ltd., Palakkad, Kerala. The fresh samples were oven dried (60 ^{o}C 18 h) to ensure common drying procedure. The Total ash and Acid Insoluble ash content was analyzed as per AOAC,1990. Calcium, Phosphorus, Magnesium, Sulphur, Sodium, Potassium, Copper, Zinc, Manganese, Iron, Cobalt contents of the samples were estimated by Atomic Absorption Spectrophotometer.

RESULTS AND DISCUSSION

The per cent major mineral compositions of samples of BSG reported in this study were (mean ±SE) calcium (0.183 ± 0.01),phosphorus(0.293 ± 0.03),magnesium (0.120 ± 0.00),sulphur (0.113 ± 0.00),sodium (0.030 ± 0.01),potassium(0.077 ± 0.01) on DMB. The total ash content of BSG (03.07± 0.08 per cent) reported in this study is accordance to the values of 3 to 5 percent reported by Dong and Ogle (2003) and Denstadli et al., (2010).Whereas higher value of 5.76 per cent was reported by Senthil Kumar et al.,(2011).

The acid insoluble ash content of BSG reported in this study is lower (01.59 ±0.13 per cent)than the value reported by SenthilKumar(2011). Since the BSG available in the market for livestock feeding is in wet condition mixed with salt to improve the storage condition. Hence, the acid insoluble ash content may vary from nature of sample collected for analysis.

The Calcium values of BSG reported in this study is similar to value(0.16 per cent) reported byGohl(1981) and higher than values reported by Murdock et al.(1981) (0.29 per cent) , SenthilKumar (2011) (0.32 ±0.03 per cent).The level of Phosphorus present in BSG reported in this study is less than the values reported by Dong and Ogle(2003)(0.48 per cent) Senthil Kumar (2011) (0.60 ±0.02 per cent).Magnesium content of BSG reported by Senthil Kumar et al(2011) (0.16 ±.02 per cent) is comparable to reported in this study.The Magnesium and Sodium contents were lower than the values of 0.26 and 0.22 per cent, respectively reported by Dhiman et al. (2003). The value of sodium content of BSG on fresh basis byMegan Thomas et al(2010)(0.03 per cent) which is in accordance with present study.

The higher sulphur content (0.26 to 0.39 per cent on wet basis) reported by Megan Thoams et al.(2010) compared to value reported in this study. Potassium content reported by Senthil Kumar et al.(2011) was higher than the reported value in this study.

The levels of micro minerals reported in this study were (mean± SE) Copper (14.387 ± 0.20 ppm), Zinc (60.593 ± 3.26 ppm), Manganese (43.747 ± 0.58 ppm),Iron(661 ± 158 ppm) on DMB. Senthil Kumar et al.(2011) and Dhiman et al.(2003)also reported similar copper and iron content values .Lower copper(7.7 ppm) and iron content (330 ppm)

were reported by Dong and Ogle(2003).Higher value of Zinc (80 -85 ppm) were reported by Dhimanet al.(2003) and lower value of (35 ppm) were reported by Senthil Kumar et al(2011) compared to BSG values reported in this study on DMB.Dhimanet al (2003) and Dong and Ogle(2003) reported value for manganese content was in accordance with estimated value of this study and lower value of 21 ppm was reported by Senthil Kumar et al.(2011).Cobalt value of 0.607 ± 0.25 ppm was estimated and reported in this study.

Barley grain is excellent source of minerals which are not affected during brewing process and available in BSG for animals use. The combination of germination and fermentation is a potential process for decreasing the anti-nutrient levels and enhancing digestibilityof grains(Sripriyaet al., 1993). The minerals present in BSG are more available compare to mineral contributions from grain source in the animals feed.

Sangita and Sarita (2000) who reported that during malting process calcium and phosphorus content increases whereas iron content decreases.There is possibilities of variation in the mineral content of BSGbetween brewery to brewery and within brewery from time to time may be due to the quantity of different types of grains used for brewing process.

CONCLUSION

Wet brewers' grains are low in calcium and potassium, similar to other cereal grains. Hence from this mineral profiling we may conclude that a well-balanced mineral supplement should be supplied when using WBG in cattle diets to avoid the negative effects of decreased growth performance.

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Table: 1Mineral Content in Brewers Spent Grains (BSG)

Parameters	n	Brewers Spent Grains
Cal (per cent)	3	0.57
Phosphorus (per cent)	3	1.01
Magnesium (per cent)	3	0.37
Sulphur (per cent)	3	0.33
Copper(ppm)	3	50.72
Zinc (ppm)	3	187.12
Manganese (ppm)	3	139.78
Iron (ppm)	3	1895
Cobalt (ppm)	3	1.36
Sodium (per cent)	3	0.157
Potassium (per cent)	3	1.24

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RESEARCH ARTICLE

The Effect of Institutional Factors on Foreign Direct Investment in Developing Countries

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ABSTRACT

The purpose of this study is to examine the effect of institutional factors of economic freedom, economic security and the voice and accountability beside the economic factors on foreign direct investment by GMM (Generalized Method of Moments) of dynamic panel data in 114 developing countries for the period 2004-2011. This method is the most efficient ways to estimate the effectiveness of institutions. Because, this method solves the problem of endogenous institutional index. In this study, three groups of developing countries, countries with a high human development (40 countries), countries with a medium level of human development (35 countries), countries with a low human development (39 countries) have been classified.

Results show that the Institutional factors of economic freedom, economic security and the voice and accountability have significant positive effect on attracting foreign direct investment in developing countries with a high human development .However, in the other two groups of countries (with weaker institutions), institutional factors have adverse effects on attracting FDI.

This shows that all countries, especially developing countries should make institutional reform to attract more foreign investment in various sectors.

Key words: Institutions, foreign direct investment, panel data, GMM

INTRODUCTION

Ongoing process of development and growth in the economy needs the precision in its creative factors. According to economic theory, investment is one of the effective factors on economic growth. Also foreign direct investment is one of the major substrates for increasing economic interaction in the international arena. In this regard, the provision of the required economic capital is always one of major concerns. Because of limited domestic capital, foreign capitals are used as a supplement to finance economic plans. Foreign direct investment is one of the types of foreign investment which all countries compete to attract it more and more in recent years.

FDI inflow in addition to financing, led to technology transfer, expertise human capital, knowledge and management. So in order to achieve sustained economic growth and stability it is necessary that identify the effective factors on FDI scientifically.

Although the foreign direct investment has grown considerably since the 1980s in the global level, but most part of the process of developing countries were not significant. Economists considered many factors as the main reasons for the performance differences in attracting the FDI between different countries to response the inability of some countries to attract FDI. Some factors show a part of observed differences across countries in attracting FDI such as, the size of economy, exchange rate, inflation rate, the intensity of trade openness, wage rates, the ratio of foreign debt to GDP, the ratio of domestic investment to GDP and etc. But certainly there are numerous factors have been neglected in the minds of economists so far. The role of institutions in attracting the FDI is one of factors which have far less attention. In this paper, institutional factors are: economic freedom, the voice and accountability, and economic security which have been studied beside the other economic effective factors on foreign direct investment in developing countries. The sample of developing countries is for 2011 to 2004.

LITERATURE REVIEW

There are strong reasons to attract more foreign direct investment in the environments or countries with strong institutions (including effective bureaucracy, low corruption, regulation, proper implementation of contracts, etc.). This chapter discusses the role of institutional factors in determining the FDI and weaknesses and deficiencies in the empirical research. Thus, a proper understanding of the relationship between institutions and foreign direct investment is presented.

Institutionalisms pointed out the weaknesses of neoclassical and ignore the value of economy and issues related to low levels of salaries and income distribution and raise the civil institutions creation to solve the problems of classical and neoclassical schools. The institutional economics, believes that the economy should be the optimal combination of market institutions, government and civil institutions. The optimum composition should be such that minimizes the exchange cost of private contracts (among economic agents) and free ride (at collective decisions) . Institutional studies indicate that many institutions and institutional factors do not exist in developing countries and if they are available they're not effective. In the absence of appropriate institutions, motivations have no impact. Therefore markets need non-market institutions support.

Institutional perspective believes that if some or all the neoclassical assumptions are not true, our analysis is wrong. If the institutions do not exist in neoclassical theory, predictions will be wrong. Neoclassical economics is based on the institutional framework assumption and its strong point is that if there is an institutional framework, it is maintained at all times and places. However, the weakness point of this factor is that if there isn't any institutional framework, not only it cannot tell us that no one can predict the cause of the failure but also it hasn't enough ability

to track the problem. We should know appropriate institutions in neoclassical theory to have a better analysis. Therefore institutions play an important role in the theoretical analysis and better understanding.

Thorsten Veblen defined the economics as the processes and practices detection, and known that institutions shape the process. He believed that institutions can effect on the behavior of economic agents and economic performance. This influence is done by multiple channels which emphasizes on the role of institutions. Institutions have dominant effect on the structure of economic incentives in society. Economists believe that institutions influence on the limit of people's selections in society.

Theoretical explanation of the relationship between foreign direct investment and institutional quality can answer fundamental questions of economic planners, especially in developing countries. Because these countries were suffering from low level of investment and consequently lower per capita income and the income gap extension.

Institutions and foreign direct investment: a theoretical approach

To better understand the role of institutions in determining FDI flow it needs to establish a relationship between determinants FDI frameworks and investment incentives framework. One of methods is dunning eclectic paradigm or OLI system relying on North approach or the impact of institutions on investment and economic activity. Dunning paradigm originally developed to describe the behavior of multinational corporations (MNEs) or how to companies benefit from foreign production facilities. Recently this paradigm mostly uses to analyze the determinants of FDI inflows (Gastanga & Nugent et al., 1998). It should be noted that the North approach about institutions mainly focused on their effects on economic activity and investment but it can also be used in the discussion of foreign direct investment. (Fathi A. Ali et.al.)

Eclectic paradigm and determinants factors of FDI inflows:

According to the dunning paradigm (1993) and (2001) any companies should have following three conditions to being a multinational organization: (1) having a special property that makes it distinctive compared to other firms in the host country. The assets may be tangible assets such as patents or products with intangible assets such as management skills, marketing or entrepreneurship. Dunning called such asset "ownership advantage" or "O advantage". (2) If the condition No. 1 achieves for the company, using the ownership advantages will be very useful through FDI and keeping these benefits in the form of local ownership or lease of these assets in order to prevent copying by rival companies. This advantage is called internal or internalization advantage or "I advantage". These advantages include an attempt to avoid the search and negotiation costs, moral hazard, and self-protection against non-compliance with contract terms. (3) In the host country, combining the ownership and internalization advantages with some locational advantages (L advantages) must be profitable for the company such as reducing input costs, the emergence of large and growing market, and so on. The third condition can explain the FDI distribution in most countries because it can be a specific advantage to a country. Dunning's paradigm suggests locational advantages which can be helpful in some countries attraction compared to other countries in the establishment of multinationals organizations (MNEs). These advantages may include some variables such as the availability of natural resources, price and quality, the quality of infrastructures, investment incentives, and economic systems and other strategies (Dunning (1993) and (1998)). Dunning (2001) argued that a variable such as locational advantage must be based on the assumption that companies are looking for places settlement of their activities in the situation with the highest profitability. In general, each variable would be likely to affect the profitability of a company's decisions concerning the location of investments can be considered in the set of variables that can affect the distribution of FDI in the countries. Dunning eclectic paradigm is a flexible tool for analyzing the determinants of FDI and any hypotheses about the determinants of FDI can be examined by Dunning eclectic paradigm.

North argues that institutions have dominant effect on economic activities. Because they have dominant effect on transactions cost. Transaction costs include; (1) The cost of measuring the value of what is exchanged, (2) The costs related to rights protection, the policies and actions of the agreement. These costs are obtained from the opponent's behavior in economic exchanges due to lack of adequate knowledge. Uncertainty will be in the behavior of parties in economic transaction without such institutions. If the interests of each party is required, it may be a crook, disengagement agreements or shirk on their contract. Therefore, the concept of risk premium is considered on transactions costs. Both formal and informal institutions are explained in order to establish rules and guidelines to reduce uncertainty in economic transactions. Informal institutions such as the moral law (professional), behavioral norms and customs can reduce the level of uncertainty in transactions. Impersonal exchanges that allow fraud and the difference is high, need a third party to enforce agreements and reduce uncertainties between the parties. Governments can impose administrative mechanism to play the role of third party in transactions through investments law, effective justice system and other formal institutions. Therefore, if the parties' property rights do not defend and the contracts' implementation was difficult, the risk premium should be high. (Fathi A. et.al)

Institutions can be numerous possible effects on FDI inflows. Consequently, those countries which have proper institutional systems able to attract more foreign direct investment. Also recent developments in the global economy have changed the multinational organizations approach to the locational advantages. These organizations tend to have the best economic and institutional conditions (Dunning, 1998). These organizations do not attention to the countries with advantages in labor cost, availability of natural resources and etc. Rather, they seek advantages include a country's assets of knowledge, infrastructure and institutions. (Narula and Dunning, 2000)

Background research and empirical studies

Various research have been carried out on the relationship between the effective factors on FDI flow as well as the experience of some countries in relation with FDI inflows as follows: Table:1

Model, estimation method, variables and estimation results

Challenges in empirical study of the impact of institutions:

Experimental test about the impact of institutions on FDI faces some problems that make the test difficult. The important issue is the defining appropriate indicators for institutions. Determining these indicators is the important issues, especially with regard to the econometric methods. Another major challenge is the endogenous variables that if it does not solve the accurate estimation model will have bias. Because maybe foreign direct investment leads to the creation of effective institutions in the country. The fact that it is possible to increase investment and improves the quality of institutions, makes the institutional quality endogenous, creates problems in measurement error, reverses causation and creates a false correlation. This problem should solve by using a suitable econometric approach (Rigobon &. Rodrik, 2005). High correlation between structural parameters and other control variables in this study as well as the size of government are some problems that cause multi linearity in the model.

Model and econometric method:

According to Brendan (2007) Bass and Hefeker (2005), Jensen (2003) and Lee & Resnik (2003) studies can use the following model to empirically examine the role of institutions that play in determining FDI:

$$FDI_{it} = \alpha_i + \beta Inst'_{it} + cv'_{it}\delta + u_{it} \qquad u_{it} = \varepsilon_{it} + v_{it}$$

Where FDI_{it} indicates the dependent variable, Inst indicates the vector of institutional variables (independent variables) include economic freedom, economic security, responsibility and right of the comment, CV indicates the vector of control variable (economic variables affecting on FDI) which is obtained from theoretical basis of the existing empirical determinants of FDI, α_i indicates component of the fixed effects (Fixed-effect method).

The suitable econometric methods for solving or reducing the problem of endogenous institutional indicators and correlation between institutional variables and other explanatory variables is the model estimating by generalized method of moments (GMM) of dynamic panel data. Econometric method which has been used to solve this problem is the econometric two-stage least squares method (2SLS). To use this method we should find a suitable variable to solve endogenous problem of institutional variables. However, this method has limits such as the difficulty of finding appropriate instrumental variables and these variables are limited. Moreover, this method cannot solve the correlation problem between explanatory variables and reduce or eliminate the linearity in the model. Caselli, et al (1996) estimated economic growth models by GMM techniques of dynamic panel data. Sachs (2003) said that determination of per capita income must be done with dynamic models. Bond, et al (2001) have investigated the use of this method in estimating growth models. Using GMM of dynamic panel data method have some advantages such as personal dissonance and remove the cross-sectional regressions. Therefore more accurate estimates with higher efficiency and less linear in the GMM have been achieved. GMM dynamic panel data method is used when the number of cross-cutting variables (N) is higher than the number of times (T) and years (N> T). It means that the number of countries is greater than the number of times (Bond, 2002; Baltagi, 2008).

Therefore the model as the main basis for assessing the role of institutions in determining FDI is used as follows:

$$FDI_{it} = \alpha_i + \beta_1 Freedom_{it} + \beta_2 Security_{it} + \beta_3 Voice_{it} + \delta_1 FDI_{it-1} + \delta_2 Exdebt_{it} + \delta_3 infiationcp_{it} + \delta_4 GCF_{it} + \delta_5 Trade_{it} + \delta_6 GDP_{it} + \delta_7 Nettax_{it} + \delta_8 Ggce_{it} + u_{it}$$

Research hypotheses:

1 - Institutional factor of economic freedom have dominant effect in attracting the FDI in developing countries.
2 - Institutional factor of voice and accountability have dominant effect in attracting the FDI in developing countries.
3 - Institutional factor of in economic security have dominant effect in attracting the FDI in developing countries.

Model variables

Control variables:

Economic variables (mentioned in the empirical literature), affecting on FDI were used in this study include: foreign debt, inflation rate (reflecting economic instability), gross fixed capital formation, trade (indicating the degree of economic openness), GDP (reflecting the size of economy), net of taxes, and ultimately the percentage of government consumption expenditures to GDP (as the size of government).

Independent variables:

In this study some institutional factors such as economic freedom, economic security, voice and accountability are introduced as independent variables.

The aspects of proposed institutional environment in this study is defined as follows:

A - Economic Freedom: According to this research, economic freedom is one of the most important determinants in increasing the competition, investment, entrepreneurship, managers accountability and reducing financial corruption, rent-seeking and reducing the informal sector. One of the most important references for identification the economic situation in countries is the "Fraser Institution" which calculated the annual economic freedom index. The index dada is derived from the World Bank WDI site. It includes five categories. (1) The size of government, expenditure, taxes and government participation. (2) Legal structure and protection of private property. (3) Access to base money. (4) Freedom to exchange with neighbors (5) laws relating to credits, labor market and commodity (business).

B - Voice and Accountability: The World Bank defines good governance based on six features (Kaufman, et al 2006): voice and accountability, political instability and violence, government effectiveness: government efficiency in duties, financial regulation: regulation and extra costs, the rule of law and control of corruption.

In this paper, the voice and accountability has considered as one the good governance indices. Voice and accountability as defined by the World Bank means that people be able to ask question against the government. (Including measures of civil and political freedom and freedom of the press), data for this indicator is derived from the World Bank WDI site.

C - Economic Security (capital risk): Economic security is a situation in which their all units pay attention to long-term planning without any fear of environmental hazards. In other words, creating the economic security means the creating a legal, social and political environment which the investment projects and economic activities can began without disturbing and external disturbances. Thus, in an economy where future conditions are somewhat predictable the economic security will be established. Also all data for this index is derived from the World Bank WDI site.

The results of the variables analysis and the results of the model estimation is presented in the below. It should be noted that the software Eviews8 has been used in order to test and model estimation.

Checking the Variables' Stationary**:**

The presence or absence of unit root in the model variables should be investigated before the model estimation. It helps the results from model estimation not false and we will obtain more reliable results. When a stochastic process is stationary that the mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or interval between two rounds and does have any communication to the real time of covariance. Generally the stationary test is one of the most important tests to estimating regression with reliable coefficient. Stationary test is used to avoid creating spurious regression. There are various tests are used in determining the stationary of panel data such as Levine Line, Fisher, and Im-Pesaran and Shin tests. In the present study some tests have been used such as adjusted Dickey Fuller-Fisher and the results are shown in table1.

According to the results in stationary tests of adjusted Dickey Fuller-Fisher , all studied variables except TAX and GDP are significant and H_0 can be rejected. Thus, all model variables except TAX and GDP are stationary by one subtract stage.

However, we must perform Kao Co-integration test whether the long-term relationships is confirmed or not?

The results in table 2 indicate a long-term relationship between variables and all the variables have a convergence over time.

Results of the model estimation:

Period SUR and GMM method of dynamic panel data are used for model estimation. This test was performed for 114 developing countries with high, medium and low degree of human development in 2004 to 2011. According to the results in table 3, the effect of institutional factors along with economic factors has been investigated on foreign direct investment.

The results show in countries with a high human development (including 40 countries) that economic freedom index with 27.17 has the most impact, voice and accountability with 4.37, and eventually economic security with 3.32 has the least impact. Therefore they have dominant effect on foreign direct investment and significant at the 99% confidence level. In other words, for every one percent change in the economic freedom and voice and accountability indices the foreign direct investment changes 27 and 4.4 percent, respectively. Finally, for every ten percent change in the economic security index with one-year delay, the FDI changes 3.3 percent in the same direction.

According to economic variables the interrupted FDI with 0.072, foreign debt with – 0.73, inflation rate with 0.127, gross fixed capital formation with 0.273, trade (openness of economy) with 1.439, GDP (the size of economy) with 1.067, government's tax with – 1.14 and the ratio of government expenditure to GDP (reflecting the size of government) with 86 have been effective to attract foreign direct investment in these countries. All variables are significant at 99% level except the size of government. The ratio of government expenditure to GDP (size of government) is significant at 95% level. The direction of inflation impact and the size of government have been estimated unexpectedly.

The results show in countries with a medium human development (including 35 countries) that economic freedom index with 3.52 , voice and accountability with -1.33 , and eventually economic security with -0.434 has the least impact. Therefore they have dominant effect on foreign direct investment and significant at the 99% confidence level. In other words, for every one percent change in the economic freedom and voice and accountability indices the foreign direct investment changes 3.5 and -1.33 percent, respectively. Finally, for every ten percent change in the economic security index with one-year delay, the FDI changes -4.3 percent .

According to economic variables the interrupted FDI with 0.239 , foreign debt with – 0.644, inflation rate with -0.684 , gross fixed capital formation with -0.368 , trade (openness of economy) with 2.0138 , GDP (the size of economy) with 4.887, government's tax with – 2.20 and the ratio of government expenditure to GDP (reflecting the size of government) with 8.095 have been effective to attract foreign direct investment in these countries. All variables are significant at 99% level except the size of government. The ratio of government expenditure to GDP (size of government) is nonsignificant. The direction of size of government have been estimated unexpectedly.

The results show in countries with a Low human development (including 39 countries) that economic freedom index with -5.50 , voice and accountability with 0.187 , and eventually economic security with -0.011 has the least impact. Therefore they have dominant effect on foreign direct investment and significant at the 99% confidence level except the economic security. In other words, for every one percent change in the economic freedom and voice and accountability indices the foreign direct investment changes -5.5 and 0.19 percent, respectively. Finally, for every ten percent change in the economic security index with one-year delay, the FDI changes -0.11 percent .

According to economic variables the interrupted FDI with 0.2486 , foreign debt with -1.521, inflation rate with -0.353, gross fixed capital formation with 0.471, trade (openness of economy) with 5.071, GDP (the size of economy) with -2.54, government's tax with -0.51 and the ratio of government expenditure to GDP (reflecting the size of government) with 0.0033 have been effective to attract foreign direct investment in these countries. All variables are significant at

99% level. The ratio of inflation rate and economic security index is significant at 95% level. The direction of inflation impact and the size of government have been estimated unexpectedly.

CONCLUSION

Although, the level of foreign direct investment has grown in the global level since the decade of the1980s, but the share of many countries especially developing countries, was not significant. Institutional studies indicate that many institutions and institutional factors do not present in developing countries and if these factors were available they won't efficient. In the absence of appropriate institutions, motivations don't have dominant impact. Thus all markets need the supporting of non-market institutions. In this study, due to the inability of some countries to attract FDI, the factors affecting on FDI are divided into two categories; Economic and Institutional factors. There are strong reasons to attract more foreign direct investment in countries with strong institutions (including effective bureaucracy, low administrative corruption, lawful, proper implementation of contracts, and etc.) which is mentioned in the theoretical and experimental studies in the literature review.

According to the third paradigm of Dunning, those countries with strong institutions able to provide a locational advantage to attract foreign direct investment. In such cases, foreign investors get higher profitability and lower risk. Consequently, those countries which have proper institutional system able to attract more foreign direct investment.

Finding appropriate indicators for evaluating the impact of institutions on economic performance and institutional endogenous indices are some fundamental problems to evaluate the impact of institutions on economic performance. Economic freedom, voice and accountability and economic security in 2004-2011 are used in this paper as institutional indicators for developing countries with high, medium and low level of human development. All data were extracted from the World Bank website.

The results showed significant impact of institutional factors (in addition to economic factors) to attract foreign direct investment. This shows that all countries, especially developing countries should perform institutional reform to attract more foreign investment in various sectors.

Empirical research related to institutions is just at the beginning stage and many questions exist in this area that should be addressed. Research on the effective institutions to attract foreign direct investment and degree of importance of each such matter is appropriate field for future studies.

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Rank	Author	Year	Title	Results
1	Jude, Cristina	2013	Growth effect of FDI In developing economies: The role of institutional quality	Improving in the institutional framework must precede to the FDI attraction to impact on growth.
2	Blanton. R	2012	Rights, Institutions, and Foreign Direct Investment: An Empirical Assessment, Foreign Policy analysis	Domestic institutions, social rights and participation in international institutions and trade agreements are the effective factors on the foreign direct investment flow.
3	Holmes, R.M.et.al	2011	The Interrelationships among Informal Institution, Formal Institutions, and Inward Foreign Direct Investment	Formal institutions of a country (set of political-regulatory and the future directions for economic institutions) and culture as informal representative institutions are effective in attracting foreign direct investment.
4	Bissoon	2011	Can Better Institutions After More Foreign Direct Investment (FDI)?	Control of corruption, rule of law, political stability and freedom of media, as institutional quality indices are effective on FDI. The institutional factors are complementary and their combined effects have more effect on FDI.
5	Fathi A. Ahmed Ali	2010	Essays on foreign Direct Investment, Institution and Economic Growth	The relationship between property rights (as representative of institutional quality) and FDI and then their relationship with economic growth
6	Kohler, philippe	2010	Foreign direct investment in countries with weak institution	Weak institutions are a barrier for foreign direct investment. Centralization of corruption and administrative bureaucracy increases

				the cost of multinational international firms and have negative effect on their incentives to invest.
7	Wernick, A. D., J. Haar, and S. Shane	2009	Do Governing Institutions Affect Foreign Direct Investment Inflows?	The quality of regional institutions is an important factor in explaining the FDI differences in the countries. The positive effects of good regional governance on FDI is more than the impact of developed regional market.
8	Dumludag, Devrim & Sukruoglu, Deniz	2007	The Impact of Macroeconomic and Institutional Variables on Foreign Direct Investment Flows in Emerging Markets,	The main reason for the uneven distribution of FDI in developing countries is the difference in institutional quality (political and economic stability, civil rights, corruption and crises) between different countries.
9	Daude. CH & Stein. E	2007	The quality of Institutions and foreign Direct Investment	Better institutional quality has a significant positive economic impact on foreign direct investment. Particularly laws, regulations and regulatory policies in contrast with the political instability and lack of commitment in the contracts have an important role in preventing the FDI attraction.
10	Jakobsen J., and I. de Soysa	2006	Do Foreign Investors Punish Democracy?	In addition to the effect of democracy on protection of property rights, the establishment of democracy by increasing the flow of free trade and its impact on the educational level of workforce will increase the growth of foreign direct investment inflows.
11	Asiedu, E	2005	Foreign Direct Investment in Africa	Unlike his previous study (2002) concluded that less administrative corruption, political stability and reliable system of law can attract the FDI.
12	Globerman, S. ; D. Shapiro and Y. Tang	2004	Governance and foreign Direct Investment in Emerging and Transition European Countries	Transition and emerging countries in Europe (due to issues related to governance) have provided better conditions than other developing countries to attract FDI in the world.
13	Harms, P.and H.ursprung	2003	Do civil and political repression really boost foreign direct investment?	FDI will be seen in countries where there is civil liberties and political freedoms and they are respected.

14	Globerman, S and D. Shapiro	2002	Global Foreign Direct Investment Flows: The Role of Governance Infrastructure	Investment in governance structure has a lot of effect on FDI on the one hand with the attraction of foreign capital and on the other hand, with the rise of multinational companies and their investment in abroad.
15	Busu. A, and Srinvasan. K,	2002	Foreign Direct Investment in Africa	African efforts to establish political and economic stability in the macro level and structural reforms in key sectors make some African countries success in attracting FDI.

Table1 - Measuring unit root in variables

The title of variable	**The test statistic ADF – Fisher countries with high degree of human development**		**The test statistic ADF – Fisher countries with medium degree of human development**		**The test statistic ADF – Fisher countries with low degree of human development**	
	Statistic value	**Recognition**	**Statistic value**	**Recognition**	**Statistic value**	**Recognition**
FDI	163.652 (0.4052)	All Level I(0)	32.61 (0.000)	All Level I(0)	79.06 (0.4452)	All Level I(0)
EFCI	142.833 (0.0000)	All Level I(0)	71.36 (0.0253)	All Level I(0)	84.30 (0.0313)	All Level I(0)
ES	118.511 (0.0034)	All Level I(0)	88.99 (0.0624)	All Level I(0)	95.30 (0.0890)	All Level I(0)
VA	100.54 (0.0601)	All Level I(0)	134.19 (0.000)	All Level I(0)	78.05 (0.4771)	All Level I(0)
EXDEBT	64.69 (0.5911)	All Level I(0)	64.39 (0.4628)	All Level I(0)	57.32 (0.9242)	All Level I(0)
INFLATIONCP	217.65 (0.0000)	All Level I(0)	100.54 (0.0024)	All Level I(0)	165.74 (0.000)	All Level I(0)
GCF	201.18 (0.0000)	All Level I(0)	145.97 (0.000)	All Level I(0)	115.45 (0.000)	All Level I(0)
TRADE	90.42 (0.1997)	All Level I(0)	72.30 (0.3378)	All Level I(0)	85.85 (0.2541)	All Level I(0)
GDP	16.28 (1.0000)	All Level I(1)	7.13 (1.000)	All Level I(1)	7.69 (1.000)	All Level I(1)

TAX	31.38 (1.0000)	All Level I(1)	25.78 (0.9999)	All Level I(1)	39.30 (0.9731)	All Level I(1)
GGCE	93.02 (0.1514)	All Level I(0)	61.56 (0.6960)	All Level I(0)	70.35 (0.5987)	All Level I(0)

Source: Research findings

Table2 - Kao Residual Co-integration Test

	Prob.	t-statistic
ADF (High)	0.0202	2.4895
ADF (Medium)	0.0224	-0.4611
ADF (Low)	0.1129	1.2112

Source: Research findings

Table3. Results of model estimation by GMM method

Dependent Variable LOG FDI	HIGH		MEDIUM		LOW	
Model Variables	**Coefficients**	**Prob.**	**Coefficients**	**Prob.**	**Coefficients**	**Prob.**
C (Fixed effect)	-41.63	0.0000	-94.55	0.0000	103.08	0.0000
LOG FDI(-1)	0.072	0.0036	0.2391	0.0053	0.2486	0.0001
LOG EXDEBT	-0.730	0.0000	-0.644	0.2476	-1.521	0.0000
LOG INFLATIONCP	0.1275	0.0037	-0.684	0.0001	-0.353	0.0130
LOG GCF	0.2736	0.000	-0.368	0.0075	0.471	0.0002
LOG TRADE	1.4394	0.0015	2.0138	0.0016	5.071	0.0000
LOG GDP	1.0675	0.0065	4.8875	0.0002	-2.54	0.0003
LOG TAX	-1.142	0.0021	-2.203	0.0002	-0.51	0.0025
LOG GGCE	0.8632	0.0342	8.095	0.0033	0.0033	0.0000
LOG ES	0.3317	0.0002	-0.434	0.0089	-0.011	0.0190
LOG VA	4.3697	0.0000	-1.330	0.0001	0.1876	0.0013
LOG EFCI	27.174	0.0000	3.5196	0.0007	-5.501	0.0003
J-Statistic	8.8811	0.3524	0.4163	0.9987	5	0.4159

Source: Research findings

List of Countries (High HDI)

Argentina	Brazil	Jamaica	Macedonia	Saudi Arabia
Armenia	Chile	Jordan	Montenegro	Serbia
Azerbaijan	Colombia	Kazakhstan	Mauritius	Tonga
Bulgaria	Algeria	Kuwait	Malaysia	Tunisia
Bahamas	Ecuador	Libya	Panama	Turkey
Bosnia	Georgia	Lithuania	Poland	Ukraine
Belarus	Croatia	Latvia	Romania	Uruguay
Belize	Iran	Mexico	Russian	Venezuela

List of Countries (Medium HDI)

Bolivia	Gabon	Cambodia	Nicaragua	Syrian Arab Republic
Botswana	Guatemala	Lao PDR	Pakistan	Thailand
China	Guyana	Sri Lanka	Philippines	Tajikistan
Congo, Rep.	Honduras	Morocco	Paraguay	Turkmenistan
Dominican Republic	Indonesia	Maldives	El Salvador	Timor-Leste
Egypt, Arab Rep.	India	Mongolia	Suriname	Uzbekistan
Fiji	Kyrgyz Republic	Namibia	Swaziland	Vietnam

List of Countries (Low HDI)

Afghanistan	Comoros	Kenya	Malawi	Sierra Leone
Angola	Djibouti	Liberia	Niger	Chad
Burundi	Ethiopia	Lesotho	Nigeria	Tanzania
Benin	Ghana	Madagascar	Nepal	Uganda
Burkina Faso	Guinea	Mali	Papua New Guinea	Yemen, Rep.
Bangladesh	Gambia, The	Myanmar	Rwanda	Zambia
Cote d'Ivoire	Guinea-Bissau	Mozambique	Sudan	Zimbabwe
Cameroon	Haiti	Mauritania	Senegal	

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RESEARCH ARTICLE

Optimization of Process Conditions for the Effective Biodegradation of Azo Orange Dye by Actinomycetes

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ABSTRACT

The present study was carried out to biodegrade the textile azo orange dye by using two actinomycetes strains (DJP1 and DJP2) isolated from dye contaminated soil in and around Palakaad textile industry, Palakkad District, Kerala. The decolourizing activity was measured spectrophotometrically after incubation of the isolates for 48h in mineral salt medium amended with 50 mg/L of the test dye. It was noticed that there was a decrease in the OD indicating the degradation of the test dye by both the isolates studied. Different pH, temperature, culture volume and dye concentration were used in the present study to investigate their effect on the decolourisation rate. Decolourisation of the dye was studied both under shaking and static condition. Both the actinomycetes exhibited significant decolourizing activity after 48h of incubation. DJP2 isolate exhibited better degradation ability than isolate DJP1. The degrading ability decreased with increase in dye concentration whereas increase in degradation was observed with an increase in the inoculum size. The optimum pH and temperature for the decolourization was 7.2 and 37 °C, respectively. The results of present study thus suggest that the DJP1 and DJP2 can be effectively used to treat waste water containing reactive dyes.

Key words: Azo dye, Industrial effluent, Microbial degradation, Actinomycetes.

INTRODUCTION

Environmental pollution caused by the release of industrial wastewater contaminated with a wide range of azo dyes is a serious problem in present days. Azo compounds constitute the largest and the most diverse group of synthetic dyes that are widely used in a number of industries such as textile, food, cosmetics and paper printing [1]. The annual world production of azo dyes is estimated to be around one million tons, and more than 2000 structurally different azo dyes are currently in use [2]. Azo dyes, containing one or more azo bond (-N=N-), account for 60-70% of all textile dyestuffs used [3]. The industrial manufacturing of azo dyes and their usage in textile industries generate waste water contaminated with azo dyes. The discharge of such highly colored synthetic dye effluents is aesthetically displeasing and cause considerable damage to the aquatic life [4]. These dyes are recalcitrant to biodegradation due to their xenobiotic nature and are mutagenic and carcinogenic [5]. In addition to toxicity, dye wastewaters have high TOC, high salt content and extremes in pH, with reactive dye baths having high pH and acid dye baths have low pH [6]. Several physical-chemical methods have been used to eliminate the colored effluents in wastewater, however they are generally expensive, and produce large amounts of sludge. More often these conventional modes of treatment lead to the formation of some harmful side products [4]. Owing to these aspects, the use of biological methods for the treatment of textile wastewaters has received attention as a more effective alternative. Compared with chemical and physical methods, biological processes using microorganisms have received more interest because of their cost effectiveness, lower sludge production and environmental friendliness [7] [8]. Microorganisms have developed enzyme systems for the decolorization and mineralization of azo dyes under certain environmental conditions [1]

A number of studies on the degradation of azo dyes by bacteria and fungi have been done [9] [10]. Unfortunately, most azo dyes are recalcitrant to aerobic degradation by bacterial cells. However, there are a few known microorganisms that have the ability to degrade azo dyes under aerobic conditions [11] [12]. Actinomycetes now are being recognized for their degradative capacity of highly recalcitrant compounds [13]. In the present study we have screened two isolated actinomycetes strains (DJP1 and DJP2) for their ability to decolorize azo dyes present in the textile effluents.

MATERIALS AND METHODS

Decolourisation experiments

The two isolates (DJP1 and DJP2) were grown and maintained on the enrichment media proposed by [14] amended with 50 mg/L of the azo orange dye at a temperature of 37 °C under agitation at 180 rpm. Decolourization experiments were carried out in 100 mL of the medium (glucose 0.1%, yeast extract 0.05%, peptone 0.5%, NaCl 0.5%, $(NH_4)_2SO_3$ 1%, K_2HPO_4 0.02%, KH_2PO_4 0.5% and $MgSO_4.7H_2O$ 0.5%) amended with 50 mg/L of the test dye. Different pH and temperature, culture volume and dye concentration were used in the present study to investigate their effect on the decolourisation rate. All experiments were done in triplicates.

Analytical methods for dye decolourisation studies

Aliquots (3 mL) of the culture media were withdrawn at time intervals of 6 h over 48 h and centrifuged at 7000 rpm for 15 min. Decolourisation was quantitatively analyzed by measuring the absorbance of the supernatant using a UV–visible spectrophotometer (Spectronic® GENESYS TM 2PC; UNI/NRE/GPA/106) at maximum wavelength, λmax, of 544 nm for azo orange dye. The decolourisation rate was calculated using the equation [15].

$$\text{Dye decolorisation (\%)} = \frac{\text{Initial absorbance} - \text{Final absorbance}}{\text{Initial absorbance}} \times 100$$

Evaluation of decolourisation capacity of the isolates at different dye concentrations

Decolourisation capacity of the two isolated strains was studied by preparing, various concentrations of dye from wastewater effluent (50, 100, 200, 300, 400 and 500 mg/L) [16]. Decolourisation rate was investigated under shaking condition. A fixed inoculum of 20 % (2 ml) was used in the study. The pH was maintained at 7.2. The percentage decolourisation was determined over 48 h period.

Evaluation of decolourisation capacity of the isolates at different inoculum concentrations

Decolourisation capacity of the two isolated strains was studied by preparing, various concentrations of inoculum viz., 10% (1 ml), 20% (2 ml), 30% (3 ml) and 40% (4 ml). Decolourisation rate was investigated under shaking condition. A fixed dye concentration of 300 mg/L was used in the study. The pH was maintained at 7.2. The percentage decolourisation was determined over 48 h period.

Evaluation of decolourisation capacity of the isolates at different pH

Decolourisation capacity of the two isolated strains was studied in relation to the effect of different pH concentrations (3, 5, 7.2, 8, 10 pH). pH was adjusted using either HCl (0.1M) or NaOH (0.1M). Inoculum size of 20% (2 mL) was used to access the decolourisation rate under shaking condition. A fixed dye concentration of 300 mg/L was used in the study. The percentage decolourisation was determined over 48 h period.

Evaluation of decolourisation capacity of the isolates at different temperature

Decolourisation capacity of the two isolates was studied in relation to the effect of different temperatures such as 25 °C, 30 °C and 37 °C. Inoculum size of 20% (2 mL) and a fixed dye concentration of 300 mg/L were used to access the decolourisation rate under shaking condition. The pH was maintained at 7.2. The percentage decolourisation was determined over 48 h period.

Decolourisation at static and shaking conditions

Decolourisation of textile dye effluent by the two isolated strains was studied under shaking and static culture at optimum pH (7.2) and temperature (37°C) [17]. 1 ml inoculum from each isolate was individually introduced into separate 100 mL conical flask containing 10 mL growth medium amended with 50 mg/L of the dye. One set of flask was incubated under agitation at 180 rpm and temperature of 37 °C while the second set was incubated under stationary condition at 37 °C for a period of 48 hours. The control consisted flask without any microorganisms. Decolourisation was quantitatively analyzed by measuring the absorbance of the culture supernatants using a spectrophotometer.

Determination of nitrates concentration (NO_3^-) in treated sample

The nitrate concentration in the treated samples was determined using the sodium salicylate method [18] In the presence of sodium salicylate, nitrates would give paranitrosalicylate which has yellow coloration and colorimetric

techniques can be carried out to determine the concentration of the nitrates. The NO_3^- concentration was determined before and after decolourisation of dye using both the bacterial isolates under shaking conditions.

The Nitrate concentration was calculated using the following formula

$$\text{Nitrate in sample} = \frac{\text{O.D of sample}}{\text{O.D of Known Standard}} \times \text{Standard concentration}$$

Standard concentration was 5 mg/L

RESULTS

Decolourisation of azo orange dye by the two bacterial isolates at static condition

The rate of decolourisation of the dye was noted by measuring the optical density (OD) at 544 nm and decolourisation % was calculated, which are tabulated in table 1. Both the isolates exhibited good decolourisation activity. Isolate DJP2 showed better decolourization (67.1%) than isolate DJP1 (60.0%), after 48 h of incubation at static condition.

Decolourisation of azo orange dye by the isolates at shaking condition

The rate of decolourisation of the dye was noted by measuring the optical density at 544 nm and decolourisation % was calculated, which is tabulated in table 2. Isolate DJP2 showed better decolourisation activity at shaking condition than at static condition. Isolate-DJP2 exhibited better decolourization (73.3%) activity than isolate-DJP1 (60.0%) after 48 h of incubation at shaking condition.

Decolourisation of azo orange dye by the isolates at different dye concentrations

The capacity of the isolates to degrade the azo orange dye, by keeping the inoculum constant and increasing the dye concentration, was studied and the data is tabulated in table 3 and 4. Better degradation was observed with isolate 2 than the isolate 1. The capacity of degradation decreased with increasing concentration of dye in both the cases. Above 80% degradation was observed with both the isolates at 50mg/L concentration of the dye.

Decolourisation of azo orange dye by the isolates at different inoculum size

The capacity of the isolates to degrade the azo orange dye, by keeping the dye concentration constant and increasing inoculum size, was studied and the data is tabulated in table 5 and 6. The capacity of degradation increased with increasing inoculum size in both the cases. Above 85% degradation was observed with both the isolates at 40% inoculum concentration.

Decolourisation of azo orange dye by the isolates at different pH

Effect of different pH on the two isolates in degrading the dye was monitored by measuring the optical density at different time intervals, and tabulated below in tables 7 and 8. Maximum degradation was observed at pH 7.2 in both the cases and was considered as optimum pH.

Decolourisation of azo orange dye by the isolates at different temperature

The dye degradation by two isolates at different temperatures were monitored and tabulated below in table 9 and 10. Maximum degradation was observed at 37 °C in both the cases and was considered as optimum temperature.

Determination of nitrates concentration (NO_3^-) in treated sample

The Nitrate concentration was obtained by measuring the optical density at different intervals of time and the OD obtained and the corresponding nitrate concentration are tabulated in table 11.

DISCUSSION

A number of azo dyes including reactive dyes are used in textile dying operations. This leads to effluent streams containing intense colour due to the presence of azo dyes. The removal of azo dyes from effluents is important due to their mutagenicity and carcinogenicity together with their intense colouration. Physicochemical and biological methods for the removal of dyes have been investigated widely, biological methods being preferred more presently due to various advantages. Owing to this, in the present study two actinomycetes isolates were screened for their dye degrading ability. Both the isolates exhibited significant dye degradation that was monitored spectrophotometrically. Since the isolates were originated from the dye contaminated wastewater, they could easily adapt to the prevailing environment. Microbes isolated from dye contaminated environment usually exhibit better degradation activity [19]. There are also a few reports on the partial or complete biodegradation and decolourization of the textile effluent and dyes using pure or mixed cultures of actinomycetes and their enzymes [20] [13] [21].

Effect of different dye concentrations, inoculum size, pH and temperature was studied. Degradation was maximal at lower dye concentration and decreased with increased dye concentrations. Similar results have been reported by many other workers i.e. higher net color removal efficiencies at lower dye concentrations [22] [23].Decrease in decolorization ability at high substrate concentration might be due to the increased toxicity of the dye with increased concentration [24]. In case of pH as a variable, decolorization was on higher side at pH 7.2. Whereas lower and higher pH decreased the decolorization efficiency of both the tested isolates. Neutral or near neutral pH is known to be optimal for bacterial degradation activity [25]. Temperature is another very important parameter for treatment of wastewater. Selected isolates showed better decolorization at 37°C. This could be due to a greater production of enzymes and optimal growth conditions of the isolate for its dye decolorizing ability. The decolorization at this optimum temperature may be owing to higher respiration and substrate metabolism. This also demonstrates that decolorization of the dye was through microbial reaction which relies on optimal temperature and not by adsorption [25]. The degradation was better at stationary condition than at static condition indicating that the degradation was under aerobic condition. Degradation of azo dyes under aerobic condition by bacteria has been reported [26] [27].

CONCLUSION

The two isolates DJP1 and DJP2 are found to be good biodegrading actinomycetes. They could resist a dye concentration of 300ml/L and exhibit degradation activity. The optimum pH and temperature were found to be 7.2 and 37^{o}C respectively. The results obtained indicate that these two isolates could be employed for biodegradation of dye contaminated effluents. However, there is a need for further research to precisely characterize the isolates and to understand the enzymes and other parameters involved in the degradation activity.

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Table1. Decolourisation of azo orange dye by the isolates at static condition

Time in hours	Isolate - DJP1		Isolate - DJP2	
	OD at 544 nm	Decolourisation %	OD at 544 nm	Decolourisation %
0 (Blank)	2.4	0.0	2.4	0.0
6	2.29	4.58	2.16	10.0
12	2.09	12.9	1.98	17.5
18	1.96	18.3	1.72	28.3
24	1.74	27.5	1.51	37.0
30	1.56	35.0	1.36	43.3
36	1.33	44.5	1.18	50.8
42	1.19	50.4	1.02	57.5
48	0.96	60.0	0.79	67.1

Table2. Decolourisation of azo orange dye by isolates at shaking condition

Time in hours	Isolate - DJP1		Isolate - DJP2	
	OD at 544 nm	Decolourisation %	OD at 544 nm	Decolourisation %
0 (Blank)	2.4	0.0	2.4	0.0
6	2.22	7.5	2.03	15.4
12	1.94	19.1	1.88	21.6
18	1.78	25.8	1.62	32.5
24	1.56	35.0	1.46	39.2
30	1.42	40.8	1.29	46.3
36	1.33	44.5	1.12	53.3
42	1.12	53.3	0.96	60.0
48	0.96	60.0	0.64	73.3

Table3. Decolourisation of azo orange dye by Isolate - DJP1 at different dye concentrations

Time in hours	Azo orange dye concentrations											
	50 mg/L		100 mg/L		200 mg/L		300 mg/L		400 mg/L		500 mg/L	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	1.42	0.0	1.73	0.0	2.10	0.0	2.35	0.0	2.56	0.0	2.78	0.0
6	1.20	15.5	1.62	6.4	1.94	7.6	2.18	7.2	2.39	6.6	2.54	8.6
12	1.04	26.8	1.41	18.5	1.72	18.1	1.93	17.9	2.21	13.7	2.44	12.2
18	0.91	35.9	1.26	27.2	1.59	24.3	1.74	26.0	1.98	22.7	2.31	16.9
24	0.77	45.8	1.16	32.9	1.39	33.8	1.56	33.6	1.72	32.8	2.18	21.6
30	0.59	58.5	1.02	41.1	1.21	42.4	1.39	40.9	1.57	38.7	2.03	27.0
36	0.41	71.1	0.89	48.6	1.09	48.1	1.21	48.5	1.36	46.9	1.89	32.0
42	0.34	76.1	0.72	58.4	0.85	59.5	1.01	57.0	1.22	52.3	1.76	36.7
48	0.23	83.8	0.61	64.7	0.74	64.8	0.87	63.0	1.09	57.4	1.61	42.1

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table4. Decolourisation of azo orange dye by Isolate – DJP2 at different dye concentrations

Time in hours	Azo orange dye concentrations											
	50 mg/L		100 mg/L		200 mg/L		300 mg/L		400 mg/L		500 mg/L	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	1.42	0.0	1.73	0.0	2.10	0.0	2.35	0.0	2.56	0.0	2.78	0.0
6	1.11	21.8	1.55	10.4	1.88	10.5	2.02	14.0	2.27	11.3	2.42	12.9
12	0.98	31.0	1.33	23.1	1.69	19.5	1.84	21.7	2.13	16.8	2.28	18.0
18	0.83	41.5	1.18	31.8	1.49	29.0	1.69	28.1	1.83	28.5	2.04	26.6
24	0.68	52.1	1.02	41.1	1.31	37.6	1.48	37.0	1.64	36.0	1.88	32.4
30	0.51	64.1	1.02	41.1	1.12	46.7	1.31	44.3	1.48	42.2	1.76	36.7
36	0.34	76.1	0.81	53.2	0.96	54.3	1.07	54.5	1.27	50.4	1.62	41.7
42	0.26	81.7	0.64	63.0	0.74	64.8	0.92	61.0	1.14	55.5	1.53	44.9
48	0.18	87.3	0.49	71.7	0.61	71.0	0.79	66.4	0.99	61.3	1.40	49.6

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table5. Decolourisation of azo orange dye by Isolate-DJP1 at different inoculum size

Time in hours	Inoculum concentrations							
	10%		20%		30%		40%	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	2.21	0.0	2.28	0.0	2.34	0.0	2.46	0.0
6	2.16	2.3	2.09	8.3	2.04	12.8	2.0	18.7
12	1.98	10.4	1.92	15.8	1.78	23.9	1.64	33.3
18	1.82	17.6	1.68	26.3	1.56	33.3	1.36	44.7
24	1.73	21.7	1.54	32.5	1.35	42.3	1.16	52.8
30	1.60	27.6	1.39	39.0	1.24	47.0	0.81	67.1
36	1.46	34.0	1.28	43.9	1.12	52.1	0.62	74.8
42	1.38	37.6	1.09	52.2	0.93	60.3	0.47	80.9
48	1.10	50.22	0.83	63.6	0.74	68.4	0.33	86.6

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table6. Decolourisation of azo orange dye by Isolate-DJP2 at different inoculum size

Time in hours	Inoculum concentrations							
	10%		20%		30%		40%	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	2.21	0.0	2.28	0.0	2.34	0.0	2.46	0.0
6	2.08	51.1	1.96	14.0	1.88	19.7	1.80	26.8
12	1.82	17.6	1.74	23.7	1.69	27.8	1.61	34.6
18	1.61	27.1	1.53	32.9	1.46	37.6	1.31	46.7
24	1.53	30.8	1.41	38.2	1.33	43.2	1.04	57.7
30	1.42	35.7	1.23	46.1	1.14	51.3	0.74	69.9
36	1.26	43.0	1.08	52.6	1.02	56.4	0.57	76.8
42	1.08	51.1	0.91	60.1	0.83	64.5	0.33	86.6
48	0.80	63.8	0.72	68.4	0.66	71.8	0.21	91.5

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table7. Decolourisation of azo orange dye by Isolate-DJP1 at different pH

Time in hours	pH 3		pH 5		pH 7.2		pH 8		pH 10	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	2.4	0.0	2.4	0.0	2.4	0.0	2.4	0.0	2.4	0.0
6	2.4	0.0	2.36	1.7	2.24	6.7	2.28	5.0	2.38	0.8
12	2.32	3.3	2.27	5.4	2.02	15.8	2.11	12.1	2.30	4.2
18	2.32	3.3	2.18	9.2	1.89	21.3	1.98	17.5	2.28	5.0
24	2.28	5.0	2.04	15.0	1.73	27.9	1.86	22.5	2.19	8.8
30	2.28	5.0	1.96	18.3	1.54	35.8	1.72	28.3	2.14	10.8
36	2.28	5.0	1.84	23.3	1.38	42.5	1.64	31.7	2.04	15.0
42	2.28	5.0	1.73	27.9	1.19	50.4	1.56	35.0	2.0	16.7
48	2.28	5.0	1.61	32.9	0.92	61.7	1.44	40.0	1.98	17.5

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table8. Decolourisation of azo orange dye by Isolate-DJP2 at different pH

Time in hours	pH 3		pH 5		pH 7.2		pH 8		pH 10	
	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %	OD	DCL %
0	2.4	0.0	2.4	0.0	2.4	0.0	2.4	0.0	2.4	0.0
6	2.4	0.0	2.35	2.1	2.21	7.9	2.30	4.2	2.38	0.8
12	2.32	3.3	2.24	6.7	1.93	19.6	2.16	10.0	2.36	1.7
18	2.32	3.3	2.14	10.8	1.78	25.8	1.88	21.7	2.30	4.2
24	2.29	4.6	2.0	16.7	1.62	32.5	1.79	25.4	2.22	7.5

30	2.27	5.4	1.81	24.6	1.48	38.3	1.67	30.4	2.16	10.0
36	2.26	5.8	1.75	27.1	1.21	49.6	1.53	36.3	2.08	13.3
42	2.24	6.7	1.68	30.0	1.09	54.6	1.43	40.4	1.90	20.8
48	2.24	6.7	1.61	32.9	0.83	65.4	1.33	44.6	1.83	23.8

OD – Optical density at 544nm; DCL – decolourisation percentage

Table9. Decolourisation of azo orange dye by Isolate-DJP1 at different temperature

Time in hours	25 °C		30 °C		37 °C	
	OD	DCL %	OD	DCL %	OD	DCL %
0	2.34	0.0	2.34	0.0	2.34	0.0
6	2.16	7.7	2.09	10.7	2.04	12.8
12	1.98	15.4	1.92	17.9	1.78	23.9
18	1.82	22.2	1.68	28.2	1.56	33.3
24	1.73	26.1	1.54	34.2	1.35	42.3
30	1.60	31.6	1.39	40.6	1.24	47.0
36	1.46	37.6	1.28	45.3	1.12	52.1
42	1.38	41.0	1.09	53.4	0.93	60.3
48	1.10	53.0	0.83	64.5	0.74	68.4

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table10. Decolourisation of azo orange dye by Isolate-DJP2 at different temperature

Time in hours	25 °C		30 °C		37 °C	
	OD	DCL %	OD	DCL %	OD	DCL %
0	2.34	0.0	2.34	0.0	2.34	0.0
6	2.08	11.1	1.96	16.2	1.88	19.7
12	1.82	22.2	1.74	25.6	1.69	27.8
18	1.61	31.2	1.53	34.6	1.46	37.6
24	1.53	34.6	1.41	39.7	1.33	43.2
30	1.42	39.3	1.23	47.4	1.14	51.3
36	1.26	46.2	1.08	53.8	1.02	56.4
42	1.08	53.8	0.91	61.1	0.83	64.5
48	0.80	65.8	0.72	69.2	0.66	71.8

OD – Optical density at 544 nm; DCL – decolourisation percentage

Table11. Nitrates (NO_3^-) concentration in treated sample

Time in hours	Isolate-1		Isolate-2	
	OD at 544 nm	Nitrates concentration in mg/L	OD at 544 nm	Nitrates concentration in mg/L
6	0.21	0.86	0.34	1.39
12	0.68	2.78	0.74	3.03
18	1.01	4.13	1.13	4.63
24	1.23	5.04	1.46	5.98
30	1.58	6.47	1.62	6.63
36	1.83	7.5	1.88	7.7
42	2.02	8.27	1.98	8.11
48	2.36	9.67	2.1	8.6

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RESEARCH ARTICLE

An Investigation of Health and Ergonomic Aspects in Designing and Setting up a Small Wood Product Workshop with a Study of Environmental Conditions in an Existing Workshop

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ABSTRACT

In recent years, many workshop companies in small manufacturing industries and wood products are active throughout the country. Since most of these centers are set up with minimal cost and without basic research in various fields, particularly health and ergonomic issue, the risk of diseases and problems from work would be inevitable for employees in these centers in coming years. In this study, we tried to investigate not only factors influencing the design and setting up of a small wood workshop but also health and ergonomic requirements. Therefore, Wood Workshop of Industrial Design in Islamic Art University of Tabriz, was selected as a case study and its health condition was measured from different aspects, including noise, light and dust. The condition of the workshop indicated that the volume of noise and dust exposure was in the standard range, and the brightness rate was desirable and tolerable. Finally, some solutions for improving and reducing the risks of occupational disorders in the workplaces have been suggested and the requirements that must be considered in designing these workshops have been mentioned briefly.

Key words: Small workshops producing wooden products, safety and ergonomics, work-related problems and diseases

INTRODUCTION

In developing countries, work-related problems and diseases are important, poor working conditions and lack of effective preventing programs resulted in occupational diseases among the employees of these centers (1, 2). Despite a lot of research in the field of occupational health and safety, yet many businesses, especially small personal workshops health and ergonomic issues are not considered. Wood-product workshops are among those industries. Carpentry job, can cause some major health problems, including nose cancer and nasal sinus (3) and (4), eye injuries caused by wood chips thrown into the eyes, toxicity associated with the use of solvents and polishing substances and the toxicity of the various types of wood (Toxic woods) including the possibility of fungus, mold and parasites or other toxic substances. Furthermore, different injuries caused by excessive noise, vibration, especially in the hand and arm, disorders such as Raynaud's syndrome symptoms and bone and cartilage injury in more severe cases, back pain caused by repeated bending, lifting heavy objects, twisting, pulling and pushing objects. (Guide to Occupational Health in carpentry), most of these workshops are set up to produce furniture, wooden cabinets and a variety of wooden crafts. It is obvious that prior to designing and establishing of workshops, safety issues should be the priority goal and program since lack of attention on this matter can cause irreversible consequences. Is your workshop safe? What are the safety requirements of a small wood workshop? This study is to investigate the harmful environmental factors in a small woodcraft workshop to answer these questions. Regarding to the specialty of the work that wood workshops are doing, it uses special instruments and equipment, generally these specialties include cutting, grating the surface, fitting, bending, embossing or engraving on wood, and final woodturning. Space required for the workshop can vary for the works of the workshop, for example, embossing or engraving on wood requires less space than furniture producing (5). The space includes many huge tools such as saw table, tool compartment, and electric hand tools, including drills, vertical saw, and small hand device shelves such as the caverns, grate, and the clamps. Figure 1 shows some of the machinery and tools in wood workshops.

A simple wood workshop includes machinery, hand tools, solvents, wood and wood dust, which may have potential risks to its users. Physical activities such as lifting and carrying heavy loads, inhaling dust, gases, being in touch with chemicals, long-term exposure to loud noises, working with vibrating electrical equipment, etc., which requires safe and careful management.

To achieve greater safety and health, workers at these centers, in addition to knowledge and experience in the manufacturing of wood products, must have sufficient knowledge about the safety requirements in various occasions. Given the importance of the health and safety of employees while working, several studies have been conducted in various countries associated with this job. In the study conducted by (6) ten wood workshops in Colombia were evaluated from the dust and harmful gases exposure aspect. The research involved 177 workers the results of this paper show that all the workers were at the exposure of severe injuries by dust in the environment. Another study in Tanzania evaluated the workers' exposure to wood dust and endotoxin bacteria. The results show that engraving (embossing), and manual cleaning were associated with the greatest exposure to dust and clean and upholstery hand sewing and cleaning by hand also had the highest levels of endotoxin that requires necessary controls (7).

Risk of various accidents in workshops has been studied by Michael Wood et al in British Columbia and Canada wood workshop. In most cases when people are under pressure to increase productivity, the risk, including falling timber, deep skin and tissue abrasion, cutting and amputations in using saws, and nails piercing through the body during the use of pneumatic nailing, threat the safety of workers and the risk of occurrence of these events became too much by temperature changes and loud noise of the work environment. The data indicate that there is improvement and in the 1998-2002 period, there is about 25 percent decrease at the rate of non-fatal incidents in wood and paper products (8). The rate of reported incidents for wood products in Maine State is about twice comparing to the other jobs in the state. A case study for determining the preventable risks in wood factories was

done by Holcraft. The results showed that these factors include high rate of physical work, high speed of work with machinery, no break for rest, lack of training, lack of luck / stop working program and lack of expert supervisors (9).

Ratnasingam et al investigated the various factors of accidents in wood workshops in Malaysia, Thailand, Indonesia, and Vietnam, in addition to environmental factors; they also studied the effect of behavioral characteristics of individuals in the incidence of these events (10). The effect of behavioral characteristics has already been studied by Holcraft 2009, but Ratnasingam studied on contract workers(11). Their study shows that contract workers are less prone to accidents in comparison to permanent workers, and their productivity is higher. Contract workers have more positive motivation to do well, and they are more active in getting safety guidelines (11).Noise is one of the most common causes of adverse working environment in industrial that threat individuals, health directly and indirectly. Hear loss, temporary and permanent deafness are among the direct effects and cases such as interference in the conversation and disruption in communication and social interaction; physiological changes such as increased blood pressure and hyper tension are among the indirect effects (12). In addition to the individual effects, noise pollution affects the bio environmental and by the growing numbers of factories and manufacturing centers in large cities, noise pollution and its controlling methods should be considered prior to setting up the business (13). On the evaluation and control of noise at the workplace, many studies have been done, for example, in one study, the level of noise pollution produced in the wood chips unit of Mazandaran paper and wood company, was investigated and some suggestions were given for reducing it (14). In another study in Malaysian timber industry, both noise and chemical agents were studied as the most environmental polluting factors in the work (10). In the similar article, the noise volume is measured in the five wood product workshops in Tanzania; the average noise at the center was about 86.8, which is higher than the standard exposure.

Risk in the workplace can fall into two categories of safety and health dangers. Safety risks are related to the risk of injuries and sudden incidents such as electrical and mechanical accidents, and most of the health dangers jeopardize the health over time such as the dangers of excessive exposure to noise, dust and vibration (15). Before the start of monitoring workplace health hazards in the selected workplace, a number of different workshops in Tabriz had been observed and their conditions were often very not safe and risky. Observations showed that a lot of workers working in the small workshops do not use personal protective equipment. The pictures below shows some examples of the workshops (Fig. 2).

Measurement of harmful agents

The base of the process of risk assessment is identification of hazards in the work environment. Overall environmental risk factors include: chemical agents (gases, vapors, liquids and solids) physical agents (noise, heat, cold, light, ionizing and non-ionizing radiation), and biological factors: (any living organism such as bacteria, viruses, fungi, parasites) (16). In this paper, in addition to visiting of workplace and evaluating various risk factors, sound, lighting, and dust was measured. Before the measurement processes the plan of target place and position of the machinery were determined. This workshop is approximately 72 square meters, and a ceiling height is 5 meters. The roof and walls are made of plaster and floor from mosaic. Measurement of noise was accomplished by calibrated sound level meter while planning machineries, which create noise. Furthermore, regarding to the fact that positioning of the measuring individual near the working individual can cause behavior disorder and effect on his work, an individual dosimeter was attached to the workers clothing to measure environmental noise exposure to the worker. This monitoring is very good for identifying workers at the risk of hearing loss. Since the choice of ear protecting device should be according to the intensity of sound intensity, measurement was necessary in each octave. Results from these monitoring were measured by exposed to noise amount standard in Iran (according to ACGIH). Under this standard, the maximum intensity of 85 dB is considered for an 8-hour work per day, for every 3 dB increase in sound intensity, the person's work time must cut down to half of it. (Regulations occupational exposure limits, and work environment Health Center) if during shifts, a person is in contact with different sound intensity by

measuring the time of per sound intensity, the daily dose is calculated as follow and compared to the standard (Sound in the work environment).(4,16)

$$D.N.D = \frac{C1}{T1} + \frac{C2}{T2} + \cdots + \frac{Cn}{Tn}$$

DND: (daily noise dose), C: (time of exposure to a certain noise level) T: (Permissible sound exposure level). (16)

If the acquired value of the number is larger than 1, the working conditions for sound exposure would be unacceptable.

Light intensity measured by lux meter EC $_1$- Hanger. Light measurement criterion was considered according to the manuals of occupational exposure limits of pathogenic factors (Regulations of occupational exposure limits, and work environment Health Center).

For monitoring aerosols, gases and vapors, sampling pumps are used. Pumps conduct the air containing compounds into the sampling medium (including filters, solid or liquid absorbent). Sampling medium separates superficial adsorption and deep absorption pollutants from the air and then air flows into the pumps and out of it (16). Finally, sampling medium was sent into the laboratory for analysis. The pumps were calibrated before use.

The results of the measurements

The values obtained from measurements in each case were compared to the requirements in (Regulations occupational exposure limits, Work Environment Health Center). The results show that in all stations of the workshop noise level exceeds the standard and reducing strategies must be considered. The lighting was good in all parts of the workshop. The dust was outside the standard range.

Occupational exposure limits for chemical elements in three groups 1: The weight/ time mean (OEL- TWL) 2: Short-term occupational exposure limit (OEL-STEL) 3: Ceiling exposure limits (OEL-C) are provided with various applications. For the majority of factors, weight / time mean alone or in combination with a short-term exposure limit is applicable. Weight / time mean related to the timber dust used in this research is average concentration of a chemical in a 8-hour work day and 40 hours a week so that continuous exposure to all workers do not cause adverse effects if the interval between 8-hour work and returning to working is not less than 16 hours. (Regulations of occupational exposure limits, and work environment Health Center). This amount for the wood dust is considered 5mg / m $^{3.}$

In the case of an amount of light needed in this work, according to the occupational exposure limits for usual imprecise tasks such as normal manufacturing and repairing jobs, light intensity is 250 Lx and for precise tasks such as planning and accurate designing is 500 Lx (regulations about occupational exposure, work environment health center) and these amounts are minimum standards proposed for this study. Values obtained at different stations are in Table 2.

Possible strategies for reducing the effects of harmful agents:

Workshop space layout planning should be coordinated with the type of the work and the characteristics of space, including the location of doors and windows, access to electricity supply. For example, MDF and board require more

space for carrying, storing and cutting. Space division according to the type of work accelerates work process and reduces human mistakes. For example, cutting, fitting, and space (fig. 3).

Air compressors have a very effective and important role in a wood workshop. These compressors are used for the launching of some pneumatic tools such as pneumatic stapler and nailer. The device is one of the major noise creator machines in the workplace. Noise pollution can have a serious damage not only in workshop staffs, but also in harassment of neighbors and the environment. Creating isolated spaces for the equipment that are sound and dust creator can have a greater output and safety for staffs. Installation of sound-absorbing panels (foam) also moderates this problem in a great amount. However, before installing any sound absorbing panel, safety against fire must be considered first and the use of personal protective equipment such as earmuffs are recommended while working.

When the average amount of wood dust is less than 200 microns, there is the risk of the explosion, and it happens if less than 10% of the mixture contains less than 80 microns dust. Thus, controlling of environmental dust, in addition to the prevention of respiratory diseases, is necessary to avoid the risk of an explosion. (Safe collection of wood waste) Dust controlling equipments are among requisite equipment in wood workshops. These devices are available in a variety of types from small suction to all types of ventilation systems able to be connected to machines simultaneously. (Wood dust: controlling the risks) For example, Whitman in his private workshop, in an area of 1,200 square feet has an 8-inch jointer, 15-inch grater, a s 10-inch table saw and a 16-inch electric sanding which are all supported by a 1. 5 hp sucker. This size is sufficient if they do not to be used simultaneously. It is better to use the smaller dust sucker when a dust creating electrical hand equipment is used. Use of a ventilation system which is hung from the ceiling and absorb air particles by filters can lower the inhale of particles into the respiratory tracts of staffs. Still, the use of masks, safety and periodic cleanliness of the workshops, especially in cases where the workload is high are recommended. Personal protective equipment such as masks must be selected according to the dust volume and pollutant gas type (Fig. 5) (regulations for Individual protective devices)

Workshop heating systems are among the cases that must be selected meticulously. Workshop environment is a place which is prone to fires (wood dust: controlling the risks) and in the case of fire quick spreading will be possible. Therefore, heating system should be selected cautiously. For desirable temperature and humidity for the personnel and materials (wood) use of an air-conditioning system seems to be a good option.

Regulations for the protection of timber cutting machines, has mentioned various wood cutting machines and also mentioned some tips on the safety of different machine and environmental conditions in workshop and safety requirements for each of the saw machines. For creating more safety in the use of risky machinery, some low-cost and simple solutions can have more effective impacts. For example, designing and manufacturing of small parts for various cuttings can bring more safety to the workers. Figure 6 shows some examples of these helping components.

People working in various jobs, including carpentry job should be familiar enough with the chemical characteristics of all materials they are using, these characteristics have been listed in the material safety data sheet (MSDS) and are accessible to people. Each paper contains useful information about the inflammability, poisoning by inhalation, ingestion, and skin and other different risks (Work safe BC).

DISCUSSION AND CONCLUSIONS

Investigation of the health conditions in the wood workshop of Islamic Art University of Tabriz Branch indicated that light rate is desirable in different parts of this workshop while dust and sound volume is out of the standard limits. In comparison to prior studies(17) in this area, the results of this study also emphasize on the existence of dust and sound higher than standard limits in carpentry job and in most of the existing small wood workshops around the country, protective devices for reducing dust and sound are rarely used. Previous studies, statistics of suffering from

hearing loss and respiratory disorders among the workers in this job indicate the validity of the relationship between these diseases and the risks.

The air pollution findings are sampled by considering whether conditions during the day in autumn, and the activities in the sampling time and workload are valid in the unit. Therefore, for reliability and comparison of the results, it is suggested to do the measurement during different time intervals and weather condition.

Fortunately various strategies for encountering these risks are being used throughout the world which has significant decrease in the diseases and incidents, and some of them are referred in this study. Precise determining of the risk of this job, statistics of the people suffering various diseases in this job and other small workshops in the country and suggesting efficient strategies for reducing incidents and results of them can be a further study for accomplishing this study.

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Figure 1. Some devices and machinery, which are used in the most of wood workshops.(4)

Figure 2. Existing condition in one of the workshops in Tabriz, most of the workshops are like this one.

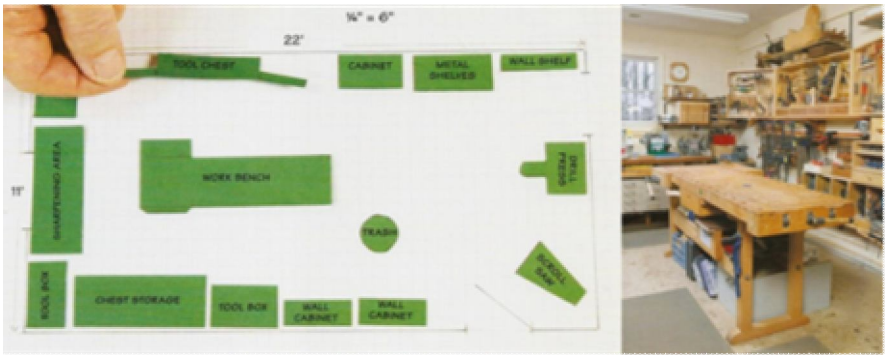

Figure 3. Hand device division and shelving (right), and division and layout of work stations according to interaction intensity (left).

Figure 4. Central portable vacuum system (left), portable vacuum (middle), stationary vacuum system (right).

Figure 5. A sample of mask and air filter which protects eyes and respiratory track simultaneously, a battery operating motor that ventilates the air inside the mask (right), for preventing big particles entrance to the respiratory track a small mask is enough (left, a) but if there are small particles, a mask with changeable cartridge must be used (left b, c).(4)

Figure 6. An arm for holding big pieces on the cutting table (left), a V-shaped device for cutting small pieces (middle), a device for more safety and ease in cutting (right).

Table 2: Results of measuring the general light intensity (the day condition).

	Station name	Natural and non natural	evaluation		Station name	Natural and non natural	Minimum standard	Suggested standard	evaluation
1	A-1	271	desirable	10	B-4	432	250	500	Desirable
2	A-2	303	desirable	11	B-5	460	250	500	Desirable
3	A-3	290	desirable	12	B-6	714	250	500	Desirable
4	A-4	320	desirable	13	C-1	780	250	500	Desirable
5	A-5	330	desirable	14	C-2	344	250	500	Desirable
6	A-6	370	desirable	15	C-3	770	250	500	Desirable
7	B-1	448	desirable	16	C-4	486	250	500	Desirable
8	B-2	382	desirable	17	C-5	720	250	500	desirable
9	B-3	395	desirable	18	C-6	780	250	500	Desirable