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FOREWORD TO THE SPECIAL ISSUE

The special issue offers a collection of research papers presented in the first International Conference of Research in Innovation and Technology in Iran, in the subject of entrepreneurship and innovation in the service economy, with a focus on a profitable emerging market of Iran.

This conference held in AmirKabir University of Technology in Tehran brought together a considerable number of researchers, practitioners and executive managers from the country and international community participating in this event. Diversity of researches and background of researchers managed in five separate panels of Innovation and Information Technology; Entrepreneurship, Marketing and Media Management; Engineering and Applied Sciences; Economics and Finance; Environment and Urban Planning. Presentations done in physical appearance as well as virtual presentation, to use technology and innovation for a hybrid form of conference.

As the chair of the conference I hope this special issue will create continued dialogue amongst scholars in the field. Collaborative researchers among researchers from different countries, that can be seen in this special issue.

I would like to thank the authors of the articles in this collection for their influential contributions and their hard efforts during the conference and then for preparation of their final manuscripts. I know it was difficult period of time to improve the conference abstracts to a final publishable paper. By their efforts this special issue is in our hands. My very big thanks is to Prof. Dr. Maria Alejandra Gonzalez-Perez, the Editor-in-Chief of AD-Minister who generously provides the conference with this special issue in the journal of AD-Minister and also for her honorable serving as a scientific member of conference. I also thanks the founding members of this conference, Prof. Dr. Mike Friedrichsen, from Stuttgart Media University and Humboldt School of Germany and Prof. Dr. Wilfried Modinger from Stuttgart Media University and Steinbeis University of Berlin for their very important role in success of the conference. AmirKabir University of Technology optimistically look at the future to establish a tight cooperation with Humboldt School University of Berlin, the founding higher education institute under directorship of Prof. Dr. Mike Friedrichsen. My special appreciation is for Dr. Datis Khajeheian, the scientific editor and the member of scientific board of the conference who took responsibility of the guest editor for this special issue, as well as another special issue for the conference. By his sincere, precise and obsessed supervision, all of selected manuscripts took rounds and rounds of revision and improvements to be prepared for publishing. Last but not least I would like to thanks Mr. Hadi Zarea as Chief of Executive committee of the conference and his wonderful team. From the very first day until today they spent lots of energy and time to make this conference a great and success one, and they succeeded in it. Scientific contribution is possible by support of people in supporting services, as this special issue implies on, so it is very important to recognize and appreciate what this people of executive committee did.

I wish the readers find this special issue as an influential contribution in the field. Moreover, we look forward for a more fruitful and productive conference in the next year. Excellence of human lives depends of collective effort; so let's continue this cooperation in the next conference of research in innovation and technology.

Naser Shams Gharneh
Associate Professor in Industrial Management
AmirKabir University of Technology, Tehran, Iran
Chairman of the First International Conference of Research in Innovation and Technology

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EDITORIAL: ENTREPRENEURSHIP AND INNOVATION IN THE SERVICE ECONOMY

The service sector serves as a key indicator of an economy and as a nation's economy develops, the importance of services also continues to grow. Based on the latest World Bank report, in 2014 the share of the service sector in the North American economy was 78% and in the OECD the percentage recoded was 74.2%. This is considerably higher than the average outlook of the service sector in low income countries, as they recoded a percentage of 47.5% and middle income countries who recorded a percentage of 55.5%. In Iran, the share of the service sector has increased from 48.5% in 1995 to 52.4% in 2014. In comparison with the Middle Eastern average of 46.2%, the Iranian economy is more service-oriented than the other regional economies.

Also manufactured products today have a larger amount of service component compared to decades ago. Many products have been transformed into and are sold as services. The price of many products has dramatically decreased, while the cost of many services has been raised. As a result, the traditional distinction of product-service has been blurred and we live within economies that are characterized by the servitization of products.

Based on this importance, the service markets are a vital portion of a modern economy, especially when it comes to a developing economy such as Iran. For an economy that suffers from a history of inefficiency, unproductivity, disadvantaged in manufacturing, recently freed from strong international sanctions that aims to join the international economy and take a share of the international and regional markets, the service sector is a key for economic development. Most of recent entrepreneurial activities in the country occur in the service sector, especially in communication technology sub-sector. In 2010, 49% of the nation's employment was in the service sector (World Bank, 2017) and it is estimated that there is an increase in the percentage. Recent investments have been also in education and technical training for service markets (Ministry of Labor of Iran, 2016).

As a result of these identified impacts of the service sector to economies, this special issue is a collection of academic articles that addresses the various aspects of the service economy, mostly in the Iranian context. Papers in this special issue highlight the relationship between entrepreneurship and/or innovation in organizations that operate in a service economy. The 12 papers included in this special issue are authored by 30 academics from 14 higher education institutions locates in 5 different countries, namely Iran, Germany, Denmark, Egypt and Turkey. The diversity of author's nationalities is also visible in this issue which have Iranian, German, Japanese and United Kingdom authors. Three papers are co-authored by a collaboration of researchers from different nationalities (Iranian-German, Iranian-Japanese, Iranian-British). The diversity in the geographical, institutional and academic background provides valuable insight into the subject of entrepreneurship and innovation. In service economics, gender equality is an important issue, therefore with 16 male and 14 female authors, this special issue is well balanced from this perspective. Also gender issues, such as women entrepreneurship are covered in this special issue.

The diversity of methods is another characteristic of the selected papers. Empirical and theoretical papers are present in this collection and both quantitative and qualitative approaches have been adopted by the different authors. Quantitative methods such as Structural Equation Modeling, AHP, Regression model and multivariate regression analysis as well as qualitative methods such as the Delphi, thematic analysis and the bibliographic method have been employed in the papers for this issue.

This issue begins with two theoretical papers. Aidin Salamzadeh and Professor David A. Kirby explain how startups grow. Their findings stress the importance of opportunity and identification of an idea as a starting point towards pursuing new venture creation. Then Sara Yousefikhah, a Sociologist, contributes with the subject of sociology of innovation. She adopts the perspective of the social construction of technology and sheds light on the social aspects of technology and how human behavior shape technology implementation.

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In the third paper, Prof.Dr. Mike Friedrichsen, Hadi Zarea, Amin Tayebi and Fatemeh Asadi Saeid Abad used the Unified SWOT and Fuzzy AHP approach to investigate competitive strategies of knowledge and the commercialization of innovation. Universities are identified as a source of innovation and creativity, but in a country such as Iran, their knowledge is not connected with industry. They have shown the importance of academic research as a source of innovation and have identified the proper strategies for successful commercialization.

Co-creation and the use of external sources of innovation is one of the most attractive subjects in the current research ininnovation studies. Naser Shams Gharneh and Fatemeh Hamidi proposed a model on the impact of Co-Creation on Innovation Capability and Firm Performance using the Structural Equation Modeling (SEM). Their findings show that co-creation mediate the effect of process innovation capability.

Entrepreneurship in the Media Industry has been one of the most attractive and at the same time, one of most ambiguous areas in both fields of entrepreneurship and media management. Despite an increase in the research interest in this area, a clear and comprehensive definition of media entrepreneurship is still absent. A consensual definition of media entrepreneurship has been provided by collecting ideas from using a multi stage Delphi method. It is expected that this definition will be of benefit to the researchers of this subject.

While women, as half of the population have been neglected in many aspects, the business world has become a playground for women in many different places of the world to show their potential. Entrepreneurship among women is the subject of sixth paper of this special issue. A team of cross-national researchers from both genders have studied women entrepreneurship in a relatively poor province of Iran. They investigated the effect of social capital, innovation and market knowledge on the promotion of women entrepreneurs. Their result showed that social capital has a significant effect on the success of female entrepreneurs in small local markets.

To enable innovation in organizations, knowledge sharing is essential. Somayeh Labafi studied "knowledge hiding" as an obstacle towards innovation in organizations. She conducted a qualitative study of software industry to understand what factors lead employees to hide their knowledge. Her findings show that managers in knowledge organizations should pay special attention to the factors such as the incentives of knowledge sharing, internal competition, trust and learning.

The acceptance of an innovation is a very important subject in the study of technology adoption. Amitis and Artonis Moradiabadi and Abbas Jafari conducted a survey on a sample of taxpayers with regard to new tax information systems. Their aim was to evaluate customer satisfaction as an indicator of innovation acceptance. Using the American model of customer satisfaction, they showed that perceived value has a significant impact on user satisfaction and effects on successful innovation acceptance.

Seyyed Amiri, Shirkavand, Chalak and Rezaeei investigate competitive intelligence as a means of getting competitive advantage. In a case study of an insurance company as an important part of a service economy, they conducted a survey on a sample of managers and analyzed the data gatheredusing the Structural Equation Modeling. Their findings emphasized on the effect of competitive intelligence on creation of sustainable competitive advantage.

In tenth paper, sustainability in innovative organizations is studied again. This time in the area of human resource management. Aibaghi Esfahani, Rezaii, Koochmeshki and Sharifi Parsa investigated the effect of flexible human resource management in the innovativeness of organizations. They concluded that psychological capital and human resource flexibility should be considered as significantby HR managers in knowledge organizations that operate in a service economy.

The impact of educational expenditure by governments on economic growth is the subject of paper by Jeyhoontabar, Najafi and Sistani Badooei. In this paper the positive effect of investment in education on economic growth is identified. The findings of this research indicates that government expenditure on education strengthens the industries in the service sector of the economy. Therefore, governments should allocate more budget to the education sector for the skills needed in the service industries.

Finally, service performance has been studied by Zahra Zare. Using data envelopment analysis, she analyzed the data of 23 hospitals and public health institutes in Tehran to measure their efficiency. She then contributed in the improvement of efficiency evaluation models.

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As the guest editor of this special issue, I do appreciate the sincere cooperation of Prof. Dr. Maria Alejandra Gonzalez-Perez, Editor-In-Chief of AD-minister, for accepting my request for this special issue and facilitating the process of finalizing the papers. Also I have a special thanks to the Universidad EAFIT in Colombia for providing this opportunity to collaborate on this issue. I also send my regards to the center of communication, media and information technologies (CMI) at Aalborg University for being very supportive during the preparation of this special issue. Finally, I appreciate AmirKabir University of Technology for hosting the platform of this special issue through their international event.

I hope the readers of this special issue benefit from the diversity of methodologies, perspectives and contributions. Also I hope the researchers in the fields of entrepreneurship and innovation find this collection as a valuable source of knowledge.

Datis Khajeheian
Guest Editor
University of Tehran

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NEW VENTURE CREATION: HOW START-UPS GROW?

CREACIÓN DE NUEVOS EMPRENDIMIENTOS: ¿CÓMO CRECEN LAS *START-UPS*?

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ABSTRACT

Start-ups, often seen as sources of innovation and change, are prone to failure and accordingly they are attracting considerable attention not least from policy makers and Government officials. However, the various new venture creation studies that have emerged since the early 1980s lack cohesiveness, and the domain remains controversial. This article not only exposes the limitations of the existing body of understanding on the topic but attempts to develop a more comprehensive and comprehendible framework for start up (new venture) creation. To do so it uses the frameworks proposed by Whetten, and March and Smith to develop 11 propositions. The resultant model suggests that the creation of a start up involves the identification of an idea or opportunity by an entrepreneur who subsequently organizes a series of activities, mobilizes resources and creates competence using his/her networks in an environment in order to create value. It sheds light on the start-up (new venture) creation process and has relevance for entrepreneurs, policy makers and researchers.

KEYWORDS

New Venture Creation; Start-up; SME; Growth; Ideation; Opportunity.

RESUMEN

Las empresas emergentes (*start-ups*), con frecuencia vistas como fuentes de innovación y cambio, son propensas al fracaso, y en consecuencia, están atrayendo considerable atención especialmente por parte de los legisladores y representantes del gobierno. Sin embargo, los diferentes estudios sobre nuevos emprendimientos que han surgido desde principios de los años ochenta carecen de cohesión y el área de interés continúa siendo controversial. Este artículo no solamente expone las limitaciones de la manera en que se ha comprendido este tema, sino que busca desarrollar un marco más amplio y comprensible para la creación de empresas emergentes (nuevos emprendimientos). Para lograr esto, utiliza bases propuestas por Whette y por March y Smith para desarrollar 11 proposiciones. El modelo resultante sugiere que la creación de *start-ups* involucre la identificación de una idea o una oportunidad por parte del emprendedor, quien posteriormente organiza una serie de actividades, moviliza recursos

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y crea competencias a través del uso de sus redes en determinado ambiente con el fin de generar valor. Este artículo da claridad sobre el proceso de creación de *start-ups* (nuevos emprendimientos) y tiene relevancia para empresarios, legisladores e investigadores.

PALABRAS CLAVE
Creación de nuevos emprendimientos; empresas emergentes (*start-ups);* PYME; crecimiento; ideación; oportunidad.

INTRODUCTION

Variously referred to as a journey from conception to birth (Evers, 2003), start-up (Vesper, 1990; Van de Ven and Poole, 1995; Salamzadeh, 2015a,b), preorganisation (Katz and Gartner, 1988; Hansen, 1991), organization in vitro (Hansen and Wortman, 1989), pre-launch (McMullan and Long, 1990), gestation (Reynolds and Miller, 1992), entry (Lumpkin and Dess, 1996; Gonzalez-Perez and Velez-Ocampo, 2014), start-up companies are currently seen as engines of innovation in society (Brockhoff and Guan, 1996; Dushnitsky and Lenox, 2005; Khajeheian, 2014) and as a means of entering new markets (Zejan, 1990). These entities are, however, both agile and fragile (Blank, 2010; Lanciano-Morandat and Verdier, 2010). It is clear that start-up (new venture) creation requires a series of actions. To create a start-up, therefore, relies on actions based on an idea or opportunity (Vesper, 1990; Bhaves, 1994; Deakins and Whittam, 2000; Serarols, 2008; Dimov, 2010; Becker et al., 2015; Salamzadeh & Kesim, 2017). A typical founder of a start-up or new venture, i.e. the entrepreneur, is mostly focused on his/her idea. This concentration might lead to mismanagement or failure of the start-up. Most start-up founders miss some points or critical stages, and this could increase the rate of failure (e.g. see, Pretorius and Holtzhauzen, 2008; Salamzadeh and Kesim, 2015). Thus, although rational economic man is always criticized in real world situations, taking a series of actions in a logical sequence should lead to a higher rate of success (e.g. see, Delmar and Shane, 2004; Haugh, 2007).

Moreover, there is currently a surfeit of theories and models that attempt to explain new venture (start-up) creation. Yet, the existing theories and models are in their embryonic stage, and the evidence is fragmented (Salamzadeh, 2015b). Thus, on the one hand, there is a limited common understanding of the concept, and scholars have paid attention to different aspects of the phenomenon, while on the other, these entities are drawing the attention of entrepreneurs, intended individuals, businesspeople, investors, and even policy makers, as there is a growing need to define them and propose conceptual frameworks for their study. Recently, for instance, Kuratko et al. (2015) investigated the existing approaches in entrepreneurship research, and defined eight major themes- i.e. venture financing, corporate entrepreneurship, social entrepreneurship and sustainability, entrepreneurial cognition, women and minority entrepreneurs, the global entrepreneurial movement, family businesses, and entrepreneurial education- which characterize research about entrepreneurs and new venture creation. They highlighted the importance of studying the existing trends, and taking steps forward to define those themes. Moreover, Moroz and Hindle

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(2012) put stress on new venture creation as one of the main research streams in entrepreneurship which needs to be studied in more detail.

Mainly this paper aims to answer the question: "what are the main stages in the process of new venture creation?" Moreover, the paper answers two other questions. First, "what is the evolutionary trend of new venture creation theories?", and second, "what are the main existing theories in the field of new venture creation at micro, meso, and macro levels?". However, the paper sheds light on a more significant issue, which is the nature of "new venture creation". To do so, the authors have used suggested questions by Whetten (1989), along with an evolutionary lifecycle view of the start-up companies. First the relevant existing literature on start-up companies (new ventures) is studied. Then, propositions are made, based on the mentioned questions (Whetten, 1989) and March and Smith's (1995) design science framework. Finally, the paper concludes with some remarks and suggestions for future research, and highlighting the research limitations.

THE EXISTING THEORIES ON START-UP COMPANIES

"Organizational genesis does not mean virgin birth" (Padgett and Powell, 2012). It is "a journey from conception to birth" (Evers, 2003).

It seems that the history of new venture creation goes back to Darwin's question regarding the origin of species, which triggered the movements in social sciences to make propositions and explanations about the biology of organization. Indeed, like any living organisms, human organizations have evolved throughout history. For instance, new forms of organizations emerged and evolved, both theoretically and practically, in human history (Padgett and Powell, 2012). The literature from the 1900s until 1970s is dominated by the works of scholars such as Schumpeter (1912, 1934), and Hannan and Freeman (1977), who elaborated the evolution of firms at the macro level. However, in the 1980s, these works were followed by the ideas of such scholars as Van de Ven et al. (1984) and Gartner (1985), at the micro and meso levels. Table 1 shows the evolution of the main new venture (start-up) creation theoretical studies.

Table 1. Evolution of the main new venture (start-up) creation (theoretical) studies

2010s	Meso and Macro level: Conceptual model of nascent entrepreneurs and venture emergence (Dimov, 2010); A panel study of new venture creation (Davidsson and Gordon, 2012); A dynamic multi-stage new venture emergence view (Becker et al., 2015), A contract-based theory of intermediator media firm (Khajeheian and Tadayoni, 2016)
2000s	Meso and Macro level: Effectuation approach (Sarasvathy, 2001); Activity based venture creation model (Delmar and Shane, 2004); Incubation model of new venture creation (Grimaldi and Grandi, 2005); Dynamics of new venture creation (Lichtenstein et al., 2006); Entrepreneurial model of new venture creation Serarols, 2008)

Table 1. Evolution of the main new venture (start-up) creation (theoretical) studies. Continued

1990s	Macro level: An ecological perspective toward new venture creation (Aldrich, 1990) Meso and Macro level: Components of a new venture (Vesper, 1990); A network theory of new venture creation (Larson and Starr, 1993); A process model of entrepreneurial venture creation (Bhaves, 1994); Pre-venture activities and start-up event sequences (Carter et al., 1996)
1980s	Meso and Macro level: Dimensions of new venture creation (Gartner, 1985); Factors showing new venture creation (Katz and Gartner, 1988); Business creation steps (Van de Ven et al., 1984)
1970s	Macro level: Theory of population ecology (Hannan and Freeman, 1977)
1900s-1970s	Macro level: Theory of Economic Development (Schumpeter, 1912; 1934)

Source: Authors

RESEARCH METHOD

Given the main goal of the research, finding an appropriate research methodology was not easy. The reason behind this study is not just to understand the phenomenon of new venture (start-up) creation. Rather it is a problem solving approach which tries to solve the problems of elaborating the phenomenon. It shows the business logic behind the formation of such entities, i.e. start-ups. It aims to design and build a model that represents the process of new venture creation. Then, a "problem solving" approach is used based on the design science approach by March and Smith (1995). This proposes a two-sided framework, i.e. (i) research activities, and (ii) research outputs (Figure 1). In this framework: (i) the *constructs* mention the main terms and concepts of the domain, (ii) the *model* is a set of propositions showing the relationship between the constructs, (iii) the *method* is a set of steps used to perform a task, and (iv) the *instantiations* operationalize the constructs, the models, and the methods. March and Smith (1995) consider that four research activities are required, namely: To *build* means to construct the constructs, models, methods, and artifacts. To *evaluate* means to develop criteria, and to assess the findings. To *theorize* and *justify* are simultaneously conducted. The result will be a justified theory. This research is mainly focused on the first two research activities, which are to build and evaluate. Moreover, research output is focused on constructs and model. The final framework is based on Whetten's (1989) questions, and March and Smith's (1995) approach. It should be noted that the authors used speculation, library research, and literature analysis to answer the main research questions.

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Table 2. Design science research framework

Research output \ Research activities	Build	Evaluate	Theorize	Justify
Constructs	To find the basic constructs/concepts (WHAT?)	Investigate completeness and understandability (WHAT?)		
Model	Define a process model based on the business logic and lifecycle (HOW?)	Investigate fidelity with real world phenomenon (WHY?+ Context (Who, Where, When))		
Method				
Instantiation				

Source: March and Smith, 1995) combined with Whetten's (1989) approach

As mentioned earlier, theories of new venture creation are among the most prominent theories which cover start-up companies (Davidsson and Gordon, 2015). However, start-ups, in their present sense, are not only preorganizations (Katz and Gartner, 1988), but also creative ventures aiming at making change. Whetten (1989) suggests the questions of what, how, why, who, where, and when in order to scrutinize the process of theory development. These questions reveal the elements embedded in a typical theory. In sum, in his views: (i) "What" refers to "*which factors (variables, constructs, concepts) logically should be considered as part of the explanation of the social or individual phenomena of interest?";* (ii) "How" deals with how these sets of factors are related. These two, i.e. what and how, constitute the subject of a typical theory; (iii) "Why" mentions the *"underlying psychological, economic, or social dynamics that justify the selection of factors and the proposed causal relationships"*. Then, "What" and "How" provide description of what are the main constructs and relations in new venture (start-up) creation, while "Why" provides explanation; (iv) "Who", "Where", and "When" are conditions or the contexts which place limitations on the propositions generated in a theory. He continues that *"these temporal and contextual factors set the boundaries of generalizability, and as such constitute the range of the theory"* (Whetten, 1989). This paper concentrates on each of these elements in order to review the existing theories on start-up companies, and to develop a series of interconnected propositions which offer a new theory in this domain. To do so, a combination of two approaches, i.e. Whetten (1989) and March and Smith (1995), is offered (Figure 1).

Describing And Explaining The Phenomenon

In this study, the phenomenon in question is the process of new venture creation. Thus, to describe the phenomenon, the first step is to identify and describe the underlying concepts or stages. Since a process view is considered, the authors critically review the existing models, and suggest the following stages: (i) ideation, opportunity (venture idea) recognition, (ii) shaping the entrepreneurial intention, (iii) preparation, (iv) networking, (v) entry, (vi) value creation, (vii) exit, and (viii) organization. However, the last stage shows the birth of an organization, and is not considered as a stage in this process. To elaborate the subject of the theory, a definition is suggested which includes both "what" and "how" elements. Thus, the "Creation of a start-up company is:

(i) a process (e.g. see, Gartner, 1985; Davidsson and Gordon, 2012),
(ii) that starts with a venture idea (e.g. see, Vesper, 1990; Deakins and Whittam, 2000; Serarols, 2008; Becker et al., 2015) or opportunity (e.g. see Bhaves, 1994; Deakins and Whittam, 2000; Dimov, 2010),
(iiii) followed by an intended individual (e.g. see, Katz and Gartner, 1988; Aldrich, 1990, 2000; Brush et al., 2014) entrepreneur (e.g. see, Gartner, 1985; Campbell and De Nardi, 2009; Dimov, 2010; Davidsson and Gordon, 2102),
(iiv) who organizes a series of activities (e.g. see, Gartner, 1985; Deakins and Whittam, 2000; Delmar and Shane, 2004; Samuelsson and Davidsson, 2009), creates competency (e.g. see, Van de Ven et al., 1984) and mobilizes resources (e.g. see, Katz and Gartner, 1988; Vesper, 1990; Lim et al., 2008; Samuelsson and Davidsson, 2009),
(iv) using his/her networks (e.g. see, Vesper, 1990; Larson and Starr, 1993),
(ivi) in an environment (e.g. see, Gartner, 1985),
(ivii) in order to create value (e.g. see, Katz and Gartner, 1988; Vesper, 1990; Bhaves, 1994; Deakins and Whittam, 2000)".

This process starts with a gestation stage (Haugh, 2007; Liao and Welsch, 2008), i.e. an early stage evolution, continues with an entry (Gartner, 1985; Shaver and Scott, 1991, Gonzalez-Perez and Velez-Ocampo, 2014), e.g. go to market activities (Gonzalez-Perez and Gutierrez-Viana, 2012), and ends with an exit strategy (Becker et al., 2015), such as merger and acquisition, IPO, etc. Although, this process indicates the lifecycle of a successful start-up, and some start-ups might fail. As mentioned earlier, "Why" mentions the "underlying psychological, economic, or social dynamics that justify the selection of factors and the proposed causal relationships?" (Whetten, 1989: p. 491). The proposed definition which includes "what" and "how" elements, is drawn from the existing literature. Thus, selection of the factors is based on: (i) logical sequence of the process, and (ii) the supporting arguments and propositions available in the literature. However, there are some propositions consolidating the causal relationships.

Stage 1- Ideation, opportunity (venture idea) recognition: The concept of entrepreneurial opportunity as the core concept in entrepreneurship proposed by Shane and Venkataraman (2000) has been challenged by Davidsson and Tonelli

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(2013). They suggest New Venture Idea (NVI) as a more appropriate concept. Thus, though individual-opportunity nexus is still a main concern, NVI is "becoming" a main driver of entrepreneurship. Moreover, research on new venture creation and start-up companies, confirms the importance and effect of venture idea (e.g. see, Vesper, 1990; Deakins and Whittam, 2000; Serarols, 2008; Khajeheian, 2013; Becker et al., 2015). There are a large number of research works that support the possibility of creating a new venture without a new venture idea (e.g. see, Dess & Lumpkin, 2005), or an opportunity to be exploited (e.g. see, Shaver and Scott, 1991). Moreover, the literature suggests that when a new venture idea or an opportunity exists, it motivates the intended entrepreneur to start a new venture (start-up) (Krueger et al., 2000).

P_1: A new venture idea or an opportunity initiates the process of new venture (start-up) creation.
P_2: A venture idea or an opportunity motivates the intended individual or entrepreneur to start a start-up company.

Stage 2- Shaping the entrepreneurial intention: Shaping the entrepreneurial intention is another dilemma. There are many new venture ideas which never come into existence, or would fail if introduced by someone who does not have enough intention to follow the idea though. He or she will start the process, but would be likely to fail, since entrepreneurial intention might not exist. As Degeorge and Fayolle (2013) argue, "new venture creation is a planned and therefore intentional behavior". Thus, shaping the entrepreneurial intention is a critical issue.

P_3: Shaping the entrepreneurial intention affects the process of new venture (start-up) creation.

Stage 3- Preparation: As mentioned earlier, research on entrepreneurial intention is a factor that motivates entrepreneurs to organize a series of activities (e.g. see, Gartner, 1985; Deakins and Whittam, 2000; Delmar and Shane, 2004; Samuelsson and Davidsson, 2009), create competence (e.g. see, Van de Ven et al., 1984) and mobilize resources (e.g. see, Katz and Gartner, 1988; Vesper, 1990; Lim et al., 2008; Samuelsson and Davidsson, 2009). It signifies the importance of entrepreneurial intention. Krueger et al. (2000) highlights this argument by contesting that: "Entrepreneurial intention is defined as the commitment to starting a new business". Indeed, starting a business needs resource mobilization, creating competence, and activity organization (Ruef , 2005; Degeorge and Fayolle, 2013).

P_{4a}: Entrepreneurial intention motivates the intended individual or entrepreneur to mobilize resources.
P_{4b}: Entrepreneurial intention motivates the intended individual or entrepreneur to create competence.

P_{4c}: Entrepreneurial intention motivates the intended individual or entrepreneur to organize activities.

Here, the mentioned three elements, i.e. resource mobilization, creating competence, and activity organization, are called "preparation". Atherton (2007) mentions that there are activities to be undertaken by the entrepreneur in order to prepare for business start-up. He calls these activities "pre-start activities".

P_4: Entrepreneurial intention motivates the intended individual or entrepreneur to be prepared.

Stage 4- Networking: Networking is another requirement to initiate a successful business (Vesper, 1990; Larson and Starr, 1993; Forbes, 1999; Ramachandran & Ray, 2006). On the one hand, networking without preparation might lead to failure in the very early stage of new venture creation (Davila & Foster, 2007; Sommer et al., 2009), since the potential entrepreneur might fail to make relevant and useful connections based on his or her potentials, needs and requirements. Also, he or she might waste time on irrelevant networking activities. On the other hand, networking can help the intended individual or entrepreneur to enter the market and create value (Mitchell et al., 2000; De Carolis et al., 2009).

P_5: Networking affects the process of new venture (start-up) creation.
P_6: Preparation makes the intended individual or entrepreneur ready to initiate networking.

Stage 5- Entry: After the preparation stage, and networking, start-up companies try to offer their products or services to the market. This is called entry (Kuester et al. 1999). Entry is a critical stage, which affects the success or failure of the new venture (start-up). While entry strategies for different start-ups might differ, a successful entry is vital for any start-up (Gartner, 1985). As Dean and Meyer (1996) argue, entry barriers constrain the new venture (start-up) creation, and do not let them take advantage of available opportunities.

P_7: Entry affects the process of new venture (start-up) creation.
P_8: Networking helps the intended individual or entrepreneur to enter the market.

Stage 6- Value creation: Value creation, which lies at the heart of entrepreneurship, is an integral part of new venture (start-up) creation (Bruyat and Julien, 2001; Zahra and Dess, 2001; Fayolle, 2007; Karra et al., 2008; Khajeheian, 2013, 2016). The more a new venture creates value, the more successful and valuable it will be (Bruyat and Julien, 2001; Brush et al., 2001; Teal and Hofer, 2003).

P_9: Value creation affects the process of new venture (start-up) creation.
Stage 7- Exit: Once a start-up company offers its new products and enters the

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market, if not before, it is time to make a serious decision about the best exit strategy? Created value, both economic and social, generated in the entry stage (Katz and Gartner, 1988; Vesper, 1990; Bhaves, 1994; Deakins and Whittam, 2000) helps the entrepreneur choose an efficient and effective exit strategy (Peters, 2009; MacKillop, 2009). Generally exit strategies are merger and acquisition, initial public offering (IPO), family business succession, etc. (DeTienne, 2010). However, it is important to think about an exit strategy at the outset and before the business is formally launched.

P_{10}: Value creation helps the intended individual or entrepreneur to exit.

The context: As stated earlier, "Who", "Where", and "When" are conditions or the contexts which place limitations on the propositions generated in a theory. *"These temporal and contextual factors set the boundaries of generalizability, and as such constitute the range of the theory"* (Whetten, 1989: p. 492). The start-up creation takes place in an environment which poses boundaries to the theory. Gartner, one of the first new venture creation scholars, highlighted the role of environment in the new venture creation process. He argued that, in organization theory, there are two different views of environment: (i) environmental determinism (Aldrich, 2000; Hannan & Freeman, 1977), and (ii) strategic choice (Child, 1972; Starbuck, 1976; Weick, 1979). In entrepreneurship both views are taken into account. In his work (Gartner, 1985), and here, those variables which "are relatively fixed conditions imposed on the new venture from without are called environmental variables" (deterministic variables). The variables over which the start-up has more control should be considered in the start-up level (strategic choice variables). In his seminal paper, Gartner (1985) enumerates these environmental variables, which are supported in the literature also.

In entrepreneurship, new venture creation, and start-up research, environments play a significant role in the availability of entrepreneurial opportunity (e.g. see, Sine and David, 2003; Li, et al., 2006; Sarasvathy et al., 2010; Edelman and Yli□ Renko, 2010; Renko et al., 2012).

P_{11a}: The more the environment is ready for creating start-up companies, the more ideas or opportunities will be available.

Some scholars such as Choo and Wong (2006), Zhang and Yang (2006), Díaz-Casero et al. (2012), and Kristiansen and Indarti (2004) argue that environmental factors affect entrepreneurial intention. However, some environmental factors, such as informal institutions, social norms, social networks, might affect entrepreneurial intention, while others, such as entrepreneurial skills and press discourses, might not (e.g. see, Schwarz et al., 2009).

P_{11b}: The more the environment is ready for creating start-up companies, the higher the level of entrepreneurial intention.

As mentioned earlier, environment is an integral part in any new venture creation process. The literature confirms this argument and argues that any start-up should be prepared for this journey (Forbes, 1999). The environment plays a significant role in the preparation stage. For instance, resource mobilization and availability of resources is a function of environmental variables (Edelman and Yli-Renko, 2010). Moreover, availability of financial resources is another dilemma (Gartner, 1985), and government plays a significant role in shaping the environment. Indeed, these will affect preparation (Maggioni et al., 1999).

P_{11c}: The more the environment is ready for creating start-up companies, the easier the preparation will be.

Networking and building social capital for new venture creation and start-ups is another issue to be studied (De Carolis et al., 2009). In this regard, environment influences the networking criteria, such as network size (Coviello, 2006; Qian and Kemelgor, 2013), and network diversity (Auken, 2002), etc.

P_{11d}: The more the environment is ready for creating start-up companies, the easier networking will be.

Value creation is a vital issue for start-ups and new ventures (Katz and Gartner, 1988; Vesper, 1990; Bhaves, 1994; Deakins and Whittam, 2000). If it fails to create value, the newborn company will die. Hence, it is clear that entry determines value and value determines the existence of a typical start-up. An appropriate environment makes it easier to go to market, enter, and create value (Mitchell et al., 2000; Cohen et al., 2008; Hitt et al., 2011).

P_{11e}: The more the environment is ready for creating start-up companies, the easier entry/value creation will be.

Finally, when a start-up enters the market and creates value, it is time to make a valuation assessment in order to determine the value of that start-up (Bhave, 1994; Berk et al., 2004). In this stage, environment is a vital issue to be considered. If the market is uncertain (Sanders and Boivie, 2004), regulations are not appropriate (Ahlstrom and Bruton, 2006), key players are not interested in new venture creation (Ndonzuau et al., 2002), etc., valuation will be affected, and thus might limit the choice of exit strategies (Dossani and Kenney, 2002).

P_{11f}: The more the environment is ready for creating start-up companies, the easier the exit will be.

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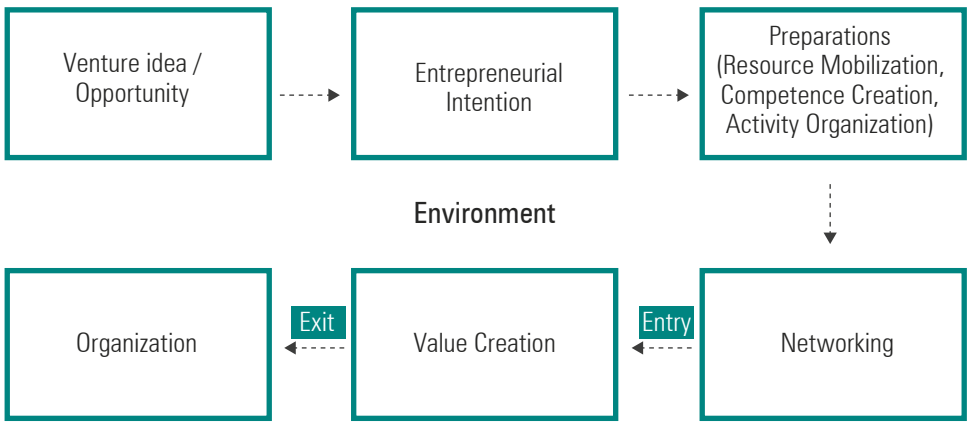
CONCLUSION

As discussed earlier, start-up companies are an emerging field, both theoretically and practically. Although, the research on "new venture creation" is not a new topic, the concept of start-up companies is in its early stages. Scholars of organization science mostly focus on pre-organization phenomena (see e.g. Gartner, 1985), while entrepreneurship scholars integrate it with concepts such as opportunity, valley of death, and the like (see e.g. Zahra et al., 2006; Wright and Stigliani, 2013). This paper has concentrated on start-up companies and tried to present a set of propositions in order to distinguish these entities from existing organizations, established SMEs, etc. Thus, based on the main research question, i.e. "what are the main stages in the process of new venture creation?", the authors used the questions suggested by Whetten (1989), and March and Smith's (1995) framework to present a new stage model for creating start-up companies (new venture creation). In this paper, the process of new venture (start-up) creation is studied, through speculation, library research, and literature analysis. Based on the findings, "creation of a start-up company is a process which starts with a venture idea or opportunity, followed by an intended individual/entrepreneur who organizes a series of activities, creates competence, and mobilizes resources, using his/her networks, in an environment, in order to create value" (Figure 1).

Figure 1. The process of new venture (start-up) creation



Source: Authors

Moreover, the authors answered other research questions. First, "what is the evolutionary trend of new venture creation theories?", and "what are the main existing theories in the field of new venture creation at micro, meso, and macro levels?". Based on our findings, the topic is raised by scholars such as Schumpeter (1912, 1934) and

Hannan and Freeman (1977) at macro level, before Van de Ven et al. (1984) and Gartner (1985) started the discussion at the micro and meso levels in the 1980s. The evolution of the field shows that there is a gap in studying "new venture creation" in multiple levels of analysis. Moreover, one of the main contributions of the authors is to use the questions suggested by Whetten (1989), and March and Smith's (1995) framework in order to clarify the nature of "new venture creation".

IMPLICATIONS FOR THEORY AND PRACTICE

As mentioned earlier, this research sheds light on the nature of new venture creation as a multi-level and a multi-stage phenomenon. It contends that theories of new venture creation should concentrate on more specific stages and levels to increase the success rate of new ventures. Although some scholars might criticize the "rational economic man" insight, it seems that if researchers could theorize this phenomenon, entrepreneurs might be able to consider the required steps, stages, or even levels which might increase the success rate, decrease the rate of failure, and provide them with a plan of the ways they could/should take. Though, some scholars criticize this process approach or more specifically the stage models (e.g. see Storey, 1994; Haugh, 2007), most believe that there should be some kind of legend for (potential) entrepreneurs to read the "new venture creation map" (e.g. see Gartner, 1985; Katz and Gartner, 1988). Thus, this paper contributes to the practice of new venture creation by introducing a set of stages that entrepreneurs may take to create a new venture. Also, it contributes to their knowledge of the new venture creation process. Based on this, policy makers could devise policies or consider support measures for different stages in order to facilitate successful new venture creation. Moreover, researchers could consider different levels of analysis, concepts, and stages in their future research. The findings of this research also have implications for teaching new venture creation to students in the fields of business and entrepreneurship.

LIMITATIONS

As mentioned above, proposing a "universal model" for new venture creation is not easy, and some researchers believe that it is not possible or reasonable. For instance, Haugh (2007) argues that this process is complex and varies between different entrepreneurs in different environments. Some scholars also criticize the stage models. For instance, Bhave (1994) argues that the transition between one stage to another is not automatic, while Haugh (2007) argues that different management styles are considered contingent to each stage. Although, this might be true, it might be proposed that high rates of failure might be a direct result of mismanagement of entrepreneurs/founders in different stages. For instance, charismatic leadership might be an integral part of managing a start-up in the very early stages, such as recruiting new experts, dealing with angel investors, etc. However, it might not be appropriate in the next stages, such as resource mobilization which requires a more pragmatic than charismatic management style. Again, Haugh (2007) argues

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that these stage models assume that movement between stages is triggered by a specific crisis. This is a challenging argument to make, which needs to be explored. Storey (1994) also criticizes the stage models. He believes that understanding the factors influencing growth is of paramount importance, compared to considering the stages. Albeit this view is initiated by Gartner (1985) and followed by many others, the process model presented in this paper shows that considering such a model, in which the environment is considered, could alleviate this dilemma. Present studies on new venture creation support this argument (e.g. see, Parker, 2006; Moroz and Hindle, 2012). Finally, in this research, the authors believe that, like human beings, any organization has its own evolution. Despite the differences which make us different people, we all pass through a lifecycle: embryo, birth, growth, maturity and death. Evolution is an integral part of our lives. However, some of us might die young, like those companies that die in the "valley of death". This similarity was the basic axiom behind this research.

In sum, however this research explains many of the apparent contradictions raised by the paradox, but it raises numerous questions and some existing questions remain unanswered. Some of these questions are: "Why do most contemporary researchers neglect meso and macro levels in their studies?". Most of the researchers mention that new venture creation is dependent on different, contextual, social, individual, and industrial factors (Gonzalez-Perez and Fernando Velez-Ocampo, 2014). If so, "what are these factors and how do they affect the process?". To some scholars the stage view is not accepted due to the reason that the sequence might change. If so, "what are the different possible sequences, and which work best in which industry or at which level?". There should be some reasons behind this argument that the process view is not acceptable. "What are the axioms or presumptions behind this reasoning?" "What are the most common evolutionary stories in the new venture creation arena?".

DIRECTIONS FOR FUTURE RESEARCH

Based on the model, future researchers might study the evolution of start-ups testing the propositions. Also, each proposition might be broken down into several sub-propositions in order to offer a better understanding of the stages, and the phenomenon itself. Another opportunity is to study different start-up companies, in different contexts and industries, in order to distinguish the nuances. Moreover, there are several axioms regarding start-ups which are not studied in this research, and could improve the research domain. Environment itself has a significant role in the creation of start-ups, however Gartner (1985) enumerates the environmental variables, finding the most relevant variables is useful. In this study, the authors divided the existing theories in (i) macro, and (ii) meso and micro levels, which might be studied in more detail. Studying these levels might lead to a multilevel theory of new venture creation, or formation of start-up companies. In addition to this, panel studies, such as the one conducted by Davidsson and Gordon (2012), could provide more insights on different levels.

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SOCIOLOGY OF INNOVATION: SOCIAL CONSTRUCTION OF TECHNOLOGY PERSPECTIVE

SOCIOLOGÍA DE LA INNOVACIÓN: CONSTRUCCIÓN SOCIAL DE LA PERSPECTIVA TECNOLÓGICA

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ABSTRACT

This theoretical paper describes the effect of social action on technological artifacts and explores how innovation may flourish or be diminished in society. Using the Social Construction of Technology (SCOT) perspective, three main elements namely, flexibility of interpretation, relevant social groups and technological frame are described and their impact on innovation is discussed. The paper proposes that in developing societies, flexibility is hardly pressed by technological frames and concrete social norms do not allow the alternative designs and the useage of artifacts. This paper proposes that innovation might flourish in a society if technological frame change, and entrepreneurship become technological frames that can change the fixed meaning of artifacts and create a path for alternative designs and interpretations.

KEYWORDS

Innovation; Sociology of Technology; Social Construction of Technology; Innovation policy; Entrepreneurship Promotion.

RESUMEN

Este artículo académico de tipo teórico describe el efecto que tiene la acción social sobre los artefactos tecnológicos y explora cómo la innovación puede florecer o reducirse en la sociedad. Utilizando la perspectiva del modelo de Construcción Social de la Tecnología (SCOT, por sus siglas en inglés), se describen y se discute el impacto que tienen en la innovación tres importantes elementos, a saber: flexibilidad de la interpretación, grupos sociales relevantes y marco tecnológico. Este artículo propone que en las sociedad en desarrollo, la flexibilidad es difícilmente motivada por los marcos tecnológicos y las normas sociales concretas no admite diseños alternativos ni el uso de artefactos. Este artículo propone que la innovación puede surgir en una sociedad donde se presente un cambio en el marco tecnológico y el emprendimiento se convierta en el marco tecnológico que puede modificar el significado fijo que tienen los artefactos y crear una ruta para diseños e interpretaciones alternativas.

PALABRAS CLAVE

Innovación; Sociología de la tecnología; Construcción social de la tecnología; Política de la innovación; Promoción del emprendimiento.

INTRODUCTION: THE MAN AND TECHNOLOGY

Technology is inextricably bound with social conditions (Burns et al, 2015a,b; Baalen et al, 2016; Surry et al,2016). Brück (2006, p. 37) interprets technology

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as the enactment of people's idea about the world. This is because the people's understanding of materials and substances and their notions of the relationship between cause and effect, impacts on technology. She expresses that, at the same time, the relationship between man and technology is "linked through a complex web of concepts, definitions and explanations of relationships."

Sillar (1996) links technology with human feelings which enables humans to use artifacts and substances. This "feeling" and "imagery" plays an important role in the interaction between human and technology. As Brück explained, in a beautiful manner, "people do not work with a 'real' environment, but with their understanding of it as constituted through a particular cultural tradition."(2006, p. 37).

Bejker (1992) identified three layers of technology. These includes a physical layer, activities and processes layer and a social layer. Based on Ghandian's school of thought, an artifact or a technological practice is contextually situated and is inherently linked to the social, political and economic spheres of life (Ninan, 2005, p. 187).

The sociological approach to the study of innovation attempts to examine the way that social structure influences both the process and products of an innovative activity (Sharif, 2005, p 87). He explains that the sociology of technology extends the application of theories and the models of the sociology of science to technology.

This paper is a response to the neglected importance of the social aspects of technology in developing countries. The paper reasons that as far as societies engage with technology, the importance of the social aspects of technology increases. Thus, based on the provisions of a perspective from the social construction of technology, the aim of this paper is to theoretically explain the obstacles and challenges of developing societies with regards to the fostering of innovation.

The dichotomy of technology determinism and social construction of technology would be a good starting point for this discussion. The technological deterministic argument suggests that technology is the driving force for social and cultural change (Humphreys, 2005). According to technology determinism view, the interaction between society and technology is that society and technology are separated spheres and technical changes happen autonomously within the technological sphere. In this view society does not have an influence on society, but technology influences society and determines its direction towards development (Elle et al, 2010).

By Olsen et al, (2009), technological determinism is based on the two main factors of the autonomy of technology and the determining role of technology on societal development. This approach entails a linear and one-dimensional view of technological development. They argue that, to criticize the technological determinism, it should be shown that the workings of technology is a social construct.

MacKenzie and Wajcman (1999) confirms that technological determinism contains a partial truth. They explain that technology matters, not just for the material condition of our lives and to our environment, but also to the way we live socially.

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SOCIAL CONSTRUCTION OF TECHNOLOGY

It would be productive to start this section with a long but educating definition of Technology and its elements by Olsen and Engen:

> *"The term 'technology' is a slippery one. The common perception is that technology is machines, devices, and tools used for some purpose. Technology is also understood as artefacts. The Concise Oxford Dictionary defines technology as the "science of practical or industrial arts; ethnological studies of the development of such arts; application of science." Here, technology is understood as knowledge. However, this definition misses the hardware aspect that is the commonly held perception of technology in everyday language. Maybe the most common way of defining technology is to integrate artefacts and knowledge, for example 'artefacts and knowledge about their operations.' But these definitions are missing the context in which all technologies exist. SCOT [....] expands these definitions by including what we normally consider as "social" elements of technology."*

The Social Construction of Technology (SCOT) argues that human action shapes technology. In the construction of the technology determinism theory, there is this believes that technology determines human action (Leonardi and Barely, 2010; Burns et al, 2016) and technology is a product of the social, political, economic, and cultural environment in which it is situated (Humphreys, 2005). Supporters of this approach, referred to as social constructivists, believe that without the understanding of the social context, a technology cannot be understood (Burr, 2015). This theory, that is within the field of science and Technology Studies, and has roots in the sociology of science, is a response to the technological determinism that identifies the technology as the determiner of human acts (See Table 1).

Table 1. The literature of the SCOT.

Pinch and Bijker (1984)	Known as the early founders of Sociology of Technology (Sharif,2005), suggested that Social Construction of Technology is an explanation of the effects of a social system. They emphasized on the interpretative flexibility which is attributed to technological artefact by relevant social groups.
Fulk (1993)	In a research paper on the subject of Social Construction of Ccommunication Technology, she showed that in organizations, work group members share identifiable patterns of meaning and action. She showed that social learning influences on technology-related attitudes and behavior patterns are stronger when individual are attracted into a group
Ramos and Berry (2005)	In a case study of a Portuguese company in an automobile industry, they showed that workers resisted the introduction of software systems and either misused or rejected them. They showed that social interpretation of a technology is a determining factor in the success of a company in the adoption of a technology.
Rowland (2005)	Interestingly, Rowland implies on difficulties in drawing a distinction between society and its institutions in one hand and technology in other hand. He then, introduces a new concept: Social Construction of Technology as a novel form of technological determinism which pays due attention to the role of large business corporations.

Humphreys (2005)	She expanded the original the SCOT model to create a framework with which to approach this model over time or on a larger economic, political, and social scale. The four broad categories of relevant social groups were introduced that allow for larger social and cultural trend to emerge from our analyses of technological innovations.
Bartis (2007)	Technological frames are presented as extension to the social construction of technology.
Olsen and Engen (2007)	They discussed how and under what conditions SCOT and the theory of technological paradigms (TTP) can be used as complementary tools for analyzing technological development. By presenting some basic assumptions of most social theories about technological development, they showed complementarities between SCOT and TTP.
Elle et al (2010)	In an action research, they compared the pro-active use of the Social Construction of Technology with the traditional use of SCOT and explored the challenges, advantages and limitation of the pro-active usege. They found that the pro-active use of SCOT might be a solution to fill in the communication gaps in the boundaries of various professional groups.
Burns, Corte, Machado (2015-2016)	In a three-part article they deeply described sociology of creativity. In part 1, they introduced a general model of innovation and creative development by stressing on the factors of the agents. In part 2, the context of creativity was investigated and in part 3, the context of receptivity and institutionalization were analyzed in areas where the innovations are socially accepted, legitimized and institutionalized, or even rejected.

INNOVATION IN SCOT PERSPECTIVE

Daniel and Klein (2014) in a general view, believe that the concept of innovation still remains abstract and ambiguous, but Hill (2010) clarifies that the term "innovation" from the perspective of sociologists is the concept that refers to new organizational forms (such as enterprises, firms, stores, etc.), new organizational processes and routines (such as rule systems for appointing civil servants that are resistant to corruption), and new products and services (like antibiotics and computer chips). He explains that the sociological approach towards the study of innovation attempts to examine the way social structures influence both the process and products of an innovative activity. Dahlin (2014) argues that the sociology of innovation highlights the nature of innovation and its structural arrangements (such as characteristics of social networks, organizations, and institutions that influence innovation).

While the traditional focus of sociology of innovation was on products. A revolutionary paradigm change happened when Utterback (1997) moved the focus of sociology of innovation from product innovation to process. The important notion for him is that process innovation is social and managerial rather than physical. Hill (2010) follows Utterback by discussing that form has an effect on process and innovation at the organizational form level leads to innovation at the organizational routines and processes level. Thus as far as organizations engage in technological

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innovations, their concern with the social aspects will increase. Schlesinger (2017) stresses on the importance of innovation in process by explaining that productivity at the manufactory level is not sufficient to create competitive advantage, so what is needed is a kind of thinking beyond production. Adolf et al (2013) suggests that knowledgeability or a bundle of social and cognitive competencies is an integral part of the process of innovation and innovative thinking.

NATIONAL SYSTEMS OF INNOVATION

The concept of national system of innovation has also attracted a large amount of literature of the field. Lundvall et al (2002) are one of the leaders of this concept. They classified the resources of innovation in tangible-intangible and reproducible-less reproductive resources, and then suggested national styles of innovation based on available resources. Lundvall (2009, p. 22) stressed on the link between society and economy and that the source of product innovation is society and diversity and variety of innovation system, which in its ideal manner creates a knowledge and learning society. Sharif (2005, p. 87) recognized national system of innovation as a source of diversity between countries. Khajeheian (2014) follows him by showing the extent countries are different in their sources of innovation and how different national systems of innovation may serve the situation and contingent natures of societies. Sharif (2005) explained national systems of innovations based on SCOT. By using SCOT he showed that different relevant social groups, as important actors, play a role in a national innovation system and the outcomes of a national system of innovation depends on the use of social groups from that framework. As national systems of innovation are both a whole social and no physical system, SCOT explains the mechanism of those systems in a meaningful way.

Ninan (2008) uses the Ghandian idea as a basis for the rejection of technology determinism. Rather than finding science and technology as autonomous and technically pre-designed system of knowledge and operation, Gandhian ventured to exert varying strategies towards approaching it. The concepts were criticized at one level, redefined at another and appropriated at a different plane. Further, they attempted to view it as a process corollary to daily life, socio-economic relations, political choices and all pervasive national identity and the nation's development (Nina, 2008, 186).

Daniel and Klein (2014) inquires on the influence of 'sociology of innovation' on value creation? They explored how the various socio-contextual frameworks and dominant outcome intentions were involved in value creation in the development of new biotechnological innovations.

Harty (2005) argues that successful innovation requires the consideration of the social and organizational contexts in which it is located. The complex context of construction work is characterized by inter-organizational collaboration, a project-based approach and power distributed amongst collaborating organizations. The second is that innovations can be divided into two modes: 'bounded', where the implications of innovation are restricted within a single, coherent sphere of influence, and 'unbounded', where the effects of implementation spills over beyond this.

THEORETICAL MODEL

Elle et al (2010), inspired by Pinch and Bijker, articulate three main elements of SCOT. These elements are flexibility, relevant social group and technological frame.

ARTIFACT

Artifact may be used interchangeable with technology, product, solution, routine. In our definition, an artifact is the subject of innovation. By using Galtung's description, where artefact and knowledge elements are the visible tip of a huge iceberg, Olsen and Engen argue that maybe the most common way of defining technology is to integrate artefacts and knowledge. For example "artefacts and knowledge about their operations." (2007, p. 457).

Pinch and Bijker (1984) clarified by saying that technological artifacts are culturally constructed, it means that there is flexibility in people's interpretation of artifacts, and it also means that there is flexibility in the design and make of artifacts. "There is not just one possible way or one best way of designing an artifact". Relevant social groups are constituted with users that shape an artifact by their view. They are not pre-defined and appear in an unstructured way toward the use of an artifact (Elle, et al, 2010). Technological frame as Bijker defines it, comprises all elements that influences the interaction of relevant social groups with an artifact. With technical frame, users give meaning to the product that they are using. Such elements include goals, key problems, problem-solving strategies, theories in hand, tacit knowledge, design methods, etc. (Bijker, 1995)

Elle et al (2010) described technological artifacts with an interesting interpretation: they did overcome over other approaches in a complex and reciprocal interaction between the technology and various social relevant groups. In their approach, which is inspired fully by social construction of technology, relevant social groups decide if a technology is workable.

INTERPRETIVE FLEXIBILITY

Flexibility is a centric element in SCOT and the most important concept from SCOT's perspective (Sharif, 2005). Based on Pinch and Bijker (1984), there is more than either one interpretation, design or meaning behind an artifact and to identify those interpretations, that are sources of innovation, we should go beyond the technological aspects of an artifact and explore its social aspect.

According to Orlikowski, interpretive flexibility is "an attribute of the relationship between humans and technology, and is a function of the material artefact, the characteristics of the human agents, and the institutional context in which technology is developed and used" (1992, p. 409).

Humphreys (2005) introduces three kinds of flexibility. Flexibility of language refers to the interpretive flexibility of an artifact. Flexibility of language refers to the interpretive flexibility of an artifact. Flexibility of use implies the idea that users can

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appropriate artifacts differently, and more open an artifact, more possible uses it may have. Flexibility of structure is associated with how we think about an artifact's design and engineering.

RELEVANT SOCIAL GROUPS

Key question: who define problem facing with an artifact? The social groups have different approaches towards doing so.

Social groups are connected with artifacts to decide what problems are relevant and therefore "a problem is defined as such only when there is a social group that constitutes a problem" (Bijker et al., 1987). Different interpretations of social groups about the concept of an artifact indicates different problem definition, and thus a diverse range of developed solutions.

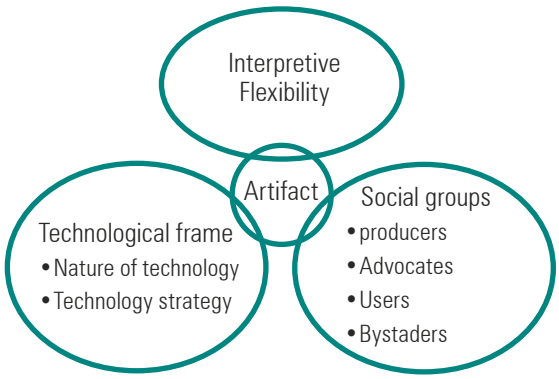
A major contribution in understanding of social groups has been presented by Humphreys (2005) with identification of four relevant social groups, including producers, advocates, users and bystanders. Producers, who are engineers, designers, marketers, financial investors, have a direct relationship with technology and develop an artifact. Advocates who are policymakers and lobbyist, are indirectly related with technology and work on policy making, lobbying and academic research on an artifact. Users, with direct and individual relationship with technology, talk, buy and use the artifact; and finally bystanders who are neighbors, family members and friends. The agreement on the meaning and interpretation of an artifact and technology is aggregated by collective interaction of these groups.

TECHNOLOGICAL FRAME

Orlikowski and Gash explained technological frames as "the subset of members' organizational frames that is concerned with the assumptions, expectations and knowledge they use to understand technology in organizations" (1994, p. 178). They suggested that there are shared frames that explain the social dynamics at the organizational level, which has an effect on the individual interpretation of socialization and training. They suggest that such social dynamics reinforce the production of similar meanings, rather than to create opportunity towards the exchange of the different meanings. Their contribution is that individuals make their social meaning of artifacts based on a collective shared frame.

Using Orlikowski and Gash's seminal work, Bartis explained three main domains of technological frames: 1) Nature of technology, that implies on the image of technology and its capabilities and functions in the minds of users, 2) Technology strategy, that is the motivation or vison behind implementation of that technology, 3) Technology in use, that refers to understanding of how to use the technology on day to day basis (2007, p. 129).

Figure 1. Three interactive elements of SCOT.



CLOSURE: STOPPING POINT OF CREATIVITY

Using the SCOT approach, our framework is able to describe the obstacle of innovation. Closure (or stabilization in SCOT terminology) is the point of agreement of the relevant social groups about a solution. At that point, the problem is perceived as solved. In other words, the problem disappears and no more tries will be made to find an innovative alternative (Bijker et al.,1987).

As Elle et al (2010, p. 137) describe, in most cases interpretive flexibility diminishes when relevant social groups approach an agreement on an interpretation. It can be said that such a consensus, that might be reached based on interests and actions, is the stopping point of innovation and creativity. At this point the flexibility of an artifact in the minds of user fades and a fixed, concreted meaning that lower the chance of creative thinking and change of interpretation is established. At this point, alternative meanings and interpretations are eliminated and one dominant, socially accepted design remains.

A PROPOSED FRAMEWORK FOR INNOVATION IN SERVICE SECTOR

By using the knowledge from SCOT and based on the interplay of its elements with actors in the society, a proposed framework is presented to suggest the fostering of innovation in a developing society, based on ICT service sector of . Based on this model, the infrastructure would not lead towards development, as it didn't already, unless the supporting social elements are in existence. The three main supplementary proposed: 1) Innovation Policy (from government side), 2) Entrepreneurial spirit (from Society Side) and 3) Entrepreneurial Skills (from civil society and institutions). This framework might be subject to expansion towards a model with further research. What developing societies experience is that social aspects of technology are normally underestimated in the policy making process. By the entry of technology into the society, a concrete, pre-defined meaning has been set and the flexibility of interpretation has been stopped before it started. For this reason, even the policy making organizations and institutions follow the fixed design and interpretation of the origin of technology.

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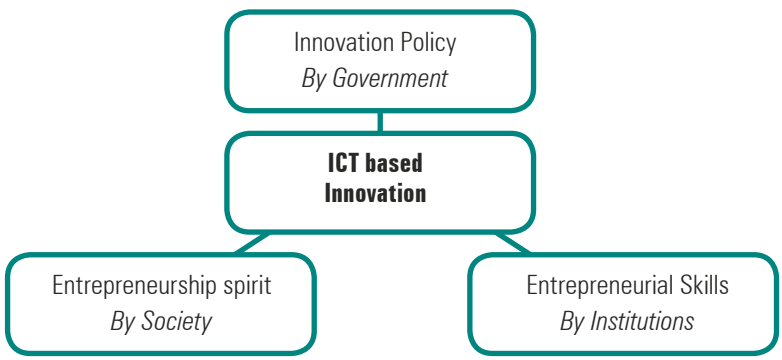
The proposed model, emphasizes on the interplay between the three levels of actors in a society. The Government at macro level, civil institutions at meso level and individuals in the society at micro level are considered as relevant social groups that could be encouraged to find an alternative meaning for technological artifacts based on the change in the technological frame. This interplay is very important because based on the experience of developing societies, governments, as dominant powers, could never succeed in fostering innovation despite their best effort. González and Healey (2005) studied the capacity of government for innovation. They showed that the interplay of government with civil society and institutions provides a way for a wider governance processes and culture. Geels (2004) emphasized that Institutions should be used to conceptualize the dynamic interplay between actors and structures. Such interplay of civil institutions, government and individual, however, should be focused on change of "technological frames".

Entrepreneurship performs as a suitable frame for such creative destruction in the society. The framework proposed that the entrepreneurial spirit accompanying entrepreneurial skills will provide the technological framework for innovation in the society. As Hill (2010) stressed that social structure influences behavior, thus the government's role in the promotion of entrepreneurship would be to provide a structure for an entrepreneurial spirit, by the approval of encouraging bills that will decrease the cost of entrepreneurship in society. It is expected that promotion of entrepreneurship creates new technological frameworks for social groups to change the established meaning of an artifact and to flourish the innovation by creativity.

Figure 2. Proposed framework of promotion of innovation.



CONCLUSION

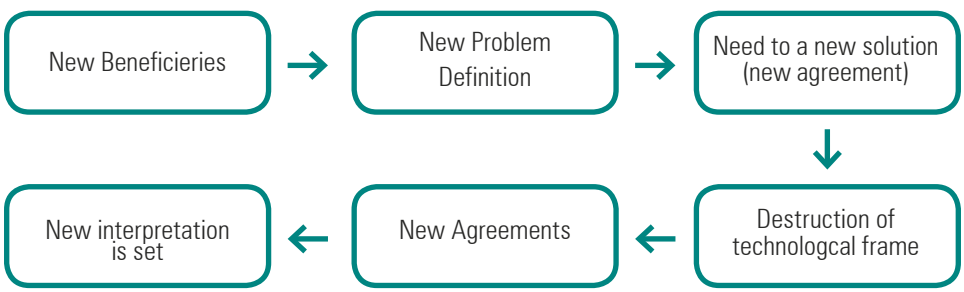
Douglas (1990) suggested that identifying a framework for legitimation within the Social Construction of Technology is an important and necessary step in understanding the relationship between technology and society. This theoretical paper, contributes to the field of sociology of innovation based on the provision of a framework and an explanation of innovation from the SCOT perspective. With proposition of a framework that is adapted from literature of the field, the author

stressed on the importance of technological frame in the stimulation of innovation in a society. It has been discussed that in the interplay of an interpretation, social groups and technological frame, the determining element is the technological frame. Based on the technological frame, the perception of actors from the artifact shapes that artifact and as this understanding is the basis of creativity, it can be concluded that for innovation the technological frames should be changed. The first and most important change is to leave the socially agreed meaning and interpretation.

The contribution of the paper is the proposal of a process of technological frame renewal. By using Schumpeter's creative destruction, technological frames must be destroyed by the diminishing of previously agreed meanings and interpretation that will result in a new agreement among relevant social groups. The change in social groups could be mentioned as a strategy to prevent from the repeat of previous agreements and it is possible, based on the entry of new actors into the social groups. The entry of the new actors is as a result of new problem definition.

As it can be seen in Figure 3, the process of technological frame renewal starts by the entry of a new beneficiary - that is a new actor. The entry of such an actor changes the balance of the social groups and creates a new problem definition. Solving this problem implies finding a new agreement in newly changed balance within the social groups. In order to reach new agreement, there is the need to destroy the previously established technological frame. It is similar to Schumpeter's creative destruction that is based on change in supply and demand by introduction of radical innovation (Fuduric, 2008). Based on therenewal and reset of technological frames, a new agreement appears, that is a new interpretation of an artifact.

Figure 3. The process of Technological frame renewal.



The findings of this paper could be used by policy makers as well as organizational leaders to foster innovation in the society or organization by the creation of a situation for the change of the technological frames. The entry of a new actor with a new demand would be a specific suggestion from this theoretical article. New ways to stimulating an innovation socially would be explored and introduced in further researches on this subject.

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COMPETITIVE STRATEGIES OF KNOWLEDGE AND INNOVATION COMMERCIALIZATION: A UNIFIED SWOT AND FUZZY AHP APPROACH

ESTRATEGIAS COMPETITIVAS DE CONOCIMIENTO Y COMERCIALIZACIÓN DE LA INNOVACIÓN: UN DOFA UNIFICADO Y UN ENFOQUE DE PROCESO DE ANÁLISIS JERÁRQUICO DIFUSO (FUZZY AHP)

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ABSTRACT

Universities have shown a strong desire to commercialize researches and innovations. As a result, they are increasingly weaning themselves from public budgets. Commercialization has become the gateway for privatization, but the improper selection of commercialization strategies often results in the elimination of resources and time. The correct evaluation and ranking of strategies for the best resources is essential for the competitive performance of a university. The hybrid SWOT and Fuzzy AHP model adopted in this study provides a clear categorization of these university strategies. The first and relevant criteria as well as sub-criteria are identified using SWOT analysis. Fuzzy AHP tool is then used to evaluate and rank the internal and external factors that affect competition in Iranian universities. Based on the IE matrix, the growth and the process of building strategies are important priorities when considering commercializing. The results of this study revealed that academic startups, joint technology, joint research laboratories, strategic alliances, recruiting pundit and contracting with industry are the best strategies for Iranian universities.

KEYWORDS

Knowledge; Innovation; Commercialization; Strategy; FAHP approach; SWOT matrix.

RESUMEN

Las universidades han mostrado un fuerte deseo de comercializar investigaciones e innovación. Como resultado de esto, cada vez más buscan depender menos de los presupuestos públicos. La

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comercialización se ha convertido en la entrada a la privatización, sin embargo, la selección incorrecta de las estrategias de comercialización con frecuencia resulta en la eliminación de recursos y tiempo. La correcta evaluación y ranking de estrategias para los mejores recursos es esencial para el desempeño competitivo de una universidad. El híbrido entre el DOFA y el modelo proceso de análisis jerárquico difuso (Fuzzy AHP) adoptado en este estudio, provee una categorización clara de las estrategias de estas universidades. Los criterios principales y relevantes, al igual que los subcriterios, son identificados utilizando el análisis DOFA. La herramienta Fuzzy AHP se utiliza luego para evaluar y valorar los factores internos y externos que afectan la competencia en las universidades de Irán. Teniendo como base la matriz IE, el crecimiento y el proceso de construcción de las estrategias son prioridades cuando se tiene en cuenta la comercialización. Los resultados de este estudio revelan que los emprendimientos académicos, la tecnología conjunta, los laboratorios de investigación conjunta, las alianzas estratégicas, los expertos en reclutamiento y las contrataciones con la industria son las mejores estrategias para las universidades iraníes.

PALABRAS CLAVE
Conocimiento; innovación; comercialización; estrategia; enfoque AHP; matriz DOFA.

INTRODUCTION
Knowledge and innovation has a direct impact on an economy, especially in fast-growing new startup companies. Knowledge workers are the key towards gaining competitive advantage for innovative organizations (Gonzalez-Perez & Leonard, 2013). Factors such as globalization, along with other factors, have fundamentally changed the relationship between industry and universities.

This is part of a general trend towards the rapid development of knowledge markets. Currently, national policies are focused on the relation between industry players and university. The aim is to facilitate the improvement of entrepreneurship in fast-growing industries (The Organization for Economic Co-operation and Development (OECD), 2002). Hence, universities are considered as important actors in the knowledge-based economy. And the commercialization of research in universities, the innovations that originate from the research and development are considered as important factors for the economic stability of countries (Arora, 2003). Innovation often results in entrepreneurship as new ventures are created (Khajeheian, 2013) and by allowing firms to survive and compete in turbulent markets (Khajeheian, 2016a,b). Innovation also emanates from knowledge and creativity expected to be fostered in universities. The change in the universities' role from a knowledge producer to an entity that commercializes knowledge, has led to an increase in innovative activities in the past two decades. But despite the importance of innovation; little attention has been paid to the successful commercialization of university research in developing countries especially in Iran (Zarea and Salamzadeh, 2012; Guerrero, Urbano, and Salamzadeh, 2014, 2015). With the importance of commercializing research that emanates from universities, and the fact that the selection of a commercialization strategy is the heart of developing innovations, commercialization determines the path through which organizations gains revenue and profit for the products and innovation (Servo, 1998). Therefore, paying attention to the mode of selecting a strategy with its correct mechanism is important for strategic planning in universities.

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Thus, this study provides a comprehensive evaluation of commercialization strategies. The aim is to provide a correct answer to the question, 'what is the appropriate strategy for the commercialization of academic studies in universities and higher educational institutions in Iran?'

RESEARCH BACKGROUND

Universities are increasingly becoming entrepreneurs in most developed countries (Moray and Clarysse, 2004; Siegel, 2006). They are considered as the source and origin of the development of technologies which can be useful for various economic activities (Mowery et al., 2001; Rosenberg and Nelson, 1994). Some researchers believe that universities have a new role in the commercialization of researches' results. And as the significance of a knowledge-based innovation in the development of industrial organizations increases every day, universities can play greater role in the development of societal innovations (Rasmussen, Moen and Gulbrandsen, 2006).

Universities become involved in technology transfer activities for various reasons. The reasons include, recruitment and retention of university professors, the development of a stronger relation between the industry and the university, strengthening the credibility of the university and, for economic, social benefits or regional economics (SBIR Program Reauthorization Act available at http://sbir.gov/about/about-sbir). Overall, the increase in commercialization has led towards the opening of a new gateway to the privatization of scientific joint-cooperation and scientific advances (Chang, Yang and Chen, 2009).

Many researchers have attempted to define the concept of commercialization. For instance, Urabe (1988) defined it as the creation of new idea and its implementation as a product, service, or a new process which leads to the dynamic growth of the national economy thereby increasing the employment rates and net profit of innovative companies. Chang et al., (2009) presents a practical definition for the commercialization of university research. The define commercialization as faculty members who seek to exploit their research results by receiving patent rights, licensing and participating in the ownership of spin-off companies. Also, Siegel et al., (2003a) and Bandarian (2007) defined commercialization as the conversion or transmission of technology towards a profitable field. The commercialization of academic research and technology transfer are synonymous in many research contexts (RAND Corporation, 2003; *Association of University Technology* Managers (AUTM), 2010; Chang et al., 2009). In general, technology transfer implies transferring ideas, methods or research results in an environment which results in a product, service or process in any way (RAND Corporation, 2003). Technology transfer is the official transfer of new discoveries and innovations resulting from scientific research that are carried out by non-profit research institutes and universities with the commercial sectors for public benefits *(AUTM*, 2003). Technology transfer from university to industry is the result of interaction between different actors and organizations such as executives of university, university researchers, research groups, public or private companies, technology transfer offices, venture investors and other financial actors

and different actors in the private sector (Goktepe, 2008). Finally, Kasch and Dowling (2008) mention that technology transfer is a comprehensive term which covers the mechanisms of information transfer to the outside borders and its effective transmission to the acceptor. Commercialization strategy also refers to a series of operations faced by an organization for transferring its product or technology to the market (Servo, 1998; Gans and Stern, 2003).

Technology takeover process and its distribution is an important factor that accelerates growth through productivity factor and the accumulation of capital and promotion of economic and social development in developing economies (Shapira and Wang, 2009; Siegel and Wright, 2015). This process is influenced by numerous external factors. The notable economic factors are the governmental policies and laws, such as Bayh–Dole Actin America (Friedman and Silberman, 2003). Incentive systems, university status, location, culture, intermediary institutions, focus, experience and defined identity, the role of the Scientific Board and nature of the technology which will be commercialized are also internal factors of commercialization (Rothaermel, Agung, and Jiang, 2006).

Universities have shown a strong desire to commercialize knowledge under economic pressure.There is the tendency for universities to become independent by building up their local budgets thus, commercialization has become a new gateway for the privatization of scientific progress (MIT, 2015 Castrogiovanni et al., 2016). The creation and transmission of knowledge by universities have been intensified under economic pressure and tighter public budgets (Brachos et al., 2007; Guzak and Rasheed, 2014). However, evidences show that universities are faced with problems in commercializing successful. One of the main challenges comes from the improper selection of a commercialization strategy. Therefore, the Grant framework was used in this study in the form of mixed exploratory study to identify and develop competitive strategies forcommercialization. Thus, information was collected via a qualitative case study and a quantitative descriptive-survey method (Kasch and Dowling, 2008).

Commercialization typically follows one of three primary strategic paths: (1) sale or licensing of Intellectual Property, (2) external development focused on acquisition, (3) internal development of a startup aimed at an initial public offering (IPO), or a mix of these strategies (Knockaert, Vandenbroucke and Huyghe, 2012; Siegel and Wright, 2015; Gittelman 2006). If the inventor does not want to be involved in the commercialization process, he/she can sell the rights to the innovation to another company (Siegel and Wright, 2015). The inventor may choose to offer the company technical assistance in exchange for a set cost, royalties, or other forms of agreement. Intellectual Property can also be licensed if the inventor wants to maintain ownership of the patent(s) but does not have the commitment or time to be involved in the company (Knockaert, Vandenbroucke and Huyghe, 2012). Although the terms of a licensing agreement vary for each technology, firm, and environment, the defining feature of this arrangement is that both parties remain independent while cooperating in commercialization of the technology (Gans and Stern, 2003).

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Standard license agreements include negotiated financial terms such as annual fees, a royalty on product sales, reimbursement of patent costs, and possibly a minority share of equity in the startup (MIT, 2015). Additionally, license agreements include nonfinancial terms such as the degree of exclusivity (e.g., nonexclusive, exclusive, or restricted by field of use), reservations of the rights for the federal government, and performance (diligence) requirements for having the capability to develop the technology (Rutherford and Holt, 2007; González-Pernía, Kuechle, and Peña-Legazkue, 2013). Another strategy of commercialization is by developing the startup externally with the goal of eventually being acquired by another company (Pettersson and Götsén, 2016; Yetisen et al., 2015). In this strategy, the innovator relinquishes the independent operation of the startup and gives the rights to commercialization and control of the technology to a third party (Brooks, Heffner and Henderson, 2014; Yetisen et al., 2015). In internal development, the innovator must be prepared to commit up to 90% of his/her available assets. The innovator must be able to sustain the development effort through the life cycle of the business with financial returns potentially only being realized after over 5 or more years (Yetisen et al., 2015). However, most startups do not have the available funding to bring the product to the inflection point, where adding a small amount of time and resources results in a significant improvement in performance (Barnes, Pashby, and Gibbons, 2002; Yetisen et al., 2015). Contractual relationships often develop at this stage. i Joint ventures and strategic alliances, and outsourcing may be used to gain access to additional assets (Yetisen et al., 2015). The commercialization strategy of a company is affected primarily by the company's vision, business philosophy, the stage of technological development, market risk, competitive activities and window of opportunity (Plewa, 2005). Ultimately, the optimal commercialization strategy depends on the innovator's background and willingness to invest time and resources to have an independent company and the desire to maximize the commercial availability of the innovation (NIST, 1999).

The main obstacles identified by researchers in the case of research commercialization are disagreements between academics who possess knowledge commercial transmission (Etzkowitz and Leydesdorff, 2000), bureaucracy , lack of flexibility of university management system (Samsom and Gurdon, 1993), lack of freedom of professors to participate in business activities (Plewa, 2005), cultural difference between industrial activists and academic life (Ndonzuau, Pirnay, and Surlemont., 2002), the lack of motivation for the university to commercialize (Debackere and Veugelers, 2005) weak laws protecting intellectual property, university dependence on governmental budgets, lack of identification of the needs and priorities of the business sector by university, different resources for industry activists and academics, lack of financial support for researchers by the university to exploit the knowledge generated by them, insufficient resources dedicated by university to technology transfer, insufficient share for professors (researchers) from the commercialization effort (Ndonzuau et al., 2002; Samsom and Gurdon, 1993).

STRATEGIES FOR COMMERCIALIZATION OF UNIVERSITY RESEARCHES

The background of research related to the commercialization of researches has expanded with the increase in patenting, licensing, corporate venturing, joint venturing business and strategic alliances (Walter, Lechner and Kellermanns, 2008). In the book entitled "Technology Transfer of Federally Funded R & D", Rand Corporation (2003) introduced seven main strategies of technology transfer. These includes licensing, cooperative activities, technical assistance, reimbursable work for nonfederal partner, exchange program, collegial interchange, publications and conferences and use of facilities. Link, Siegel and Bozeman (2007) divided transfer strategies into licensing agreements, joint research ventures, startups and academic companies in other classification. Universities are satisfied from this process because the official transfer of technology can create more revenue and relationships with external stakeholders as well as promote regional economic growth and development (Kelley et al., 2005). Several different strategies can be used to transfer research from universities to industry. These include licensing of university inventions, creation of university spin off companies, contracting with industry to conduct research, counseling university professors to industry and publishing scientific research results in scientific journals, exchange programs, joint cooperation in research and development, joint development agreements, research parks, science parks, technology parks or incubators (Rogers, Takegami and Yin, 2001). Goktepe (2008) also divided commercialization strategies into two categories. These includes general and special strategies. Special strategies include patenting and giving their license to the companies and the formation of university spin off companies. The general strategies include, attending conferences, seminars and workshops, joint supervision of graduate students and doctoral theses, employment of university graduates in the industrial sector, consultation of university professors in industry sector, working of university professors in the industrial sector, joint research laboratory with industry sector, agreements of joint research and development projects, development of joint technology by formal agreements of cooperation with industry sector and mobility of university professors between industry and university.

Universities have other strategies for commercial transmission of knowledge in addition to commercialize-able knowledge production and qualified scientists, such as attracting talented people to the local economy and cooperation with local industries through the provision of formal and informal technical supports (Bramwell and Wolf, 2008). Rogers et al., (2001) consider five different strategies of technology transfer from universities. This includes the creation of spin-off companies, licensing, meetings, papers and other publications as well as joint agreements on research and development. Also, having shares in a company, in return for providing the rights to use the intellectual property of universities, is an emerging strategy and is a good option for many universities. Goldfarb and Henrekson (2003) focuses on two groups of strategies. The first group includes three mechanisms which are generally used in a project with commercial value. They are: sponsored research, consulting (including group activities) and starting a new firm. The second group includes three

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possible mechanisms for compensation of inventor's services which are salaries, royalties and equity. Reamer, Icerman and Youtie (2003) explained five paths of collaborative research and development, licensing or sale of intellectual property, academic companies, technical advice, information exchange and hiring skilled personnel for knowledge transmission in complex environments. Nilsson, Rickne and Bengtsson (2009) classified the knowledge transfer strategies into eight categories of publications and conferences, patents, licenses, academic company, research with funding, informal or pre-formal discussions, common personnel and exchange of employees.

Increasing focus on the commercialization of university research has led to the development of efforts which promote research transfer activities. Some measures are formal while others are informal (Franklin, Wright and Lockett, 2001). Specifically, commercialization strategies of research can be divided into formal and informal mechanisms. The official commercialization strategies are licensing, university patents, the formation of new companies or university spin off companies. The informal strategies incudes consulting for industry players by university professors (Siegel et al., 2004). An informal mechanism for technology transfer involves creating facilitating tool for the flow of knowledge. But this is carried out through informal communication processes, such as technical assistance, consultation and cooperation on research (Link, Siegel and Bozeman, 2007) Cohen, Nelson and Walsh (2000) divided the informal mechanisms of commercialization into three categories. These includes the contribution to the transfer or commercialization of technology, participation in joint papers and consultation. Bercovitz and Feldmann (2006) categorized and presented formal and informal mechanisms of interaction of academic technology transfer in the form of Table (1).

Table 1: Formal and informal mechanisms for commercialization of academic research.

Mechanism	Definition
Research with funding	A contract in which the university receives funding for research.
The copyright	Legal rights to use the intellectual property of university.
Employment of students	Employing university students, especially those who work in sponsored projects.
Spin-off companies	The new concept which is based on academic research or university license.
Chance	Fortune

Source: Bercovitz and Feldmann, 2006.

Studies regarding the density, clustering and boundary spanning imply that joint venture businesses, alliances and distribution companies are useful strategies for technology transfer between companies and non-profit organizations (Siegel, Waldman and Link, 2003b) and licensing agreements between universities and private companies are the most important channel for the commercialization of the university's intellectual property (Kelly, 2004). However, the creation of new venture businesses founded by university researchers have been beneficial via technology transfer in the last two decades (Bercovitz et al., 2001; Shane, 2002; Siegel, Veugelers, and Wright, 2007). Intellectual property licensing and spin-off companies have been considered as key contributions in the creation of new technology-based companies (Feldman, Link, and Siegel, 2002).

RESEARCH METHOD

The analytical structure of our study is illustrated in Figure 1. We have reviewed some factors in literature and used fuzzy set theory to evaluate them. We collected a total number of 32 internal and external factors from previously-conducted researches (Figure 3). For collecting the data, we used fuzzy questionnaire that has 36 key internal and external factors extracted from literature. Questionnaire was created and distributed among relevant experts to elicit their opinions and suggestions about factors. EXPERTCHOICE software was used to analyze data from questionnaire. Due to the limitation in time and distance with respect to conducting interviews, and our main idea being the unification of the FAHP with SWOT, the approach was now to systematically extract strategies from the Internal-Eternal matrix and rank strategies commensurable to their weightiness. To create a SWOT-FAHP based strategic management model, we designed the following four-phase model: the building of the initial model; the confirmation of factors, the running of a ranking model through FAHP and extract strategies.

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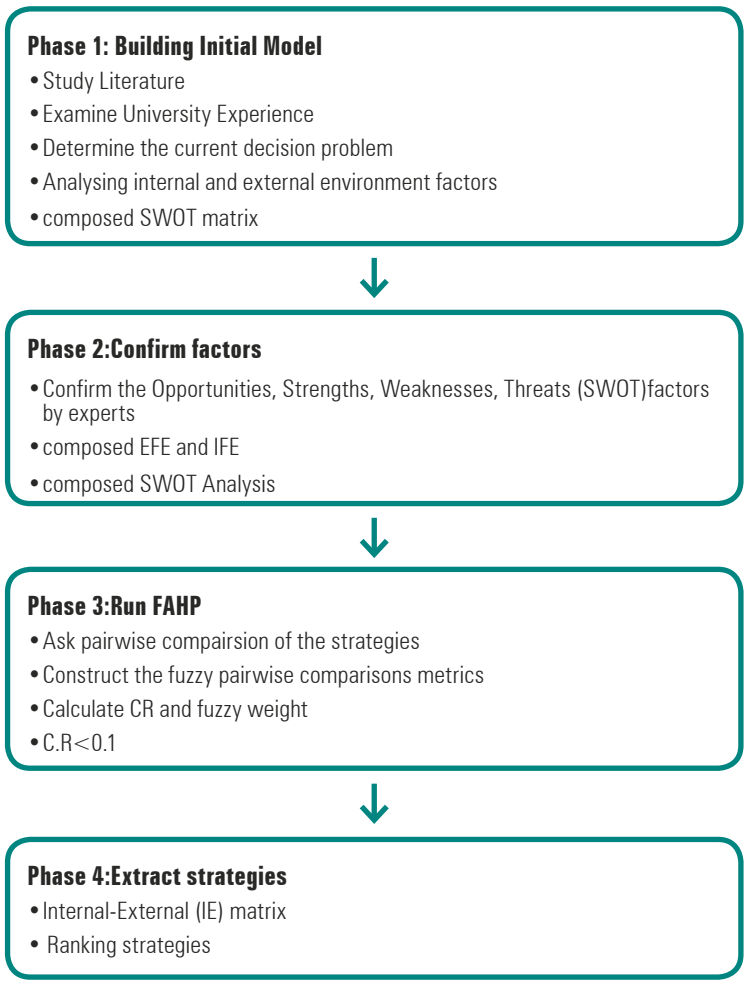
Figure 1: The phase of proposed methodologies.



FAHP Approach: Boutkhoum et al., (2015) noted that: "The Analytic hierarchy Process (AHP), initially introduced by Saaty (1980), has becomes a powerful and flexible methodology in solving problems that require complex decisions. However, the AHP method has some shortcomings due to its ineffectiveness when applied to an ambiguous problem with a high uncertainty. Therefore, several researchers, introduced fuzzy logic into the pairwise comparison of the AHP to compensate and deal with this type of fuzzy decision making technique. Hence, in this paper we prefer to utilize Buckley's methods to evaluate the weight of importance in each selected criterion. The theoretical fundamentals of Buckley's methods on FAHP were defined as follows (Ayhan, 2015):

Step 1: Experts compares the criteria via linguistic terms shown in Table 2. According to the corresponding triangular fuzzy numbers of these linguistic terms.

Table 2. Linguistic terms and the corresponding triangular fuzzy numbers.

Saaty scale	Definition	Fuzzy triangular S
1	Equally important (Eq. Imp.)	(1, 1, 1)
3	Weakly important (W. Imp.)	(2, 3, 4)
5	Fairly important (F. Imp.)	(4, 5, 6)
7	Strongly important (S. Imp.)	(6, 7, 8)
9	Absolutely important (A. Imp.)	(9, 9, 9)
2	The intermittent values between two adjacent scales	(1, 2, 3)
4		(3, 4, 5)
6		(5, 6, 7)
8		(7, 8, 9)

The pairwise contribution matrix is shown in Eq.1, where $\tilde{d}_{ij}^{k}$ indicates the kth expert's preference of i[th] criterion over j[th] criterion, via fuzzy triangular numbers.

$$\tilde{A}^{k} = \begin{bmatrix} \tilde{d}_{11}^{k} & \tilde{d}_{12}^{k} & \cdots & \tilde{d}_{1n}^{k} \\ \tilde{d}_{21}^{k} & \cdots & \cdots & \tilde{d}_{2n}^{k} \\ \cdots & \cdots & \cdots & \cdots \\ \tilde{d}_{11}^{k} & \tilde{d}_{12}^{k} & \cdots & \tilde{d}_{nn}^{k} \end{bmatrix} \qquad \text{Equation (1)}$$

Step 2: If there is more than one expert, preferences of each decision maker ($\tilde{d}_{ij}^{k}$) are averaged and ($\tilde{d}_{ij}$) are calculated as in the Eq. 2.

$$\tilde{d}_{ij} = \frac{\sum_{k=1}^{k} \tilde{d}_{ij}^{k}}{K} \qquad \text{Equation (2)}$$

Step 3: According to averaged preferences, pairwise contribution matrices is updated as shown in
Eq. 3.

$$\tilde{A} = \begin{bmatrix} \tilde{d_{11}} & \cdots & \tilde{d_{1n}} \\ \vdots & \ddots & \vdots \\ \tilde{d_{n1}} & \cdots & \tilde{d_{nn}} \end{bmatrix} \qquad \text{Equation (3)}$$

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Step 4: According to Buckley, the geometric mean of fuzzy comparison values of each Criterion is calculated as shown in Eq. 4. Here, $\tilde{r}_i$ still represents triangular values.

$$\tilde{r}_i = \left(\prod_{j=1}^{n} \tilde{d}_{ij} \right)^{1/n}, \; i=1, 2,...,n \qquad \text{Equation (4)}$$

Step 5: The fuzzy weights of each criterion can be found with Eq. 5, by incorporating next 3 sub steps.
Step 5a: Find the vector summation of each $\tilde{r}_i$
5b: Find the (-1) power of summation vector. Replace the fuzzy triangular number, to make it in an increasing order.
Step 5c: To find the fuzzy weight of criterion i ($\tilde{w}_i$), multiply each $\tilde{r}_i$ with this reverse vector

$$\tilde{w}_i = \tilde{r}_i \otimes (\tilde{r}_1 \oplus \tilde{r}_2 \oplus \cdots \oplus \tilde{r}_n)^{-1} = (lw_i, mw_i, uw_i) \qquad \text{Equation (5)}$$

Step 6: Since $\tilde{w}_i$ are still fuzzy triangular numbers, they need to de-fuzzified by Centre of area method proposed by Chou and Chang (2008) , via applying the equation 6.

$$M_i = \frac{lw_i, mw_i, uw_i}{3} \qquad \text{Equation (6)}$$

Step 7: M_i is a non-fuzzy number. But it needs to be normalized by following Eq. 7.

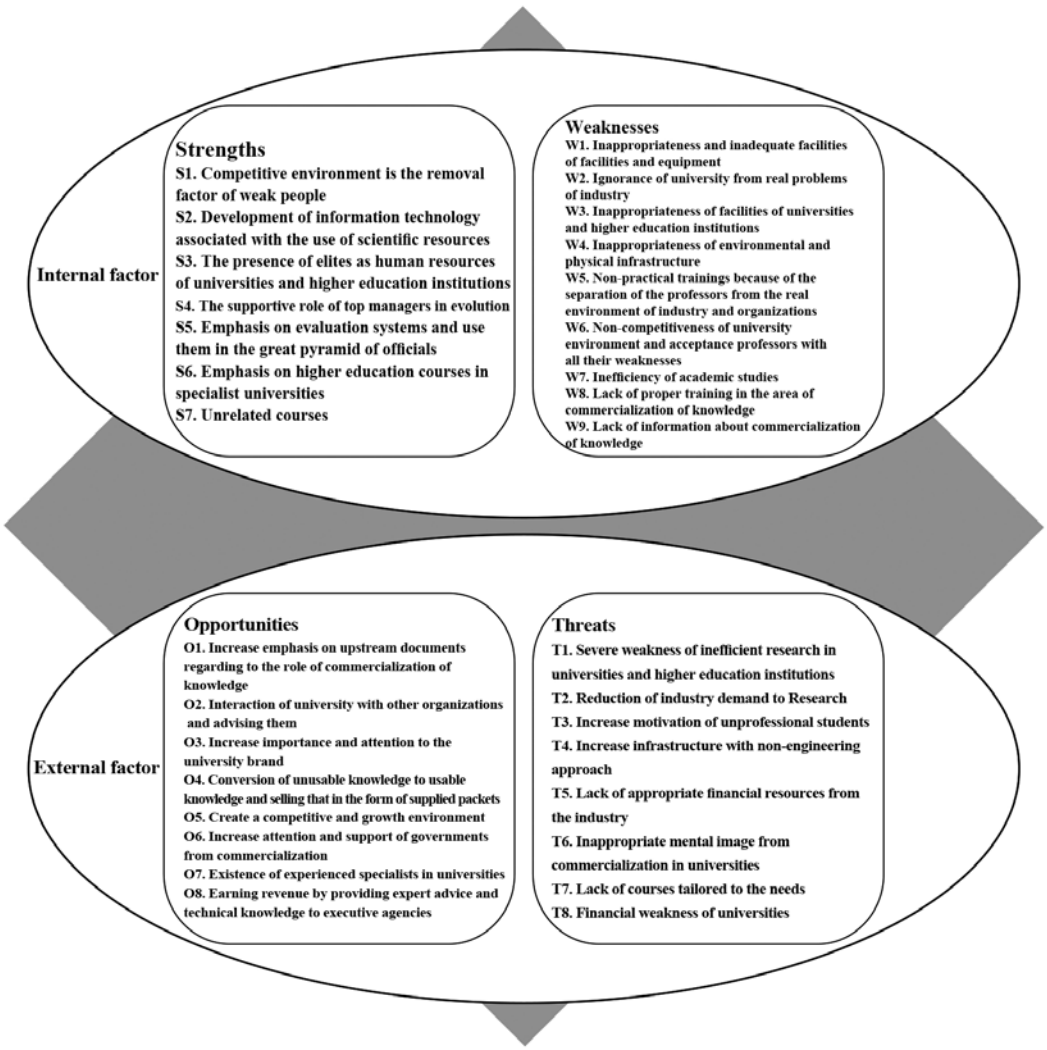
$$N_i = \frac{M_i}{\sum_{i=1}^{n} M_i} \qquad \text{Equation (7)}$$

These 7 steps are performed to find the normalized weights of factors. According to these results, the strategies with the highest score is suggested to the experts.

FINDINGS:

Based on the literature review and interview with academic experts, we developed the internal and external environment factors as shown in Figure 2.

Figure 2. Confirmed internal factors (Strengths, Weaknesses) and Confirmed external factors (Opportunities, Threats).



Source: Authors.

After that, SWOT analysis is carried out and matrix is structured (Table 10). The SWOT framework is a tool for auditing an organization and its environment. The concept of determining strengths, weaknesses, threats, and opportunities in Fig. 3 is the fundamental idea behind the SWOT Analysis Matrix. In Table 3 is an assessment of the appropriate strategies for the commercialization of knowledge in universities. They are separated into four categories according to experts which are: Strengths-

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Opportunities (SO) strategies that use strength to take advantages of opportunities, Threats-Strengths (ST) strategies that use strength to avoid threats, Opportunities-Weaknesses (WO) strategies that overcome weakness by taking advantage of opportunities and Threats- Weaknesses (WT) strategies that minimize weakness and avoid threats.

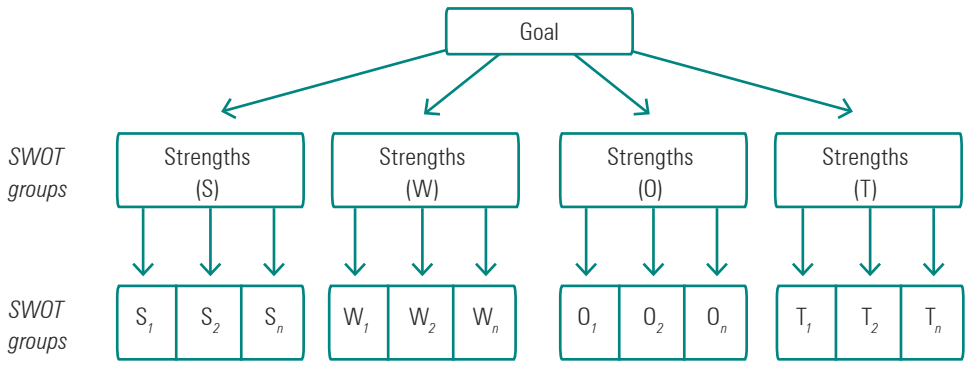
Table 3. Matrix of commercialization strategies of knowledge in universities.

	Strengths (S1, S2, S3, S4, S5, S6, S7)	Weaknesses (W1, W2, W3, W4, W5, W6, W7, W8, W9)
Opportunities (O1, O2, O3, O4, O5, O6, O7, O8)	SO strategies SO1: corporate venture business SO2: contracting with industry to conduct research SO3: academic start-ups SO4: strategic alliances SO5: chance SO6: recruiting skilled personnel for knowledge transfer in complex environments SO7: joint technology development by formal co-operation agreements with the industry sector SO8: joint research laboratories with industry sector	WO strategies WO1: counseling of university professors to industry sector WO2: use of facilities WO3: conducting conference WO4: publishing research results in scientific journals WO5: non-official or pre-official discussions WO6: shareholding hold shares in a company WO7: research joint meetings with industry and organizations WO8: reading and attracting talented people to the local economy and cooperation with local industries through the provision of formal and technical supports WO9: joint supervision of graduate students' dissertations and doctoral theses
Threats (T1, T2, T3, T4, T5, T6, T7, T8)	ST strategies ST1: research parks, science parks, incubators and technology parks ST2: Licensing ST3: patents ST4: Royalty ST5: employment of students ST6: advice to industrial enterprises by university professors ST7: Agreements to conduct R&D projects	WT strategies WT1: joint research and development agreements WT2: Partnership for transfer or commercialization of technology, participation in joint papers and consultation WT3: university interactions WT4: exchange programs WT5: extradition matters for government WT6: Technical Cooperation WT7: Interaction between university and industry WT8: The exchange of personnel and joint staff WT9: Research with sponsorship WT10: Mobility of professors between industry and university

Source: Authors.

Based on the SWOT analysis, the hierarchical structure of the SWOT matrix to develop best strategies for commercialization can be represented as found below: Figure 3.

Figure 3. Hierarchical structure of the SWOT matrix.



In the following stage, the weights of each criteria and sub-criteria are calculated using fuzzy-AHP. According to their preferences, the averaged pairwise comparison of the criteria is represented in Table 4. Due to the limitation of space and the similarity of the other calculations for each comparison matrix, we only provide the evaluation matrices of strengths factors as mentioned in Tables 4 to 7.

Table 4. Comparison matrices for criteria.

Strengths Criteria	S1	S2	S3	S4	S5	S6	S7
S1	(1,1,1)	(3,4,4.5)	(0.222,0.25,0.333)	(3,3.5,4)	(1,2,2)	(0.036,0.038,0.04)	(0.084,0.111,0.117)
S2	(0.222,0.25,0.333)	(1,1,1)	(0.167,0.182,0.2)	(1,2,2)	(1,2,2)	(0.203,0.269,0.456)	(0. 194,0. 356,0. 768
S3	(3,4,4.5)	(5,5.5,6)	(1,1,1)	(5,5.5,6)	(3,4,4.5)	(0.203,0.269,0.282)	(0. 235,0. 353,0. 765)
S4	(0.25,0.286,0.333)	(0.5,0.5,1)	(0.167,0.182,0.2)	(1,1,1)	(3,3.5,4)	(0.036,0.038,0.04)	(0.084,0.111,0.117)
S5	(0.5,0.5,1)	(0.5,0.5,1)	(0.222,0.25,0.333)	(0.25,0.286,0.333)	(1,1,1)	(0. 834,2. 532,3. 176)	(0. 345,0. 765,0. 547)
S6	(0.122,0.131,0.149)	(0.064,0.067,0.093)	(0.056,0.061,0.068)	(0.122,0.131,0.149)	(0.064,0.067,0.093)	(1,1,1)	(0. 325,0. 657,0. 432)
S7	(0.111,0.143,0.2)	(0.111,0.143,0.2)	(0. 346,0. 766,0. 467)	(0.278,0.322,0.35)	(0.203,0.269,0.282)	(0.268,0.311,0.338)	(1,1,1)

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Based on step 4, the geometric means of fuzzy comparison values of all criteria are shown in Table 5. In addition, the total values and the reverse values are also presented. In the last row of Table 5, since the fuzzy triangular number should be in increasing order, the order of the numbers is changed.

Table 5. Geometric means of fuzzy comparison values.

Strengths Criteria	Geometric means ($\widetilde{r}_i$)
S1	(2.51, 2.71, 3.30)
S2	(2.65, 3.10,3.29)
S3	(0.41, 0.54, 0.78)
S4	(0.36, 0.402, 0.439)
S5	(2.552, 2.959, 3.198)
S6	(0.42, 0.54, 0.45)
S7	(1. 42, 1. 24, 2.59)
Total	(10.332, 11.491, 14.47)
Reverse (power of -1)	(0.096, 0.087, 0.069)
Increasing Order	(0.069,0.087, 0.096)

In the fifth step, the fuzzy weight of each criteria ($\widetilde{w}_i$) is found with the help of Eq. 5. Hence the relative fuzzy weights of each criterion are given in Table 6;

Table 6. Relative fuzzy weights of each criterion.

Strengths Criteria	Fuzzy weight ($\widetilde{w}_i$)
S1	(0.178, 0.237,0.316)
S2	(0.188, 0.269, 0.315)
S3	(0.029, 0.046, 0.074)
S4	(0.025, 0.034, 0.042)
S5	(0.181, 0.257, 0.307)
S6	(0.029, 0.046, 0.043)
S7	(0.100, 0.107, 0.24)

In the sixth step, the relative non-fuzzy weight of each criterion (Mi) is calculated by taking the average of fuzzy numbers for each criterion. In the seventh step, by using non fuzzy Mi's, the normalized weights of each criterion are calculated and tabulated in Table 7.

Table 7. Averaged and normalized relative weights of strengths criteria.

Strengths criteria	M_i	N_i
S1	0.243	0.237
S2	0.257	0.251
S3	0.050	0.048
S4	0.034	0.033
S5	0.248	0.242
S6	0.04	0.038
S7	0.152	0.148

In table 8 to 10, we presented averaged and normalized relative weights of Threats, Weaknesses, and Opportunities criteria as well as SWOT groups.

Table 8. Averaged and normalized relative weights of Weaknesses criteria.

Weaknesses criteria	M_i	N_i
W1	0.353	0.247
W2	0.32	0.224
W3	0.243	0.170
W4	0.124	0.086
W5	0.148	0.103
W6	0.044	0.030
W7	0.052	0.036
W8	0.067	0.046
W9	0.075	0.052

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Table 9. Averaged and normalized relative weights of Opportunities criteria.

Opportunities criteria	M_i	N_i
O1	0.143	0.126
O2	0.032	0.028
O3	0.073	0.064
O4	0.004	0.003
O5	0.158	0.140
O6	0.139	0.123
O7	0.282	0.250
O8	0.297	0.263

Table 10. Averaged and normalized relative weights of Threats criteria.

Threats criteria	M_i	N_i
T1	0.166	0.107
T2	0.288	0.187
T3	0.265	0.172
T4	0.314	0.204
T5	0.123	0.079
T6	0.039	0.025
T7	0.182	0.118
T8	0.161	0.104

Finally, the overall priority scores of the SWOT factors are calculated. Overall priorities are shown in Table 11. The FAHP analysis results indicate that earned revenue from providing expert advice and technical knowledge to executive agencies and existence of experienced specialists in universities are the most important issues when considering the commercialization of a universities internal and external environment.

Table 11. Overall Priority Scores of SWOT Factors.

SWOT Group	Group Priority	SWOT Factors	Factor Priority within the Group	Overall Priority of Factor
Strengths	0.355	S1	0.237	0.084
		S2	0.251	0.089
		S3	0.048	0.017
		S4	0.033	0.011
		S5	0.242	0.085
		S6	0.038	0.013
		S7	0.148	0.052
Weaknesses	0.142	W1	0.247	0.035
		W2	0.224	0.031
		W3	0.170	0.024
		W4	0.086	0.012
		W5	0.103	0.014
		W6	0.030	0.004
		W7	0.036	0.005
		W8	0.046	0.006
		W9	0.052	0.007
Opportunities	0.349	O1	0.126	0.044
		O2	0.028	0.009
		O3	0.064	0.022
		O4	0.003	0.001
		O5	0.140	0.048
		O6	0.123	0.043
		O7	0.250	0.087
		O8	0.263	0.091
Threats	0.154	T1	0.107	0.016
		T2	0.187	0.028
		T3	0.172	0.026
		T4	0.204	0.031
		T5	0.079	0.012
		T6	0.025	0.003
		T7	0.118	0.018
		T8	0.104	0.016

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IE matrix: The IE matrix belongs to the group of strategic portfolio management tools; the IE matrix positions an organization into a nine-cell matrix. The IE matrix is based on two criteria: the score from the EFE matrix – this score is plotted on the y-axis and the Score from the IFE matrix – plotted on the x-axis. In the following, we composed EFE and IFE matrix to define and analyze IE matrix.

EFE and IFE Matrix: These matrix is composed of four columns. First column is a list of Internal or External factors that include strengths and weaknesses in IFE matrix or opportunities and threats in EFE matrix. The second column is an assigned normalized fuzzy weights that is calculated in table 11 (normalized overall Priority of factor) and the total value of all weights together should be equal to 1. The third column are the Rate factors that assigns a rating to each factor. The rating should be between 1 and 4. The rating indicates how effective the commercialization of the university's current strategies responds to the factor. 1 = the response is poor. 2 = the response is below average. 3 = above average. 4 = superior. The weights are industry-specific. The ratings are university-specific. And the fourth column calculates the weighted score for each factor. In last row, you sum up all the weighted scores and add all the weighted scores for each factor. This will calculate the total weighted score for the universities. The IE matrix works in a way that it plots the total weighted score from the EFE matrix on the y-axis and draw a horizontal line across the plane. Then the plot take the score calculated in the IFE matrix, plots it on the x-axis, and then draw a vertical line across the plane. The point where your horizontal line meets your vertical line is the determinant of your strategy. This point shows the strategy that a university should follow. On the x-axis of the IE Matrix, an IFE total weighted score of 1.0 to 1.99 represents a weak internal position. A score of 2.0 to 2.99 is considered average. A score of 3.0 to 4.0 is strong. On the y-axis, an EFE total weighted score of 1.0 to 1.99 is considered low. A score of 2.0 to 2.99 is medium. A score of 3.0 to 4.0 is high.

Table 12. Internal Factors Evaluation matrix (IFE), commercialization of knowledge in universities.

Internal factors Evaluation (IFE): strengths (S) and Weaknesses (W)	Fuzzy weight (normalized overall Priority of factor)	Rank	Weighted score
S1	0.171	3	0.515
S2	0.182	3	0.546
S3	0.034	4	0.139
S4	0.022	4	0.089
S5	0.173	4	0.695
S6	0.026	2	0.053
S7	0.106	2	0.212
W1	0.071	4	0.286
W2	0.063	4	0.253
W3	0.049	4	0.196
W4	0.024	3	0.073
W5	0.028	3	0.085
W6	0.008	2	0.016
W7	0.010	2	0.020
W8	0.012	2	0.024
W9	0.014	2	0.028
Total all weighted scores	1		3.237

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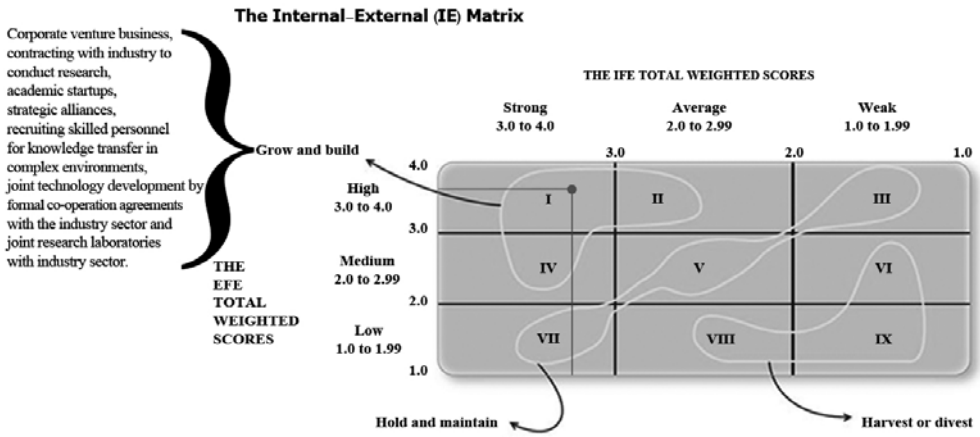
Table 13. External factors Evaluation matrix (EFE), commercialization of knowledge in universities.

External factors Evaluation (EFE): Opportunities (O) and threats (T)	Fuzzy weight (normalized overall Priority of factor)	Rating	Weighted score
O1	0.088	4	0.352
O2	0.018	3	0.054
O3	0.044	3	0.132
O4	0.002	1	0.002
O5	0.096	3	0.288
O6	0.086	3	0.258
O7	0.175	4	0.7
O8	0.183	4	0.732
T1	0.032	3	0.096
T2	0.056	4	0.224
T3	0.052	4	0.208
T4	0.062	4	0.248
T5	0.024	3	0.072
T6	0.006	2	0.012
T7	0.036	3	0.108
T8	0.032	3	0.096
Total all weighted scores	1		3.582

The IE matrix works in a way that you plot the total weighted score from the EFE matrix on the y-axis and draw a horizontal line across the plane. Then you take the score calculated in the IFE matrix, plot it on the x-axis, and draw a vertical line across the plane. The point where your horizontal line meets your vertical line is the determinant of your strategy. This point shows the strategy that your company should follow. On the x-axis of the IE Matrix, an IFE total weighted score of 1.0 to 1.99 represents a weak internal position. A score of 2.0 to 2.99 is considered average. A score of 3.0 to 4.0 is strong. On the y-axis, an EFE total weighted score of 1.0 to 1.99 is considered low. A score of 2.0 to 2.99 is medium. A score of 3.0 to 4.0 is high. We calculated IFE matrix for commercialization in a university. The total weighted score calculated is 3.237 which indicates a university with a strong internal strength. We also calculated the EFE matrix for the university. The total weighted score calculated for the EFE matrix is 3.582 which suggests a strong ability to respond to external factors. Those plots can be represented as following Figure 4:

Figure 4. Internal-External Matrix.



This IE matrix tells us that a university should grow and build its position. This means intensive and aggressive tactical strategies. The University should pursue strategies that will enable market penetration, market development, and product development. From the operational perspective, a backward integration, forward integration, and horizontal integration should be considered. Below strategies that synchronize are corporate ventures, contracting with industry to conduct research, academic startups, strategic alliances, recruiting skilled personnel for knowledge transfer in complex environments, joint technology development by formal co-operation agreements with the industry and joint research laboratories with industry sector.

CONCLUSION

According to Table 3, SO, ST, WO and WT, strategies that minimize weakness and avoid threats strategies were extracted based on the competitive advantage and capabilities of commercialization of academic research. According to this table, academic firms and joint laboratory are examples of the SO strategies. The emphasis on chance as a strategy means that when there are many opportunities and strengths, all chances are seen as a potential strategy. This is because the institution or university can achieve the opportunity based on the competitive advantages. Academic institutions have positioned themselves to serve the industry through consulting, licensing, and university spin-offs. The awareness of commercialization strategies can help academics to efficiently transfer their inventions to the market to achieve the maximum value. Universities are incentivized by the maximization of impact of the research results. Firms that use this knowledge, on the other hand, are typically driven by maximization of profit and commercial measures (Landry, Amara and Ouimet, 2007). Technology entrepreneurs must formulate and implement a commercialization strategy that determines the ultimate performance of the

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business. Optimization of commercialization strategies can enable the inventors and academic institutions to extract the maximum value from inventions and know-how (Yetisen et al., 2015). Emphasis on appropriate speed with conditions and environment to promote commercialization are suitable at the time of using this strategy. Diversification strategy refers to expanded commercialization activities. That is why the tendency is to engage university in the development of their activities. Some of the strategies related to this field include the creation of research parks, growth centers and technology transfer centers.

According to IE Matrix, a university should pursue strategies focused on corporate venture, contracting with industry to conduct research, academic start-ups, strategic alliances, recruiting skilled personnel for knowledge transfer in complex environments, joint technology development by formal co-operation agreements with the industry sector and joint research laboratories with industry sector. The literature review shows that various researchers expressed different strategies for commercialization of knowledge in university. Of course, some researchers have expressed shared items. These strategies changed based on sources, competitive advantages and capabilities of university. The performance of each strategy will be different in different environments. The coercion of labor did not only lead to reduced productivity, and competitiveness; but also its moral and political implications have economic consequences, which are exercised via market forces (Velez-Ocampo; Herrera-Cano, and Gonzalez-Perez, 2016). Scholars agree on the importance of organizations having employees that are adept team players with experience in accomplishing effective virtual projects that require online interaction, managing the dislocation of geographic- and time-based boundaries (Gonzalez-Perez et al., 2014). It is suggested that they pay more attention to the resources, competitive advantages and capabilities of the organization when choosing university strategies and strategies by higher education institutions with the aim of commercializing academic research. This is because choosing a commercialization strategy for research within a university research includes partnerships with industry players in the development of products and services. It also involves providing advisory services, meetings with industry personnel, the creation of an economy based on the university's technology transfer and joint research. These are simple to implement but have mission complexities in different organizations. And selection of all of these strategies will not express the speed, accuracy or tendency towards commercialization.

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IMPACT OF CO-CREATION ON INNOVATION CAPABILITY AND FIRM PERFORMANCE: A STRUCTURAL EQUATION MODELING

EL IMPACTO DE LA CO-CREACIÓN EN LA CAPACIDAD DE INNOVACIÓN Y EL DESEMPEÑO DE LAS EMPRESAS: UN MODELADO DE ECUACIONES ESTRUCTURALES

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ABSTRACT

Traditional firms used to design products, evaluate marketing messages and control product distribution channels with no costumer interface. With the advancements in interaction technologies, however, users can easily make impacts on firms; the interaction between costumers and firms is now in peak condition in comparison to the past and is no longer controlled by firms. Customers are playing two roles of value creators and consumers simultaneously. We examine the role of co-creation on the influences of innovation capability and firm performance. We develop hypotheses and test them using researcher survey data. The results suggest that implement of co-creation partially mediate the effect of process innovation capability. We discuss the implications of these findings for research and practice on the depict and implement of unique value co-creation model.

KEYWORDS

Co-creation; Innovation Capability; Firm Performance; SEM.

RESUMEN

Las empresas tradicionales solían diseñar productos, evaluar mensajes de mercadeo y controlar los canales de distribución de producto sin una interfaz del cliente. Con los avances en las tecnologías de la interacción, sin embargo, los usuarios pueden fácilmente tener un impacto sobre las empresas: la interacción entre los clientes y las empresas se encuentra en este momento en su punto máximo en comparación con el pasado y ya no es controlada por las empresas. Los clientes están desempeñando dos roles actualmente: creadores de valor y clientes, al mismo tiempo. A diferencia de los clientes tradicionales, que no tienen ningún rol en la innovación de los productos o los servicios, los clientes de hoy han alcanzado una posición de influencia que les permite ser innovadores y co-creadores. En otras palabras, ya no son solamente compradores, usuarios o defensores leales de un producto. Examinamos el rol de la co-creación sobre las influencias de la capacidad de innovación y desempeño de la empresa. Desarrollamos hipótesis para evaluarlas utilizando datos de la encuesta de los investigadores. Los

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resultados sugieren que implementar la co-creación logra mediar parcialmente el efecto de la capacidad de innovación. Discutimos las implicaciones de estos hallazgos para la investigación y la práctica e implementamos un modelo de co-creación de valor único.

PALABRAS CLAVE
Co-creación; capacidad de innovación; desempeño de las empresas; SEM.

INTRODUCTION

The organization of the twenty first century industries is changing from firm level into customer level (Kumar and Petersen, 2013). Going into competition with traditional methods has become increasingly challenging and firms need to adjust their marketing strategies to customer-level organizations to win competitions (Lamberti and Noci, 2009). With this evolution, companies have to reconsider their marketing strategies to succeed in the competitive environment and to maximize their profitability (Hoyer et al. 2010). With the emergence of customer level marketing, the traditional lines between marketing and finance have vanished (Johnson et al., 2000; Joshi and Sharma, 2004; Lin and Huang, 2013). Therefore, an important change that most firms have gone through is to build an interface between their marketing and finance departments (Lusch and Webster, 2011). Customers are now demanding customized and personalized products and services to feel unique and stand out from crowd, so marketing has changed its focus from the features of products to customer benefits. (Joshi and Sharma, 2004). Despite the vast and rapid change in the market, most firms still depend on firm-level organizations for designing their marketing strategies (Lundkvist and Yakhlef, 2004). Firms that create new products and customize current products are doomed to failure if they do not take into the account the cost implications of marketing and the price change of their products and services (Lusch and Webster, 2011; Lundkvist and Yakhlef, 2004; Lusch, Vargo and O'Brien, 2007; Tanha et al., 2011).

This paper aims to address the abovementioned issues by examining the impact of co-creation and innovation capability on firm performance. Co-creation refers to the practices a company uses to collaborate with its stakeholders during the design, development and deployment of its products and services (Kirah, 2009). We extend and expand the existing research by proposing a subtler model on the effects of co-creation and innovation capability on firm performance for making two important contributions: (1) to compound to the rare empirical research on performance implications of the co-creation and innovation; and (2) to develop a conceptual model that better highlights the interplay between co-creation and innovation on influencing performance. In particular, we address three research questions: (1) does the co-creation affect firm performance; (2) does the innovation capability mediate the relationship co-creation and firm performance; and (3) does innovation capability affect firm performance?

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LITERATURE REVIEW

Co-creation

In marketing study, shared creation of value by the customer and the supplier which necessitates the combined effort of the partners for developing a new offer means co-creation (Silva, Camacho and Vázquez, 2013). According to this conception, the main business is in the interaction point of the customer and the company rather than the value chain (Sjodin and Kristensson, 2012; Vargo and Lusch, 2008; Witell et al., 2011) and all the contributors in the co-creation process function as value co-creators which achieve new offers through the integration of resources (Woodruff and Flint, 2006). Therefore, co-creation is assumed as an approach to increase value for customers and firms (Vargo and Lusch, 2008; Witell et al., 2011). The "co-" in Co-creation refers to the actors who participate in the process of creating value and includes customers, firms, brand communities and other actors (Saarijarvi and Kannan, 2013). On the other hand, "creation" refers to unifying and integrating multiple resources contributed by different actors (Saarijarvi and Kannan, 2013; Sjodin and Kristensson, 2012). Co-creation replaces the hierarchical approach to management and the linear approach to innovation, affording all stakeholders the possibility to influence and bring forth meaningful and relevant solutions in a collaborative environment (Kirah, 2009). Some studies argue that it is the creation of value in a more interactive process in which customers and firms work together to generate new products and services (Ind and Coates, 2013; Skiba and Herstatt, 2009). The nature of value-creation relies on the approach we take toward it; if the customer is invited to participate in the co-creation process, it is the firm that creates value for customer (Zwass, 2010). Therefore, co-creation is defined as developing new products and services in a quicker and more relevant and innovative way than traditional processes which it brings about an opportunity for continued interaction between the firm and customers and the firm is willing to work with external stakeholders (Wandahl et al., 2011; Sawhney, 2006).

Each value creation process (customer and provider) developed during the direct interaction, merge into one integrated dialogical process in which both parties operate within the processes of the other and have the opportunity to be active, coordinate actions, and learn from each other. This eventually leads into a direct influence from each party on the other (cf. Ind and Coates, 2013) which indicates that the interactions necessitate a deep engagement from both the customers and providers and the ability and willingness of both to act and learn from the other (Prahalad and Ramaswamy, 2004a; 2004b; 2004c; Prahalad and Krishnan, 2008). In such processes, companies deliver value as a customer's partner instead of seller (Khajeheian, 2016a). The company-customer relationship in the traditional product business approach is transaction based, therefore the financial value is assumed to be the transaction itself (Prahalad and Ramaswamy, 2004b). However, in co-creation

approach, it is the set of interactions and the developing relationships that drives the financial value (Payne, Storbacka and Frow, 2008). As a result, the value is co-created through a continuous interactive learning process and customer is involved in all the stages of service development; from joint problem definition to collaborative problem solving. Consequently, the customer value creation process is assumed as a non-linear, interactive, dynamic, and often unconscious process (Payne et al, 2008; Plötner, Lakotta and Jacob, 2013).

Innovation capability

Innovation activity in the firm involves the interaction between three key aspects of the firm's operations. These includes the resources of the firm including knowledge, process and product, the firm external linkages with societal and market changes (Khajeheian, 2014), and the creative input of individuals in the firm (Balan, Lindsay and O'Connor, 2009). Tapping the potential of new ideas is the basis of competitive success (Francis, 2005). First time, Schumpeter (1934) addressed the importance of innovation for economic and organizational performance (Balan et al., 2009). Balan and Lindsay (2010) have resulted that the post-industrial era with increasingly complex, turbulent environment, organization will need to focus on increasing degree on innovation and ensure the survival and progress of firm (Khajeheian, 2016b). In this regard, given the large number of recent studies have identified a positive relationship between innovation and firm performance (Slater, Mohr and Sengupta, 2014; Aravind, Damanpour and Devece, 2013). Organizations exploit opportunities and gain competitive advantage through Innovation. As a result, Innovation and competitiveness are in relation with each other (Balan and Lindsay, 2010).

However, Innovation solely is not enough for doing competitiveness and firms need to be in a continuous process of innovation to utilize opportunities (Menguc et al.,2014). Szeto (2000) defines that innovation capability is the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders. Lawson and Samson (2001) believe that innovation capability is not only an ability to be successful at running a business new stream, or to manage mainstream capabilities but synthesizing these two operating paradigms. Chen and Xu (2009) define innovation capability as a process that enterprises acquire and integrate knowledge to generate creative ideas and new product to satisfy customers. Balan and Lindsay (2010) argue that innovation capability involves the interaction between three key aspects of the firm's operations. This include different type of resources like as knowledge, process and products/ services, the firm's external linkages with societal and market changes and the creative input of individuals in the firms.

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Firm Performance

Firm performance is one of the most important concepts of business strategy (Santos and Brito, 2009), and is one of the most relevant constructs in the field (Santos and Brito, 2009; Camisón and Villar-López, 2014). Performance is often operationalized with financial measures are often used alone regardless the growing importance of others environmental aspects and many studies represent firm performance as unidimensional even acknowledging its multidimensionality (Santos and Brito, 2009). As this regard, Firms that provide more utility to their stakeholders are better able to retain their participation and support and stakeholders depend on both the firm and its other stakeholders to satisfy their own interests (Harrison and Wicks, 2013). Garcia and Calantone (2002) describe innovations in three terms: First, new to the industry supports technology pervasively transforms an industry, second, new to the firm relate to those that may exist presently in the marketplace and finally, new to the consumers have impacts on users depending on the degree of learning and adoption.

Co-Creation and Innovation

Co-creation is defined as collaborative work between a consumer and a firm in an innovation process, whereby the consumer and firm engage in the activity of co-ideation, co-design, co-development and co-creation of new products or services (Prahalad and Ramaswamy, 2004c; Russo-Spena and Mele, 2012). In part, co-creation is a specific form of user contribution whereby "active" as opposed to "passive" consumers participate with the firm and voluntarily contribute input (be that knowledge, informed opinions, experience or resources) into an innovation process, whose outcome is better and more market-focused innovation (Russo-Spena and Mele, 2012)

The users' ability to innovate is improving radically and rapidly as a result of the steadily improving quality of information technology, improved access to easy-to-use tools and components for innovation, and access to a steadily richer innovation common (Magnusson, Matthing and Kristensson, 2003). These information-based tools can be run on a personal computer, and they are rapidly coming down in price. As a consequence, innovation by users will continue to grow even if the degree of heterogeneity of need and willingness to invest in obtaining a precisely right product remains constant (Maklan, Knox, and Ryals, 2008). Von Hippel (2005) depicted that both firms and individual consumers are increasingly able to innovate for themselves, this is to say, innovation is being democratized.

H1 Co-creation has a direct, positive effect on innovation capability.

Innovation Capability and firm performance

Linkages between Innovation capability and firm performance is emphasized by large number of researches (Damanpour and Evan, 1984; Aravind at al., 2013). Most of the studies analyze how innovation performance—innovation as output—or technological effort for innovation—innovation as input—affect firm performance. A smaller group of studies based on RBV focuses on the analysis of Innovation capabilty—innovation as organizational capability—and its effect on (Camisón and Villar-López, 2014). Damanpour and Aravind (2011) display innovation capability as new approaches in knowledge for performing management functions and new processes that produce changes in the organization's strategy, structure, administrative procedures, and systems

H2 Innovation capability has a direct, positive effect on firm performance

Cocreation and firm performance

According to Chathotha et al. (2012) co-creation is a process in which high level of participation by and collaboration of customers with companies is required for customizing and innovating new products and services. It is the participation of customers in creating the main product which is accomplished through innovation and is tied closely to usage, value-in-use and the conception that "value can be determined only by the customer". Roser, DeFillippi and Samson (2013) argued that all co-creation approaches have two common qualities: the widening of organizational boundaries and the involvement of co-creators. They concluded that firm performance usually use a pool of ideas and strategies and has its own unique approach in co-creation which is specific in its aim to increase the productivity of a firm's performance. Co-creation is an interactive dialogue between a firm performance and a group of consumers (Russo-Spena et al., 2011; Piller, Ihl and Vossen, 2010; Nicolajsen and Scupola, 2011), that can vary in depth of interaction, with the goal of jointly enhancing the value of the offerings to both the firms and the consumer (Magnusson et al., 2003; Maklan et al., 2008). The connection between the stage in which a firm get involved in co-creation and improvements in firm growth and profitability has been widely discussed (Prahalad and Ramaswamy, 2004b; Prahalad and Krishnan, 2008; Nicolajsen and Scupola, 2011; Macdonald et al., 2011; Lugosi, Janta and Watson, 2012). Firm Performance is the extent in which a firm is capable of reaching sustained competitive advantages as leveraged by resources that are valuable, rare, and imperfectly imitable and have no strategically equivalent substitutes. All these researchers on co-creation suggest or imply a relation between co-creation and firm performance in their articles, but rarely fully conceptualize it (Tijmes, 2010).

H3 co-creation has a direct, positive effect on firm performance

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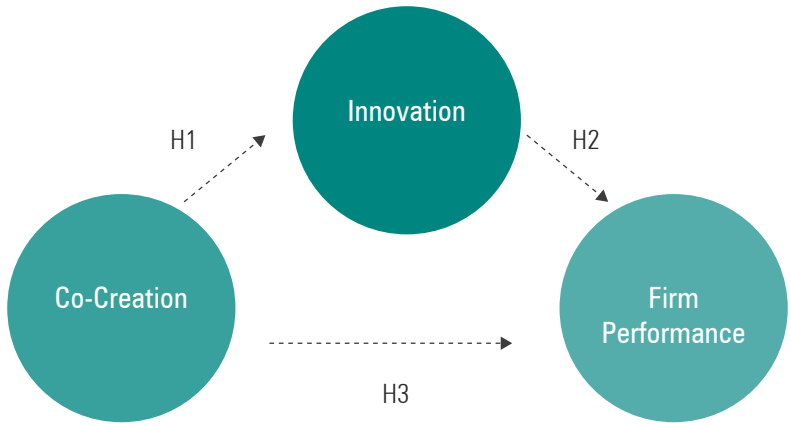
Figure 1. Illustrates the theoretical relationships between co-creation, innovation and firm performance.*



*Hypothesized model.

METHODOLGY

Data collection

This is an applied research which is conducted based on descript survey research. The population of respondents included middle manager like as R&D manager, innovation manager, sales manager, human resource manager or consular. These respondents are from the top 500 Iranian Large Enterprise that are selected from the ranking account of the Industrial Management Institute (IMI). The population was 500 enterprises, but based on Cochran's method, only 157 respondents were picked as the sample size representing a response rate of 31.4%. After excluding eight invalid responses, 149 valid responses remain. Simple sampling was used in this research. The first step in this study focuses on construct reliability and validity, whereas the second step tests structural relationships among latent constructs. The questionnaire survey was used to gather the data.

Statistical analysis

The study used structural equation modeling (SEM) and applies partial least squares (PLS) using Smart PLS 3.0 to assess the psychometric properties. PLS software were used for testing the basic conceptual model. They provide other indices plus goodness of fit evaluation of models.

Proposed model

Figure.1 presents the study's research model. The model suggests that co-creation affects innovation capability and firm performance, also innovation capability acts as a

mediator in the relationship between co-creation and firm performance. These linkages of all these constructs are taking into the model. In particular, it is going to examine the mediating role of innovation and its link strength in the impact of value co-creation on firm performance and also the direct impact of Co-creation on firm performance. In 4-1 and 4-2 section, we discuss the reliability and validity of model and its connections. Also, we show hypotheses in last of 2-4, 2-5 and 2-6 sections. As can be shown, the options of variables and their measurement scale is conducted by the theoretical premises that was discussed above, thus the model is provided with conceptual consistency. The three constructs are providing a number of questions which were selected specifically from the previous questioners, creating our measurement scale.

Measure development

In general, all constructs in the model were measured with multiple-item scales and well-validated. These measures were utilized in previous research. We measured Co-Creation using six survey items based on Payne et al. (2008). The stem question was "What is the role of following dimensions in your firm performance?" followed by three dimension: customer process (CC1 and CC2), encounter process (CC3 and CC4) and supplier process (CC5 and CC6). Our measure of Innovation capability (IC) was based on four items used in Aravind et al (2013). We used "Relative to your major competitors, your firm focuses on" as the original question. At last, a six-item scale was used to measure firm performance. It was drawn from Camisón and Villar-López (2014). Table 1 lists the questions that were used to construct our measures.

Table 1. Measures.

Construct	Indicator	Item
co-creation: What is the role of following dimensions in your firm performance? (1 = much below average; 2=somewhat below average; 3 = about average; 4= somewhat above average; 5= much above average.)	Customer learning	CC1
	Customer Relationship experience	CC2
	Exchange practice	CC3
	collaborative practices	CC4
	Supplier relationship experience	CC5
	Organizational learning	CC6
Innovation capability: Relative to your major competitors, your firm focuses on (Strongly Disagree=1, Disagree=2, Neither Agree or Nor Disagree=3, Agree=4, Strongly Agree=5):	Being the first in the industry to try new methods and technologies	IC1
	Using the latest technology in production	IC2
	Capital investment in new equipment and machinery	IC3
	Being a leader in process innovation	IC4

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Table 1. Measures. Continued

Construct	Indicator	Item
firm performance: Evaluate your firm's performance compared to the average for your competitors on a scale from 1 to 5, where 1 equals Much worse and 5 Much better Note: Items are distracted from Tehran stock exchange and IMI in Iran.	Mean economic profitability 2011	FP1
	Mean financial profitability 2011	FP2
	Mean sales profitability 2011	FP3
	Return on total assets 2013	FP4
	Return on capital employed 2013	FP5
	Return on shareholders' funds 2013	FP6

Table 2 shows descriptive statistics such as Means and Standard Deviations. According to the descriptive statistical variables in each scale of 5 with the mean close to 3.5 and 4 and with standard deviation close to 1 it indicates a perfect distribution data. Based on the obtained results a positive relationship between variable is seen. It can be stated that there is a relative independence of the relationship between the variables of the study.

Table 2. Descriptive statistics (Means and standard deviation).

Variables	Mean	SD
CC (Co-creation)	3.60	0.82
IC (innovation capability)	3.50	0.77
FP (Firm performance)	3.60	0.72

Table 3 shows correlation matrix between variables. According to Farrar and Glauber (1997) if the correlation coefficient is in the range of 0.25-0.6, it means that the relationship is positive and there is a relative independency between the variables of the study. So, all variables are in the above stated ranges and have positive relationship.

Table 3. Correlation coefficient.

Variables	CC	IC	FP
CC (Co-creation)	1		
IC (innovation capability)	0.54	1	
FP (Firm performance)	0.58	0.54	1

STRUCTURAL MODEL RESULTS

In this section, first, the technical characteristics of the model including the reliability, convergent validity and construct validity will be evaluated and then the major and minor premises will be analyzed.

Construct Reliability and Convergent Validity

To assess the Construct Reliability, the composite reliability and Chronbach's Alpha will be used. The Cronbach's alpha should be above the minimum threshold (0.7), necessarily for exploratory research in agreement with Nunnally (1978). Composite reliability (>0.7) were used for testing reliability to test the reliability of the questionnaire. All of the constructs reach the level of acceptation to be able to affirm that the scale is trustworthy and is in the Table 4.

The Average variance extracted (AVE) index will be used to determine the convergent validity. Average variance extracted (AVE) was used for testing Convergent validity of the research results. Minimum acceptable Average variance extracted is 0.5 (Adcock and Collier, 2001). Table 4 represents the AVE. In this research AVE is greater than 0.5 and CR is greater than AVE, therefore all the constructs in this study are valid.

Table 4. The Average Variances Extracted, composite reliability and Cronbach's Alpha.

Construct	Average Variances Extracted	Composite Reliability	Cronbach's Alpha
CC	0.598	0.817	0.766
IC	0.575	0.796	0.734
FP	0.611	0.862	0.787

Construct validity

In order to study on the construct validity, it is obvious to examine the relevance of each of the indicators measuring variables. The items in the questioner are the measuring indicators and were considered to assess the variables. The minimum acceptable factor loading of each item is 0.4 and in significance level of 0.95 the T-values that are greater than 1.96 are accepted (Adcock and Collier, 2001). Table 5 represents T-values and Factor loading. Referring to the results indicators have factor loadings greater than 0.4. Therefore, it can be concluded that the indicators of variables can define the factors.

Table 5. T-values and Factor Loading of structural equation model.

Item <-Construct	Factor loading	T-value
q1 <-CC	0.6477	5.6187
q2 <-CC	0.8277	23.3345
q3 <-CC	0.8441	24.2898
q4 <-CC	0.7652	14.9687

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Table 5. T-values and Factor Loading of structural equation model. Continued

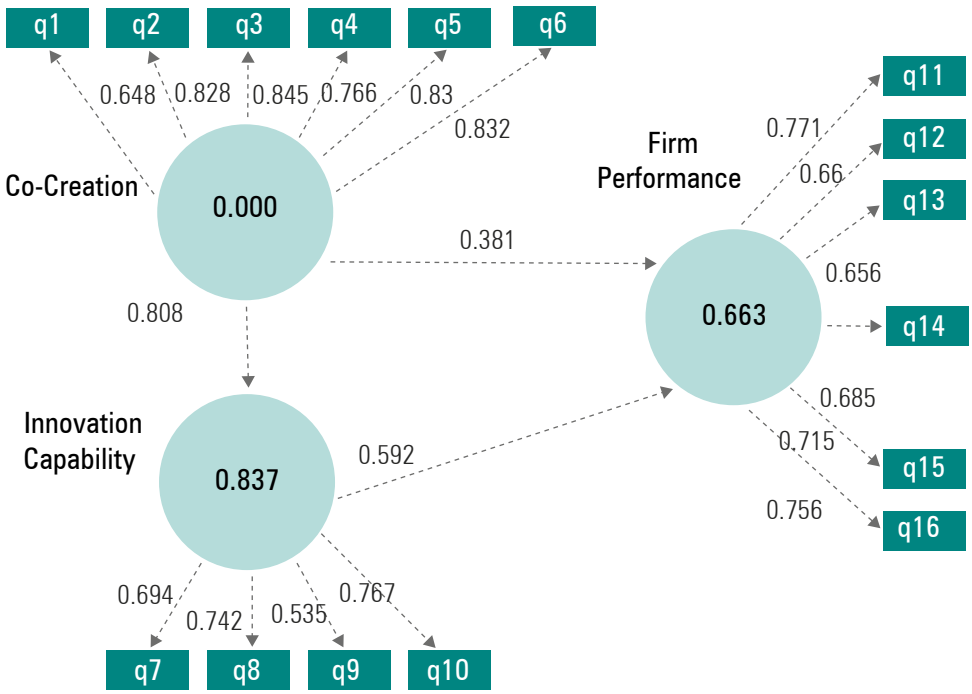
Item <-Construct	Factor loading	T-value
q5 <-CC	0.83	20.0911
q6 <-CC	0.8314	25.455
q7 <-IC	0.6938	9.3905
q8 <-IC	0.7419	11.4595
q9 <-IC	0.5355	6.0937
q10<-IC	0.7662	16.2374
q11<-FP	0.7704	18.2366
q12<-FP	0.66	6.3639
q13<-FP	0.6553	8.9703
q14<-FP	0.6842	9.5418
q15<-FP	0.7147	12.3195
q16<-FP	0.7558	17.4426

According to the achieved results, the quantity of T-values holds greater than 1.96 and are able to make clear their corresponding construct and considered in the final model.

Major and Minor premises

In this section, the quantities of T-values are checked for the model relations. These relations are approved when are greater than 1.96 at the 95 percent significant level. Also coefficients of their path shows the relevance among the variables. The Figure.2 shows the path coefficients of the model.

Figure 2. Standard coefficients of model.



Based on the gained results, the path coefficient between co-creation and innovation is 0.808. At the significant level of 95 percent and in consideration with the quantity of T-value greater than 1.96 the relationship is approved. Also since T-value 4.444 for the relationship between innovation capability and firm performance is greater than 1.96, and T-value 26.229 for the relationship co-creation and firm performance is above the defined criteria, so the relationship is approved. Also relationship between Innovation Capability and firm performance and co-creation and firm performance is approved.

Table 6. Significance of variables and path coefficients.

	Path coefficient	Std. Deviation	T-value
CC-IC	0.381	0.0876	2.159
IC-FP	0.592	0.1013	4.444
CC-FP	0.808	0.1147	26.229

Finally, we analyzed Total fitness of path analysis model, Tenenhaus et al (2005) believe that the following equation can be used for calculating model fitness:

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$$GOF = \sqrt{\overline{communality} \times \overline{R^2}}$$
$$GOF = \sqrt{0.75 \times 0.53} = 0.63$$

Since the minimum acceptable level for this indicator is 0.36 (Akin, bloemhof-Ruwaard, & Wynstra, 2009) and the value of this indicator is 0.63, we conclude that the model has appropriate fitness.

CONCLUSION

The result of structural equation modeling demonstrated a T-value of 2.159 for co-creation at significance level of 0.95. Since the result is greater than 1.95, the relation between co-creation and innovation capability is accepted. Therefore referring to path coefficient of 0.0.381, co-creation affect innovation capability in large company. The result of structural equation modeling demonstrated a T-value of 4.444 for innovation capability at significance level of 0.95. Since the result is greater than 1.95, the relation between innovation capability and firm performance is accepted. Thus, referring to path coefficient of 0.592, innovation capability affects firm performance in large company. The third hypothesis was about impact of co-creation on firm performance. The result of structural equation modeling demonstrated a T-value of 26.229 for co-creation on firm performance at significance level of 0.95. Since the result is greater than 1.95, the relation between co-creation and firm performance is accepted. Therefore referring to path coefficient of 0.808, characteristics of co-creation affect firm performance in large company. Thus it can be claimed that co-creation affects firm performance more than the other factor in the sample society. Due to the structure, type and method of partnership, the dimensions have similarities and differences from other studies. Other studies (e.g. Payne et al., 2008; Silva et al., 2013) emphasized on the need to development of models of innovation in co-creation. Current study has concluded that impact of co-creation on firm performance is greater than its impact on innovation capability.

LIMITATIONS AND FUTURE RESEARCH

The study has some limitations; much work remains in the co-creation field. First, the samples in the study are Iranian's companies; thus, generalization of the results to other samples cannot occur without some caution. Second, the data are cross-sectional and not longitudinal. Finally, some middle managers don't incline to answer.

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MEDIA ENTREPRENEURSHIP: A CONSENSUAL DEFINITION

EMPRENDIMIENTO MEDIÁTICO: UNA DEFINICIÓN CONSENSUADA

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ABSTRACT

Media Entrepreneurship has been an ambiguous, unclear and controversial concept and despite of growing academic efforts in the last decade, it is still a poorly defined subject. This paper is an effort to fill this gap by providing a comprehensive definition of media entrepreneurship. Firstly, a literature review conducted and entrepreneurship, media, opportunity and innovation as building blocks of media entrepreneurship explained. Then by using of a mixed of bibliographic method and a Delphi method with multi-stage analysis process, a consensual definition of media entrepreneurship proposed. This definition integrates some key features of the emerging media environment such as distinction of content and platform, value delivery, opportunity development, non-monetary benefit, etc. It is expected that the findings of this research clear the ground for further researches in the field of media entrepreneurship.

KEYWORDS

Media Entrepreneurship; Media Management; Venture Creation; Media Firm; Delphi Method; Consensual Definition; Consensus.

RESUMEN

El emprendimiento mediático ha sido un concepto ambiguo, confuso y controversial y a pesar de los crecientes esfuerzos académicos de la última década, sigue siendo una materia de estudio no muy bien definida. Este artículo es un esfuerzo por llenar esta brecha al proveer una definición amplia sobre el emprendimiento mediático. En primer lugar, se lleva a cabo una revisión de la literatura y se ponen el emprendimiento, los medios de comunicación, las oportunidades y la innovación como elementos básicos de la explicación del emprendimiento mediático. Luego, utilizando un método bibliográfico combinado y un método Delphi con un proceso de análisis de múltiples etapas, se propone una definición consensuada del emprendimiento mediático. Esta definición integra algunas de las principales características del naciente entorno mediático tales como la distinción entre "contenido" y "plataforma", "valor entregado", "desarrollo de oportunidad", "beneficio no monetario", etc. Se espera que los hallazgos de esta investigación allanen el camino para futuros investigadores en el campo del emprendimiento mediático

PALABRAS CLAVE

Emprendimiento mediático; gestión mediática; creación de empresas; empresa mediática; método Delphi; definición consensuada; consenso.

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INTRODUCTION

In 2008 Achtenhagen wrote: "As the area of media entrepreneurship is still a young and undeveloped field, this phenomenon is poorly understood" (p. 124). In 2017, no significant progress can be seen. The number of publications on the subject of media entrepreneurship has increased, but the field is not clear enough yet, and there is no consensus among the experts of the field.

In the short number of published research papers, some definitions of media entrepreneurship can be found. Anne Hoag defined media entrepreneurship as "the creation and ownership of a small enterprise or organization whose activity adds at least one voice or innovation to the media marketplace" (2008, p.74). She argued that her definition supports important characteristics: first, it covers a broad spectrum of media sectors; second, it considers both new entrants and existing firms; third, this definition include both for-profit and non-commercial forms of media enterprise.

Achtenhagen criticized Hoag's definition by pointing out that any person starting a blog would be a new voice in the media marketplace, while he is not principally an entrepreneur (2008, p.126). She defines media entrepreneurship as "how new ventures aimed at bringing into existence future media goods and services are initially conceived of and subsequently developed, by whom, and with what consequences" (Ibid, p.126). Khajeheian and Roshandel Arbatani (2011) defined media entrepreneurship as "the creation and ownership of a small enterprise or organization whose activity adds at least one voice or innovation to the media marketplace". In 2013 Khajeheian provided a specific definition for Media Entrepreneurship: "Individuals or small firms of which use their own or others' resources to create value by extracting opportunities via offering a service or product that is consist of any type of innovation in any of product/service characteristics, process, distribution channel or place, or different innovative usage, to the media market, or any other market that media is its main channel of interaction". (2013, p.128). However, none of definitions presented are comprehensive enough to shed light on aspects of entrepreneurial activities in fast changing and evolving media industry.

Considering the importance of entrepreneurship in the national and global economies; the increasing role of communication technologies in the provision of possibilities for entrepreneurs; and also with respect to the poor literature in the field of entrepreneurship in media industries, this paper aims to provide a consolidated definition and a consensual conceptualization of media entrepreneurship. Such achievement can create a ground for further researches and more progresses in our knowledge of the field.

For this purpose, two major means have been implied. Firstly, literature of the field reviewed and any possible connection that found, extracted. Then, a panel of scholars and academic experts in the field have questioned this concept and what it implies. "When a field is fragmented and its boundaries are blurred, it is legitimate to ask scholars what they perceive to be the defining elements of their field" (Kuckertz and Mandl, 2016, p.418). Following these steps, the next part presents the literature review and past efforts in understanding media entrepreneurship.

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LITERATURE REVIEW

In the word "Media Entrepreneurship", Media is an adjective for the noun of "Entrepreneurship", implying that Entrepreneurship is the core of this process. Therefore, to understand media entrepreneurship well, the first requirement is to clearly depict what is entrepreneurship. As there are numerous researches published on the subject of entrepreneurship and its different aspects, this paper is benefiting from the existing knowledge and by extracting the main attributes of entrepreneurship, explores how they contributes in our perception of media entrepreneurship.

Entrepreneurship

"As a scientific field of research, entrepreneurship has strong relevance to the media" (Hang and van Weezel, 2007). The word entrepreneurship is widely used, but it is still fragmented (Anderson and Starnawska, 2008) ambiguous (Hang and van Weezel, 2007) and context related (Zahra et al, 2014). "This is not because the definition is not available, but because there are too many, and even these definitions rarely agree with each other on some essential characteristics of the entrepreneurship" (Hang and van Weezel,2005, p.2).

Various characteristics have been articulated with respect to entrepreneurship. New Business Creation: Carland et al (1996) explicitly explained that the outcome of entrepreneurship is the creation of new venture. Vivarelli (2010, p.1456) defines entrepreneurship from an industrial organization perspective: "entrepreneurship is the process by which new enterprises are founded and become viable". Opportunity: "Entrepreneurship is the activity of opportunity development to introduce new good or service, way of organizing, market, process and raw materials through organizing efforts that previously had not existed" (Shane & Venkataraman, 2000, p.4). Economic Growth: Stevenson and Jarillo (2007) explains that an entrepreneur's actions have an effect on economic environment and improve society economically via innovation. Birch (1979,1987) stressed on job creation as an output of entrepreneurship. Drucker (1985) associated entrepreneurship with economic growth and innovation. Efficiency: Efficiency is a vital element of entrepreneurship. Leibenstein (1968) argued that the basic function is to destruct pockets of inefficiency in a system. Hirschman (1958, p.5) also argued that entrepreneurship fundamental function is "to call forth and enlisting of resources and abilities that are hidden, scattered, or badly utilized, rather than finding the optimal combination for given resources and factors of production". Another important characteristic of entrepreneurship is Risk-taking: "Wu and Knott (2006) argue that entrepreneurship is a risk seeking activity, when the risk is related to the entrepreneurs' own ability". Entrepreneurship is also associated with Innovation (Beckman, 1983), and flexibility (Birch, 1987), and many other important factors that play positive role in value creation and economic development of societies. However, the most important aspect of entrepreneurship, in relationship with the current study, is its association with small enterprises and possibility of involvement of individuals with low amount of capital.

Media

And what does the word “media” in media entrepreneurship imply? As mentioned, it is an adjective and it implies the context in which entrepreneurial activities are conducted. According to Hoag (2008), "this word refers to the traditional mass communications systems and content genres as well as other technologies for mediated human speech. This includes traditional publishing, traditional electronic media, motion pictures, video gaming, recorded music, advertising, etc". Hang and van Weezel (2007, p.54), define media as "the industries that produce and sell information as well as entertainment products and services".

The Internet and then Web 2.0 by reduction of entry barriers, production cost, distance working, possibility to direct contact with consumers, etc.- revolutionized the way companies do their businesses and led in the creation of new firms. The Internet also offered the artists an indispensable tool to work as independent entrepreneur (Tuomola, 2004). Media entrepreneurs can compete in the markets without the need for extensive resources (Derham et a, 2011) because the internet covers their lack of skills, resources, and technical knowledge, as well as the cost of marketing and the connection with partners and to market their products, services, and brands (Harris and Rae, 2009).

Media industry, especially in the sections that SMEs are active, has significantly affected by advances in communication technologies. With the dramatic reduction in the cost of devices, software and knowledge required to produce the media content and provision of channels to reach target customers, small companies and individual entrepreneurs found a new context for the creation and delivery of value by production of media content and distribution.

Media as a creative industry is characterized by uncertainty (Reca, 2006, Medina et al,2016; Napoli, 2016), risk (Doyle,2016, Pickard, 2004), complexity (Napoli, 2016), timeliness (Turow, 2011), autonomy (Lund, 2016), proactiveness (Hang and van Weezel, 2007), changing demand (Pickard, 2004). Such characteristics are very much aligned to the dimensions of the entrepreneurial process. These dimensions represent the entrepreneurial orientation of the firm, that includes processes, practices, and decision making activities that lead firms to decide to enter a new market or launch a new product (Lumpkin and Dess, 1996). As explained, media companies are urged to be particularly risk taking, innovative and associated with novel ways of thinking. Such entrepreneurial approach is undoubtedly extremely important for media firms (Hang and van Weezel, 2007).

Media SMEs

SMEs play an important role in national economies, by collectively contributing an average of 90% of national economic output (Wielicki & Arendt, 2010). There is growing evidence that smaller businesses can gain business value from the use of social media for internal and external purposes (Geho et al, 2010). Smaller businesses

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are often regarded as key in encouraging the development of a country's enterprise culture and in promoting business growth (Dyerson et al, 2010).

SMEs are not homogenous groups, but they differ from many different perspectives (Chua et al. 2009; Parker and Castleman, 2007; Derham et al. 2011) and that is applicable for media entrepreneurs too. "Changes in the media industries have created various windows of opportunities. Opportunities appear in different sectors of the media industries" (Hang, 2016, p.15).

> "The rationale for new media business creation first comes from an intention to adapt to the changing media environment. Market shifts and environment dynamics call for innovative new business to meet different consumers' needs, content needs and advertising requirements. It also includes the desires to gain new revenue streams, to spread risks, to strengthen content creation and audience advertising relationships, to achieve the first mover advantages and to increase learning and innovation" (Hang, 2016, p.14).

Dubini, & Provera (2008) argue that media companies require content to sustain their value proposition (p49). They articulate three major reasons for the increase of media content titles. First, a series of innovations in content production; second, the growth in the number of indies under reduction of production cost; and third, the increase in the number of distribution channels under of digital technologies. Those three reasons; innovation, low production cost and abundant distribution channels are the incentives for creation and growth of SMEs in media industry.

Opportunity: The Foundation of Media Entrepreneurship

Opportunity is the central concept of entrepreneurship (Shane and Venkataraman 2000, p.220; Singh, 2001, p.11; Lumpkin and Lichtenstein, 2005, p.457; Shane et al, 2010, p.291) and the understanding of opportunity evaluation process represents a core intellectual question in entrepreneurship research (Foss and Klein, 2012; Emami, 2017). Therefore, opportunity identification (recognition), evaluation and exploitation is a core concept in the media entrepreneurship.

In one of the most cited definition of entrepreneurship by more than 9700 citations at the time of writing this article, Shane and Venkataraman associated entrepreneurship with discovery, evaluation and exploitation of profitable opportunities and the set of individuals who process them (2000, p.218). Shane (2003, p.18) then describes entrepreneurial opportunity as a situation in which a person can create a new "means-end" framework for recombining resources that the entrepreneur believes will yield a profit. Fuduric (2008), using Shane definition, defined entrepreneurial opportunity as two-sided: something changing in the environment (external) and a creation or recombination of resources happen by an entrepreneur (internal).

A fundamental understanding of opportunity with respect to media entrepreneurship comes from the distinction between opportunity creation (Shumpeterian approach) and opportunity discovery (Kirznerian approach). In

Schumpeter view, entrepreneurs create opportunities by creative destruction; a radical innovation or invention that disequilibria market by creation of new demands for introducing innovation. In contrast, Kirznerian view argues that opportunities are already existing in the market, because of consistent shift in demand and entrepreneurs discover those opportunities earlier than the others. These approaches come into use towards understanding if media entrepreneurs create opportunities for value delivery, and they discover existed needs and demand for a type of media product or service (Fuduric, 2008). "In the Schumpeterian view, the entrepreneur moves the economy by disequilibrating it, while in the Kirznerian view the movement is equilibration" (Keyhani, 2016, p.123).

The discovery perspective assumes that opportunities pre-exist and are awaiting discovery (opportunity is independent of the entrepreneur); Whereas the creation perspective assumes that opportunities do not exist without the entrepreneur (Will et al,2016, p.195). With respect to this difference, in discovery approach entrepreneurs search, both actively and passively; while Schumpeterian entrepreneurs observe, learn, act and create opportunities (Ibid). Dimov believes that opportunity creation encompasses a social learning process whereby new knowledge continuously emerges to resolve the uncertainty inherent to each stage of opportunity development (2007, p. 714).

In understanding of opportunity in media entrepreneurship, based on an inspiration from Shane and Venkataraman (2000, p.218), three questions must be answered: why, when and how opportunities for the delivery of a media good or service comes into existence?; why, when and how media entrepreneurs discover and exploit opportunities?; and why, when and how media entrepreneurs use different modes of action to exploit opportunities.

Khajeheian (2013) argues that an opportunity in the media industry is to identify the unmet needs in a niche market that is willing to pay to receive the value that satisfies their need. Based on this definition, media entrepreneurs base their activities on recognition of a need in a segment of media markets and they satisfy the need by delivery of value. This definition is based in many other researches that tie opportunity with value, such as Lumpkin and Lichtenstein's definition of opportunity: the ability to identify a good idea and transform it into a business concept that adds value and generates revenues (2005, p.457).

The question is that what approach is more appropriate for media entrepreneurs. To what extent they are creators or discoverers of opportunities? The answer to this question is difficult, because media entrepreneurs differ along the value chain. If we classify media entrepreneurs as cultural entrepreneurs, based on Dana (1995), they are opportunity seekers and Kirznerian identifiers of opportunity that actively taking risk of economic uncertainty. If we consider some technological entrepreneurs that create opportunities by their radical innovations. Such opportunity creator entrepreneurs are few and considerably lower in number, and it should be noted that the nature of most of innovations of media entrepreneurs is incremental innovation, or imitative innovation.

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The question of how entrepreneurs discover business opportunities is the critical concern in entrepreneurial studies (Bernhard and Karlsson, 2014). The process of opportunity-discovery includes both the active and passive search. Passive search is based on Kirzner's "entrepreneurial alertness", while active search integrates with a systematic search approach (Will et al, 2016, p. 194-195). Vaghely and Julien (2010) believe that in identifying opportunities, entrepreneurs process information by using of both approaches; thus entrepreneurial opportunities are both discovered and created in dependence to combinations of information. Such conclusion is supported by Venkataraman (1997) that opportunity identification depends on the information and the way it is processed by individuals. Using Ardichvili et al (2003, p.106), major factors that influence the core process of opportunity recognition and development for media entrepreneurs include: entrepreneurial alertness; information asymmetry and prior knowledge; social networks; personality traits such as optimism, self-efficacy and creativity; and type of opportunity itself.

One of the main sources of opportunity identification for media entrepreneurs comes from social sources of information, such as industry and personal networks. Ozgon and Baron (2007) argue that informal networks have a direct effect on entrepreneurial alertness toward new opportunities. They articulate the four factors of mentor, family and close friend, informal industry network, and professional forums. Gibcus et al (2008) showed that many business owners acquire information from their contacts and Filion (2004, p.45) stresses on the role of information in opportunity identification too, by depicting that opportunity recognition requires intuition, intuition requires understanding and understanding needs a certain level of knowledge. Rae (2002) emphasizes on the role of social sources of information by arguing that the entrepreneurs in creative industries are immersed in the environment and culture of the society of which they work, and this immersion enables them to recognize opportunities that might not be apparent for "The Outsiders".

Innovation

"The concept of innovation and newness, as act of introducing something new and relevant, is an integral part of entrepreneurship." (Hisrich and Ramadani, 2017, p.4) and inevitably of media entrepreneurship. Khajeheian (2014) articulates innovation in characteristics, process, distribution channel, usage, etc. Ireland et al. (2003, p. 981) introduce disruptive and sustaining innovations. Taken from definition of Tushman and O'Reilly (cited in Ireland et al. 2003), disruptive innovation "produces a revolutionary change in markets while sustaining innovation leads to incremental change. Sustaining innovation, also has said as incremental innovation, is the exploitation of existing capabilities that contribute to the competitive advantage of the firm".

Based on Khajeheian (2013, p.128), radical or disruptive innovation is derived from identifying and exploiting entrepreneurial opportunities through new combination of resources to create new capabilities that lead to competitive advantages. According to him, this type of innovation requires a high R&D budget and a mentality of

failure acceptance. Such attributes rarely existed in developing countries and mostly existed in knowledge societies and leading organizations; so in contrast to the radical innovation, imitative innovation is the more common and successful type of innovation in developing societies or organizations with low R&D budgets, such as SMEs, family businesses, public organizations and most types of organizations and enterprises that cannot invest on research and development. Imitative innovation is one of the key success factors for media entrepreneurs, because they launch a previously successfully tested the product/service in a new market without taking major risks of investment on a radical or even incremental innovation. Present article suggests that imitative innovation is one of the most important drivers of media entrepreneurship, by showing an opportunity of value delivery in a market with low risk and investment.

Khajeheian and Tadayoni (2016) explained another aspect of media entrepreneurs: their advantage in the contract. Their study on public service broadcast showed that large media companies do not outsource the production to the users or small media firms, mainly for the reason of distrust on delivery of professional quality. Rather, they prefer to commission parts of their product provision to medium-size enterprises that entitle reputation, history and brand. Such media enterprises commission the contract to the smaller enterprises. The advantage of large companies is in their resource and operations; the advantage of small enterprises is innovation (Eliasson and Eliasson, 2005); and the advantage of medium size enterprises is their ability to produce contracts (Khajeheian and Tadayoni, 2016). As Baumol (2002) expressed, most revolutionary new ideas have been provided preponderantly by independent innovators and it is very likely to be continued in the future. So investing on user innovation provides media companies with sources of creativity and may lead the enterprises to have access to successful innovations, and then to use their resources towards the marketing and commercialization of those innovations, as Hoag explicitly argues that "there is no denying that big media corporations can be innovative, but they are better capitalized to commercialize innovation" (2008, 75) and Fuerst (2010) supports her arguing that expansion of media companies to larger sizes provides new business opportunities for small media firms. The connection of users with large media companies, is a complex process that mostly happens by intermediators and media entrepreneurs, who reduce the risk and facilitate cooperation between large media companies and small enterprises; and by such activities, increase efficiency and effectiveness of media markets.

RESEARCH METHOD

As the aim of this research is to obtain a specific and detailed definition for media Entrepreneurship, a Delphi method was selected as a research method. The reason for this selection is the success of this research method in similar cases e.g. Omer Attali and Yemini (2016), Capra et al (2014), Lohuis et al (2013). The Delphi technique is a widely used and accepted method for gathering data from respondents within their domain of expertise (Hsu and Sandford, 2007).

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To achieve the research purpose and based on the knowledge acquired from literature, a multiple-stage analytical process was designed and conducted. In the first phase, a selected group of scholars and researchers were being asked for the provision of a definition of media entrepreneurship. After collecting the primary definitions, the building elements were extracted. In the second phase, the extracted elements were offered to the sample and then asked for proposals towards a revised definition. In the third phase, they were being asked to read an abstract of 27 papers on the subject of entrepreneurial activities in media industries; and to revise their definition again. Finally, the results collected and used for a consensual definition of media entrepreneurship.

The study sample were scholars, alumni and researchers in the fields of media management, entrepreneurship and occasionally some related fields. The sample were selected from scholars with personal and academic relationship with the researcher - so they accepted the invitation to participate in the panel, either in the physical presence or via video conferencing.

FINDINGS

First phase: The most frequent words in definitions of research sample is presented in the Table 1.

Table 1. The building elements in definition of media entrepreneurship in the first phase.

Word (and variations)	Word (and variations)
Individual (Person, man or woman, entrepreneur)	Internet/Communication Technology/IT/Web 2.0 (Social media, web stores,)
New (New product/service, novel, never-experienced)	Technical expertise/knowledge/skill
Change (Change in technology, preferences, demography, lifestyle, economy, society.)	Segment/niche market
Value (Creation and delivery)	Need/demand
Innovation (Creativity, Creative idea)	Content (Media content, clip, advertising, attractive content)
Opportunity (Recognition, identification, evaluation, exploitation, development)	Creativity/Creative/Talent
Resources	Culture/Cultural
Control (including ownership, access, permit, authority to use)	Profit/Income
Venture/Small Business/Firm (Organizational form)	Restriction/Barrier
Market	Efficiency

Table 1. The building elements in definition of media entrepreneurship in the first phase. Continued

Word (and variations)	Word (and variations)
Management	Monopoly/Competition
Ownership	Advantage
Cooperation/Collaboration	Technology
Corporate/Organization	Risk
Business model	Team/Teamwork
Recombine/mix/configure	Internal/external
User/consumer/customer	Turbulence /Complicated market
Idea	Two sided market
Advertising	Public/Private
Society/Social responsibility	Job creation/economic growth

Second phase: In the second phase and based on the understanding of the building elements of other definitions, the proposed definitions were converged. Table 2 presents the elements of the second round of definitions.

Table 2. The building elements in definition of media entrepreneurship in the second phase.

Word (and variations)	Word (and variations)
Individual (Person, man or woman, entrepreneur)	Media Platform
Innovative / New	Resource
Environment (Change, Complexity, Turbulent)	Market Segment
Value (Creation and delivery)	Need/demand
Creative Idea	Venture Creation
Corporate Entrepreneurship	Management
Ownership	Control
Profit/income/money	Opportunity
Media content	Transformation/Recombination/ Configuration
User data	Advertising
User behavior	
Benefit	

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Third phase: After proposing revised definitions in the second round, 27 abstracts of papers with some relevance to the subjects presented in the sample. Then, the author of this paper composed consensual elements in different definitions. The definition was revised frequently based on the sample. Finally, some keywords were selected to be included in the definition. Two definitions were proposed, one was a comprehensive definition, another was shorter and more brief one. The idea was that the comprehensive definition helps the researchers to deeply understand the different aspects of media entrepreneurship, and the shorter definition to enhance a quicker understanding of media entrepreneurship. At the end, the sample was sifted to selected a comprehensive definition as well as a consensual definition of media entrepreneurship.

Table 3. The building elements in definition of media entrepreneurship in the third phase.

Word (and variations)	Word (and variations)
Individual	Media Platform
Innovative (Radical/incremental/ imitative)	Resource
Environment (Change, Complexity, Turbulent)	Market Segment
Value (Creation and delivery)	Need/demand
Creative Idea	Venture Creation
Media content	Management
Ownership	Control
Profit/income/money	Opportunity
Benefit	Transformation/Recombination/ Configuration
User data	Advertising
User behavior	

THE CONSENSUAL DEFINITION

As it's explained in the beginning of the paper, the main aim of this research is to provide a consensual definition of media entrepreneurship. For provision of such definition, it is necessary to extract the important elements of this concept.

The most important factors of media entrepreneurship understood as:

- Media entrepreneurship is associated with value proposition (creation and delivery);
- Media entrepreneurship may include the new venture creation, or entrepreneurial management of an existing firm, or may occur solely as an individual effort;

- Media entrepreneurship is based on consistent opportunity identification and evaluation;
- Media entrepreneurship delivers a value on one or more of following types: content, platform, emotion, audience reach;
- Media entrepreneurship can be an innovation or innovative use of business model elements;
- Media entrepreneurship is based on permanent screening of environment change;
- Media entrepreneurship integrates and recombine resources;
- Media entrepreneurship closely works with innovation in user side;
- Media entrepreneurship is not merely for profit, but sometime happens to obtain a benefit such as social responsibility, attention attraction, a favorite behavior or attitude, etc.

Based on above mentioned findings and revised definitions of the sample group, the author suggests a comprehensive definition for media entrepreneurship. By presenting this definition to the sample, no one rejected this definition.

A comprehensive definition of media entrepreneurship is as follow:

"Media entrepreneurship is taking the risk to exploit opportunities (creation/ discovery) by innovative use of (radical/incremental/imitative) resources (ownership/control) in transform of an idea into activities to offer value (creation/delivery) in a media form (content/platform/user data) that meets the need of a specific portion of market (businesses or consumers), either in an individual effort or by creation of new venture or entrepreneurial managing of an existing organizational entity and to earn benefit (money/ attention/favorite behavior) from one of the sources that is willing to pay for (direct consumers, advertisers, data demanders or any customer of generated information of consumers)."

This definition has been depicted in the figure 1.

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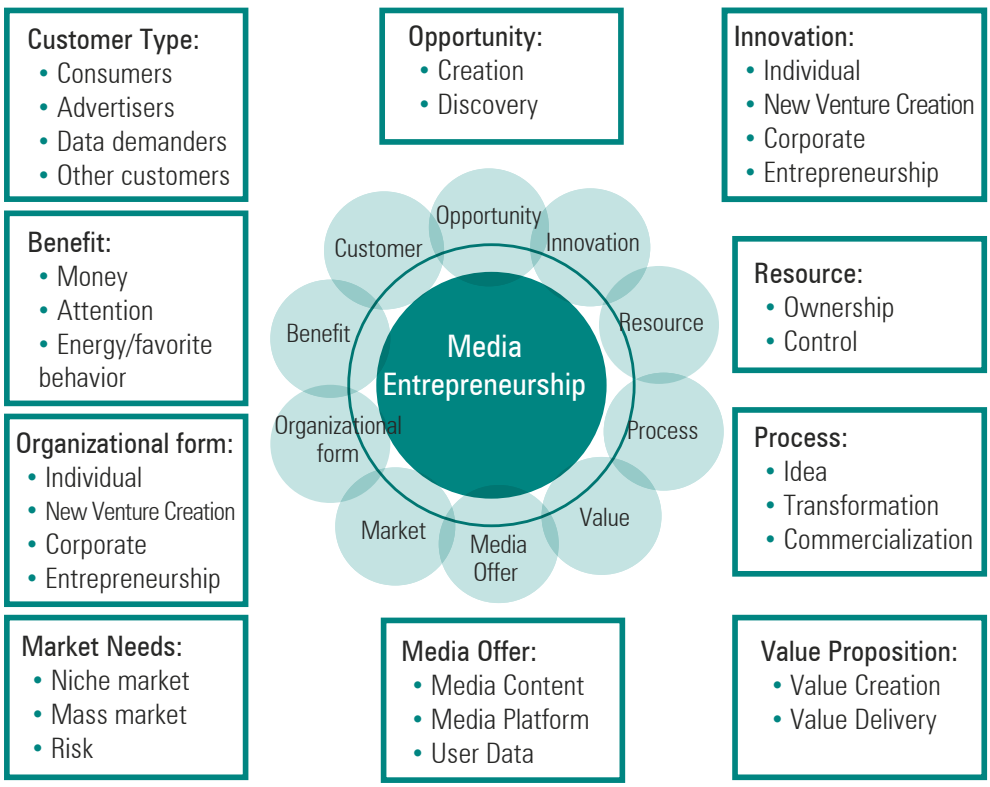
Figure 1. Elements of Media Entrepreneurship Definition.



There are some special points in this definition that are discussed in detail among the members of the research sample:

1. Media entrepreneurship is a risk-taking activity, with chance of market success or fail.
2. Media entrepreneurship is based on opportunity, either created by entrepreneur (Schumpeterian perspective), or discovered as an existed unmet demand in the market (Kirznerian).
3. Media entrepreneurship is based on an idea that is based on recognized opportunity.
4. To execute the creative idea, media entrepreneur requires to find, hire, collect, or contract with production resources, such as team, talents, suppliers, distributers, promoters, raw materials, knowledge and technic, infrastructure and other essential resources.

5. Innovation is an integral part of media entrepreneurship, but in many cases an imitative innovation and implementation of a successfully tested innovation uses for a new market or application. Media entrepreneurship doesn't necessarily base on ownership of resources, but control of what is owned by others by means of loan, borrowing, hiring, renting, etc. is a solution.
6. Media entrepreneurship is strongly associated with value proposition to the target market. This value can be created by the media entrepreneur's activity (such as produced media content) or by created by others and delivered to the target market by media entrepreneur (such as user generated content, third-party production, etc.). Before the pervasiveness of social media, platforms were notimportance in the study of media. For instance, Hoag emphasized on the media content and believes that the critical decision rule in media industry is who creates and controls the media content (2008, p.75). But today platforms play a critical role in access to users and importance of the number of users of a platform is much more than the number of attendances of a media content. Thus, media entrepreneurship in an internet-based context implies the content production, platform provision, business model invention and data analysis, while in traditional media, media entrepreneurship mostly implies on content creation.
7. The proposed value of media entrepreneurs, that differ them from other entrepreneurs, is in the form of media content, media platform for third party or user generated contents, user data for customers of those data.
8. Media entrepreneurship is based on the meet of needs in a segment of market, either businesses or consumers that is willing to pay the requested benefit in return of perceived value.
9. Media entrepreneurship can be happened by new venture creation, or inside an existing organization (corporate entrepreneurship) or occur out of a business organization form, as an individual effort.
10. Media entrepreneurship is mostly for the generation of income, but not always. Sometime a media entrepreneur aims to attract public attention to a societal issue, such as environment or a discrimination; or to encourage a behavior, such as voting to a special person/party or bill.
11. Media entrepreneurs may follow various business models to earn the intended benefit from different parties: directly from consumers (such as subscription, sell of copy, pay per view or click, etc.), from advertisers, from demanders of user data, or any possible customer.
12. The commodity that a media entrepreneur sells could be a product, service, data, users (followers or members) or even the media entity itself (such as a channel, brand, etc.)
13. Media entrepreneurship is an intentional action, but opportunity identification that could be either intentional or unintentional. This discussion supports by Emami and Dimov (2016) that implied on entrepreneurial intention of media entrepreneurs.

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Table 4, illustrates the developments in definition of media entrepreneurship.

Table 4. Definitions of media entrepreneurship.

Researcher	Definition of media entrepreneurship
Hoag (2008)	The creation and ownership of a small enterprise or organization whose activity adds at least one voice or innovation to the media marketplace
Achtenhagen (2008)	How new ventures aimed at bringing into existence future media goods and services are initially conceived of and subsequently developed, by whom, and with what consequences
Khajeheian and Roshandel Arbatani (2011)	The creation and ownership of a small enterprise or organization whose activity adds at least one voice or innovation to the media marketplace
Khajeheian (2013)	Individuals or small firms of which use their own or others' resources to create value by extracting opportunities via offering a service or product that is consist of any type of innovation in any of product/ service characteristics, process, distribution channel or place, or different innovative usage, to the media market, or any other market that media is its main channel of interaction
Khajeheian (2017)	Media entrepreneurship is taking the risk to exploit opportunities (creation/discovery) by innovative use of (radical/incremental/imitative) resources (ownership/control) in transform of an idea into activities to offer value (creation/delivery) in a media form (content/platform/user data) that meets the need of a specific portion of market (businesses or consumers), either in an individual effort or by creation of new venture or entrepreneurial managing of an existing organizational entity and to earn benefit (money/attention/favorite behavior) from one of the sources that is willing to pay for (direct consumers, advertisers, data demanders or any customer of generated information of consumers).

SUGGESTIONS FOR FURTHER RESEARCHES

and Singer (2016) in a study of entrepreneurship in journalism showed that the concept of entrepreneurship in media is defined broadly and loosely, but in a generally positive way. The current research contributed with the provision of a more specific definition of media entrepreneurship. In order to deepen the knowledge in this field, more research into the various dimensions of this concept is required.

The study of media entrepreneurship in different levels of analysis enriches the literature and deepen our knowledge of this subject from different aspects. Borrowing from Audretsch, et al (2017) and De Bruin et al (2007), determinants of entrepreneurship lie in a complex interplay of micro (firm or individual level), meso (industry level) and macro (policy) level factors and it is applicable for media entrepreneurship. It is almost impossible to study the entrepreneurial activities of an individual without considering the effect of the environment; to study the firm level

entrepreneurship without the effect of government policies and also people who run the firm; or to study media entrepreneurship policy without the effect of firms and individuals' actions. The relationship of different levels of analysis is interdependent and it is important to study media entrepreneurship with an attention to the influence of other levels. Therefore, and with respect to its importance, it is strongly suggested that researchers of this field study the media entrepreneurship in levels of micro, meso and macro and to explore the interrelationship of levels.

Macro level: Majority of entrepreneurship studies of media were mostly micro or industry level (Hoag, 2008, p.74). However, a number of studies with focus on the macro level of media entrepreneurship have been published. Loucks (1988) implied that entrepreneurship is culture-based and the policy for promotion of entrepreneurship is a cultural policy. Rae (2002, p.59) explained that distinction of media firms and other production/service firms lies in cultural entrepreneurship. Dana and Dana (2005) points out that governments around the world should foster entrepreneurship by considering social and economic values and for this reason apply a universal framework across varied cultures is not applicable. Khajeheian (2014) studied media entrepreneurship policy and how the government may foster entrepreneurship in their societies by relevant policies. In 2016 he also stated that U.S communication act is a major determinant in promotion of media entrepreneurship.

Meso level: Most of research on the subject of media entrepreneurship are in the firm level. Dennis et al (2006) in a study of strategies of media companies showed that digital technologies effect on operational levels of media firms such as hiring patterns and acquisition of creativity, analytical abilities, and technical knowledge. Khajeheian (2013) studied the commercialization of media entrepreneurs' digital innovations at the level of firms. He proposed a framework of five parts, including four controllable parts (Product, Resources, Enterprise, Strategy) and one out of control part of the infrastructure. Again Khajeheian (2016) studied audience commodification as a business model for entrepreneurial media firms to motivate favourite behaviour in users by the rewarding system to engage more users.

Micro level: Researches into the micro level study media entrepreneurs as individuals and aim to answer questions such as what is characteristics of media entrepreneurs, what derive people to act entrepreneurially in the media industry, and similar questions that are in relation with individuals' intentions, actions and behaviours? Opportunity development that was discussed in the literature review section of this paper studies a part of the process of media entrepreneurship in the micro level. Hoag and Compaine (2006) interviewed fourteen media entrepreneurs to discover attributes of the "individual-opportunity nexus" that may be unique to media industries and media entrepreneurship. In another study, Achtenhagen and Welter (2003) studied female entrepreneurs in Germany and their reflection in the German media. Such researches investigate the subject in individual level.

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Figure 2. Some suggested subjects for study of media entrepreneurship in different levels of analysis.

Emerging trends that affect media entrepreneurship are important areas in the study of media entrepreneurship. In 2016, media market was still characterized as a two-sided market, this implies on serving consumers via content and serving advertisers by audiences' attention and time (Lowe, 2016; Doyle, 2016; Medina et al, 2016; von Rimscha; 2016). But this two-sided is evolving to a multi-sided market with regards to parties being served by media firms. For example, big data is a new and few-discussed source of income for media entrepreneurs. Collection of users' information and selling of them is one growing business model.

Also, there are new business models based on free delivery of value to consumers, aimed at growing the number of users and then selling of the media firm or product to a larger company. For example, by popularity of Telegram mobile messenger in Iran, an emerging business model is the sale of the administration of a channel with a large number of users. In this case the admins of a channel create or collect media content and deliver it to interested users to keep them as subscribers and then sell this channel at a price based on the number of followers.

User commodification became a popular model for media entrepreneurs in recent years, following the success of Google advertising model. Audience commodification is the process where customers offer themselves as a commodity to receive value from businesses that sell higher-value advertising opportunities (Khajeheian, 2016, p.44). The current use of Google services is a type of audience commodification

that consumers offer their personal information and interests to benefit from the free services. Facebook users do the same to receive the value of this service by providing their personal information, their favorites, their moods, the places they have visited or plan to visit, etc.

Another area with a poor research background is the measure of media entrepreneurship. Excluding Anne Hoag's research in 2008, no other research in the subject of measures has been found. For such a broad and wide-defining concept of media entrepreneurship, understanding and identifying the measures play a determining role. Hoag suggests static and dynamic measures for media entrepreneurship, such as organizations-per-capita, turbulence, and nascent entrepreneurship. Rae implies that the vital factor in success of media entrepreneurship is the narration that led entrepreneur to the creation of a new venture: "The enterprises themselves are constructed by their founders through their discourse. They tell a good story" (2002, p.59). Also the life cycle of the media sector is an important factor in measuring, e.g. entrepreneurship in the publishing industry is in decline, while in telecommunication, broadcasting and cable, entrepreneurship is growing (Hoag, 2008).

Conducting researches in the above mentioned subjects may open the door for better understanding of media entrepreneurship and may shed light on the unexplored aspects of this important and less-studied discipline.

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WOMEN ENTREPRENEURSHIP: EFFECT OF SOCIAL CAPITAL, INNOVATION AND MARKET KNOWLEDGE

EMPRENDIMIENTO FEMENINO: EFECTO DEL CAPITAL SOCIAL, LA INNOVACIÓN Y EL MERCADO DEL CONOCIMIENTO

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ABSTRACT

Women entrepreneurship plays a key role in the economic growth. This study investigates the mediatory role of innovation concerning the effect of social capital on entrepreneurship. The sample population included 130 female entrepreneurs in Ilam province, Iran. Using questionnaire as the main means of data collection, the correlation among variables of entrepreneurship, innovation, social capital and market knowledge was evaluated. Data analysis was performed by structural equation modeling in LISREL software. The findings showed that social capital and innovation had a positive and significant effect on entrepreneurship. However, the impact of social capital on innovation was not confirmed.

KEYWORDS

Women Entrepreneurship; Social Capital; Innovation; Market Knowledge; Ilam Province.

RESUMEN

El emprendimiento femenino desempeña un rol clave en el crecimiento económico. Este estudio investiga el rol mediador de la innovación en cuanto al efecto del capital social en el emprendimiento. La población muestra incluyó 130 mujeres emprendedoras de la provincia de Ilam, Irán. Utilizando un cuestionario como el principal medio de recolección de datos, se evaluó la correlación entre las variables de emprendimiento, innovación, capital social y mercado del conocimiento. El análisis de los datos se llevó a cabo a través de un modelado de ecuaciones estructurales en el *software* LISREL. Los hallazgos

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mostraron que el capital social y la innovación tuvieron un efecto positivo en el emprendimiento. Sin embargo, el impacto del capital social sobre la innovación no fue confirmado.

PALABRAS CLAVE
Emprendimiento femenino; Capital Social; Innovación; Mercado del Conocimiento; Provincia de Ilam.

INTRODUCTION

According to the 2011 Census, the education level of women is 2% higher than men (women: 18.4 and men: 18.2). Moreover, according to the last census of Statistics Organization published in spring 2014, 10.7% of active populations of the country were unemployed with a female to male ratio of 2.15. Therefore, further emphasis should be placed on female entrepreneurship, particularly in developing countries, where female entrepreneurs are confronted with several limitations due to disregard for their ideas and involvement in social affairs (Manzanera-Román and Brändle, 2016). To overcome limitations and solve these problems, women should be supported by reinforcing female entrepreneur networks through motivation, presentation of appropriate patterns, access to information resources and opportunities to form committees (Alonso and Trillo, 2014). According to García-Palma and Sánchez-Mora Molinab (2016), a knowledge of marketing and marketing skills is required for female entrepreneurs to be successful in business. Market knowledge guides entrepreneurship orientation (García-Palma and Sánchez-Mora Molinab, 2016). Entrepreneurship plays an important role in innovation and economic development as well as poverty alleviation (Wahba, 2012), and therefore, true appreciation of entrepreneurship and its causes is of utmost importance.

In light of the above points and considering the as importance of this issue, this study seeks to investigate the effect of social capital and market knowledge on female entrepreneurs in Ilam Province through the mediating role of innovation.

RESEARCH BACKGROUND

Putnam (2000) believes that entrepreneurs are able to achieve business opportunities by establishing direct and indirect networks with their partners, active clients and interaction with market individuals or people through connection with social capitals. Entrepreneurs make decision based on information collected from suppliers, distributors, customers and even competitors (Bosma, 2004). Therefore, the application of such information is a variable of its resource reliability, with trust playing a key role in social capital (Djankov et al. 2005, 2006b, Putnam, 2000).

Social capital simply refers to the ability of individuals to work collectively to achieve shared objectives in groups and organizations. It can be obtained through social relations, norms, values and interactions inside a society (Zhang, 2003). In addition, social capital encompasses a set of resources (material, foreign economic, social and knowledge resources) (Dong et al., 2008) and it can be considered as an area to and promote entrepreneurship objectives and overcome resource limitations (Schuster et al., 2010). Social capital is underscored by the relations between factors

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such as values, partnership, commitment and trust, as well as relation quality (Bolino et al., 2002).

Economists were the first to describe entrepreneurship in their theories. According to Bovnlin and Pouchin Lee (2006), entrepreneurship environments resemble social capital as a form of capital (financial, human, physical) employed by entrepreneurs for their growth in new investments and allow other manufacturing activities like other supplementary types of social capital (Hitt and Ireland, 2002).

Decklerque (2004) argues that entrepreneurial activities, far from being independent, have to be carried out in a complex environment by business policies, regulations and governments. For such activities to be successful, an entrepreneurial organization must gain public trust at organizational and individual levels for successful investment via communication with other organizations. Exchange costs between individuals reduce the costs of negotiation, information and knowledge (lyons, 2002; House, 2000). The investment for the establishment of a new business depends on interactions with key partners and information exchange. The success and stability of this establishment determines the way an entrepreneur enters an environment for a new investment (Walter et al. 2007). Accordingly, it can be said that social capital is a strong factor that plays an important role in developing strategies and creating an innovative culture, which can also foster innovation by inspiring trust and reliance on values and leadership principles (Fabová and Janáková, 2015).

Family structures play a critical role in economy. Studies show that female entrepreneurs achieve resources and reputation as well as experience in a working place or personal networks through society and family (Hanson, 2009). In this context, family is regarded as a social capital and a working support. Researchers argue that individual who rely on family consulting for decision makings are more likely to establish a small business and retain their personal control over business (Bennett and Robson, 1999).

Social capital, as an intangible asset (Adler and Kwon,2002), not only encourage cooperation and innovative interaction, but also facilitate the learning process by increasing operational productivity, especially by weeding out worthless information, building efficient information distribution channels and providing an opportunity for being compatible with productivity. (Broumand and Jalili, 2007). Flour divides social capital into two groups of intra-group and intergroup social capital. Nahapiet and Goushal (1998) proposes three dimensions for social capital (Alvani et al., 2007), which have been adopted in this study. These three dimensions of social capital are:

1. Structural dimension including network condensation and strong relations.
2. Relational dimension including trust and commitment.
3. Cognitive dimension including shared vision and organizational distance.

All these factors contribute to knowledge transition in business and foster innovation (product development and technical innovation). Knowledge transition is closely linked to the capacity of organizations to create innovation (Phene, et al., 2006).

Knowledge transition can enhance innovation capacities in big companies, and social capital is considered as a key factor in knowledge transition that encourage innovation (Zahra and George, 2002).

According to Kai and Jay (2009), structural dimension refers to mutual social relations in which network condensation refers to the proportion of a group of individuals in relation to the real number which those people may have and when real relations are closer to the total value of relations, the network will be more condensed. (Manzanera-Román and Brändle, 2016). The strength of relations also refers to the pervasiveness of both party's relations with each other, which is emotional in nature, and that all of these factors advance knowledge transition among members of an organization (Kimbu and Ngoasong, 2016). Moreover, consistent with the communication dimension, relations among individuals are developed by their interaction and may promote respect, trust and friendship between two organizations, which in turn foster trust and commitment and finally facilitate knowledge transition (Bala Ramasamy et al., 2006). According to Ingram and Roberts (2000), knowledge exchange is facilitated in a trusting environment, and this is achieved when business partners share their knowledge and a trust is forged between supply and demand parties (Ingram & Roberts,2000).

Cognitive dimension refers to resources that can lead to the identification of levels between individual and organization (Baron, 2004). Organization distance refers to the organizational culture, innovative management models, strategic path and different systems of operation management in two organizations (Wen Lin and Chien Li,2006). Shared vision embodies organizational objectives, expectations and wishes, and when organizations have a shared vision, it allows mutual communication, breaks down misconceptions and increases opportunities for resource and idea exchange (Seuneke and Bock, 2016).

Considering the above points, it can be said that social capital is a strong factor associated with strategy making, which can create an innovative culture and provoke innovation by inspiring trust and trusting in values and leadership principles (Fabová and Janáková, 2015).

Human and knowledge resources are considered as success factors for entrepreneurship and economic innovation and growth (Kai & Jay, 2009), but other studies suggest that social capital is often considered as the main factor for reinforcing competitive advantage, creating innovation for new investments and establishing a new business, mainly where knowledge and human resource are available (Zhan & Hailin,2011; Fabová and Janáková,2015). Social capital as a reinforced resource with strong relations implies that different individuals engaged in a business should have positive expectations of their relations and reduce the costs of controlling and supervising activities by impeding opportunistic behaviors (Kai and Jay, 2009).

Studies have also highlighted the significant role of social capital in entrepreneurial activities, suggesting entrepreneurs are products of their social environment and entrepreneurship is a social act; therefore, existence or absence of

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social communications can influence business nature (Chen et al., 2007). Therefore, it can be argued that social capital is a key component of entrepreneurship without which the establishment of a new business might face several problems. Thus, based on previous studies, this hypothesis was considered for this study:
H1: Social capital has a significant and positive effect on entrepreneurship.

As noted in the literature, social capital can be positive and significant in relation to innovation and it depends on norms and contracts of social capitals. One the one hand, the factor of trust in social capital can increase the risk for organizational innovation and on the other hand, social capital can create stability for conventional relation and their exploitation in long term. It can also lead to the petrifaction of norms and defined roles so that organizations are unwilling to change and introduce innovation. However, most researchers believe that social capital has a positive impact on innovation in organizations and businesses (Landry et al., 2002). They believe that social capital is not only influenced by organizational innovation, but also a degree of organizational innovation. Therefore, hypothesis 2 can state that:
H2: Social capital has positive and significant influence on innovation.

There are several factors affecting entrepreneurship process (Nagler and Naude, 2016). Innovation also plays an important role in entrepreneurship (Khajeheian and Tadayoni, 2016) such as the motivation to be a pioneer and the ability to create and commercialize processes (Khajeheian,2013), new products (Emami and Dimov, 2016) and business systems underlying innovations give a distinctive edge to organizations and entrepreneurs. In the transition from industrial society to information and knowledge society, a positive relationship between economic growth, innovation and entrepreneurship can be observed (Larraza et al., 2011; Acs et al., 2002). Innovation can significantly influence entrepreneurial activities as it leads to ease the achievement of resources and the proper application of new ideas and knowledge, which enhances learning level, reduce risks, and simplifies response to customer needs and exploitation of markets (Kafouros et al., 2008).

Entrepreneurship is tightly associated with innovation and they are believed to be indispensable so that the success of the former depends on the latter (Shane and Venkataraman, 2000). Some studies suggest that entrepreneurs select new jobs or establish institutes and organizations not only for economic reasons, but also due for the innovation existing in jobs (Drucker, 1999). Along this line, Shane argues that real entrepreneurs start up new jobs mainly for sake of innovation rather than economic motivations (Shane, 2004). Therefore, in this study, in addition to social capital approach, entrepreneurship has been investigated through an innovation approach.

Schumpeter (1961) was the first to express innovation within a conceptual framework. Basically, he was looking for ways to recognize factors affecting economic growth of states. Within his theory, innovation is considered as one of

these forms: 1) new materials or pieces 2) presentation of new processes 3) creation of new markets, and 4) application of new organizational formations. Innovation culture is defined as the ability of undertaking an innovative measure which leads to the creation of products and services. This ability may be the result of people's talent and intelligence or the outcome of training. According to Drucker (1999), from a managerial point of view, innovation is a change that offers a new dimension of performance. From an organizational view, however, innovation is the exploitation of new ideas (Hesselbein, 2002).

As regards the subject of this study, Zahra and George (2002) found that innovation as an organizational capacity allowed companies to reinforce entrepreneurship in their performances to improve, develop and explore existing competencies and provide new facilities through knowledge attainment. Accordingly, hypotheses 3 and 4 can be proposed for this study:

H3: Innovation has a positive and significant effect on entrepreneurship.

Zhang (2008) revealed that innovation oriented companies towards future-knowledge. Knowledge transition refers to a company's routines and processes which allow analyzing process and interpreting and understanding information obtained from external resources. Zahra and George (2002) posited that the final objective of knowledge was the transition of innovation. The main factor affecting knowledge transition was the origin of knowledge, but the degree of receiver's achievement was associated with the operational knowledge. According to Zhang (2008), as innovation is highly dependent on interaction, innovative activities are a variable of the extent of learning capability, with studies showing that knowledge and innovation transition is difficult, especially with regard to organizational obstacles, (Ahuja & Lampert, 2001). Therefore, in this research, innovation has been discussed from a social capital approach.

in building relationships with their ecosystem, female entrepreneurs possess stronger managerial skills than male ones and these skills enable female entrepreneurs to have a better understanding of the works, and effective negotiation abilities with market actors and stakeholders (Emami, 2017).

According to García-Palma and Sánchez-Mora Molinab (2016), a mastery of marketing and marketing skills is required for female entrepreneurs to set up successful businesses. Market knowledge guides entrepreneurship (García-Palma & Sánchez-Mora Molinab, 2016).

Some marketing factors also affect the adoption of entrepreneurial attitudes. It seems that greater entrepreneurship in a marketing activity is associated with increased cooperation of employees with diverse mental frameworks. Similarly, the more marketing is divided into different parts of a business and the more it is decentralized, the greater will be the entrepreneurial quality of marketing actors (Seyyedamiri and Faghih,2015).

H4: There is a significant positive relationship between market knowledge and entrepreneurship in women.

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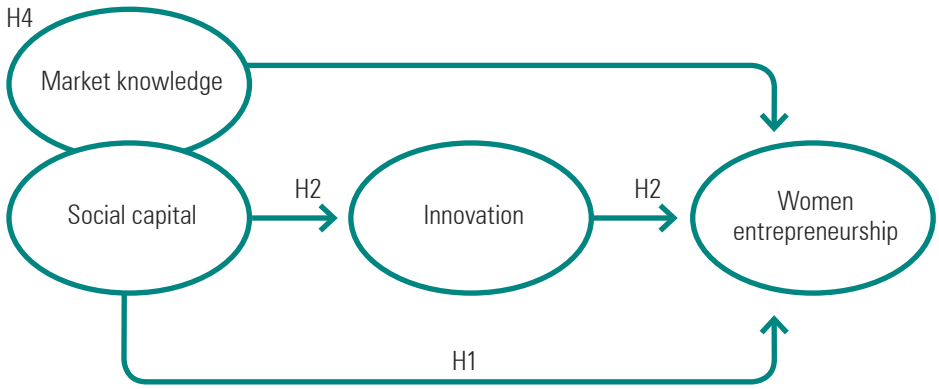
Figure 1. Research conceptual model.



RESEARCH METHOD

Since the goal of this study is to determine the causal relationship between social capital and entrepreneurship through the mediating role of innovation, it falls in the category of applied research in terms of objective. It is also descriptive, correlative and survey in terms of data gathering. The study population comprised of all female entrepreneurs in Ilam province, Iran (n=200). Based on the study of Morgan and Kerjesi, a sample of 130 subjects was selected. In the analytical model of the research, social capital and market knowledge were independent variables, and innovation and entrepreneurship were mediator and dependent variables respectively. The main data gathering instrument was a self-administered questionnaire designed on the ideas of experts. All variables were scored on a 5-point Likert scale. To evaluate reliability, 30 pretest questionnaires were given to the primary sample and the coefficient of confidence was calculated by Cronbach's alpha. The results are shown in the following table.

Table 1. Reliability of questionnaire.

Variable	Nº of items	Reliability
Social capital	9	0/852
Innovation	6	0/816
Entrepreneurship	8	0/809
Market knowledge	4	0/802
Total	27	0/873

The models of exogenous variables (social capital) and endogenous variables (innovation and entrepreneurship) were measured by second and first order

conformational factorial analysis in LISREL software. In Table 2, the structural model of research is shown.

Before testing hypotheses and conceptual model of the research, we had to assess the measuring models of endogenous (innovation and entrepreneurship) and exogenous (social capital) variables. To this this, the measuring models of these variables are presented in Table 2. It was performed using the first and second order conformational factorial analysis, which is one of the conventional statistical methods employed for investigating the relation between latent variables (obtained factors) and observed variables (years).

Table 2. Results of analyzing model of research variables (second-order conformational factorial analysis).

Measuring model	Including variables	x^2	df	$\frac{x^2}{df}$	RMSEA
Independent variable	Social capital	46/34	24	1/93	0/085
Independent variable	Market knowledge	36/48	21	1/60	0/08
Mediator variable	innovation	10/60	9	1/17	0/037
Dependent variable	Entrepreneurship	70/91	54	1/31	0/049

The results of second order conformational factorial analysis revealed that measuring models, total number and model parameters of were significant. The proportion indices of measuring models are displayed in Table 3, which indicates the fitness of models.

Table 3. Deductive and descriptive statistics for study population with regard to research variables.

Variables	SD	Observed t-value	Mean	df	State
Social capital	0.661	13.369	3.79	129	Appropriate
Market knowledge	0.852	12.37	2.89	129	Appropriate
Structural	0.806	10.292	3.728	129	Appropriate
Relational	0.820	13.041	3.938	129	Appropriate
Cognitive	0.761	10.590	3.707	129	Appropriate
Innovation	0.636	12.079	3.067	129	Appropriate
Entrepreneurship	0.559	12.199	3.592	129	Appropriate

As shown in the above table, all variables have appropriate policies and distribution, with a mean value of 3 (Table 4).

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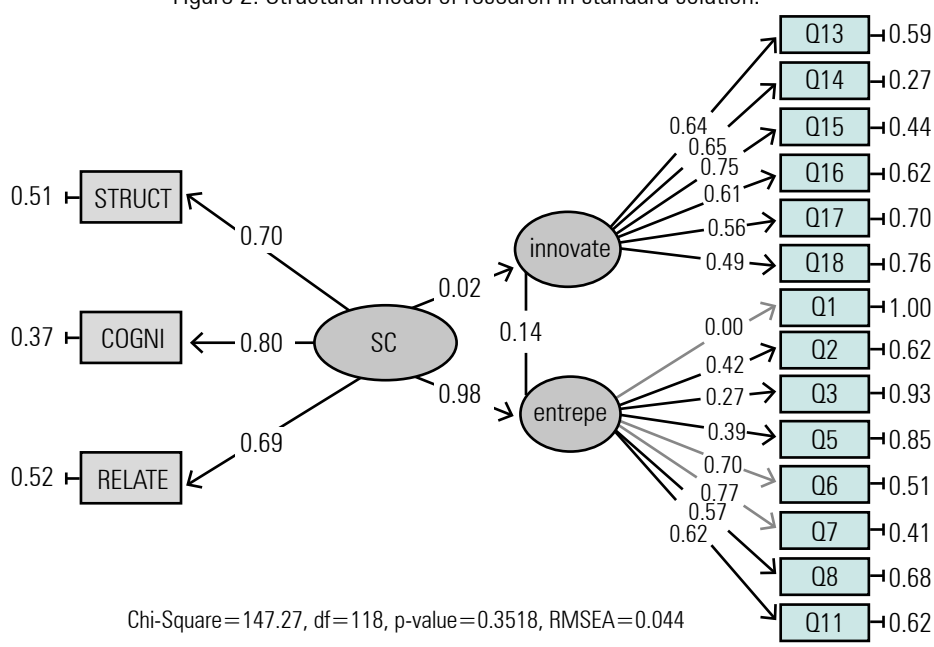
Table 4. Correlation analysis of research variables.

Correlation between exogenous and endogenous variables	Innovation	Market knowledge	Social capital	Entrepreneurship
Social capital	-	-	1	-
Market knowledge	-	1	-	
Innovation	1	-	0.084	-
Entrepreneurship	0.218	0.501	0.473	1

As can be seen, there is a significant relationship between social capital (exogenous variable) and job endeavor variables and organizational citizenship behavior (endogenous variable) at a significant level of 0.01. The highest correlation belonged to social capital-organizational citizenship behavior (α=0.473%) and the lowest correlation was related to social capital and job endeavor (α =0.084%). The correlative analysis of endogenous variables revealed that job improvement enhanced organizational citizenship behavior.

STANDARD ESTIMATION MODEL

Figure 2. Structural model of research in standard solution.



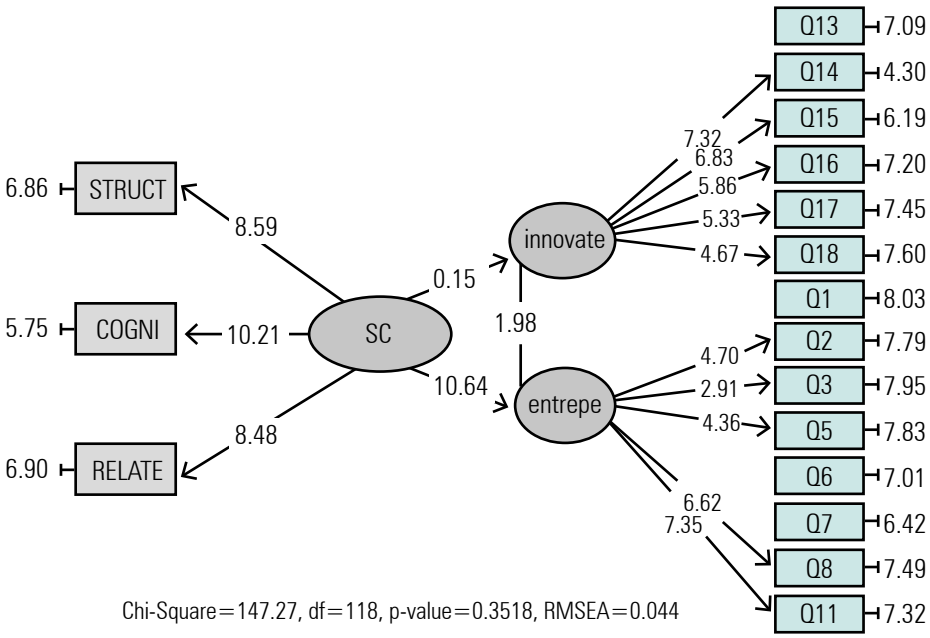
Chi-Square=147.27, df=118, p-value=0.3518, RMSEA=0.044

The proportion index indicates that the appropriate fitness of the model and the ratio of χ^2 on the degree of freedom is 1.24, which is smaller than the standard value 3. The value of RMSEA is 0.044, which is also smaller than 0.08. In the above model, social capital has a positive and significant effect on innovation (0.02%) and entrepreneurship (0.98%). Innovation also has a positive

Table 5. Results of research structural model.

Index	χ^2 /df	CFI	IFI	IFI	NNFI	GFI	AGFI	RMSEA
Quantity acceptance threshold	3<	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	0.07<
Quantity	1.24	0.98	0.98	0.98	0.97	0.91	0.9	0.044

Figure 3. Research structural models in the state of significant numbers.



As shown in the above model, social capital and innovation have a positive and significant effect on female entrepreneurship in Ilam (which confirms the first and third hypotheses). However, since the significant value was lower than 1.96 in the second hypothesis, regarding the relationship between social capital and innovation was rejected (Table 6).

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Table 6 .Summary of research structural model

Relations	Route coefficient		Quantity of t		Results	
Indirect influence	Indirect effect	Direct effect	Direct effect	Indirect effect	Direct effect	Indirect effect
Social capital-entrepreneurship	0.00	0.98	0.15	10.64	No	No
Social capital- innovation	-	0.02	-	0.15	-	No
Innovation-entrepreneurship	-	0.14	-	1.98	-	Yes
Market knowledge-entrepreneurship	-	0.15	-	1.98	-	Yes

RESULTS AND DISCUSSION

According to the results, there is a positive and significant relationship between social capital and entrepreneurship, which is consistent with the results of previous studies (Chen and et al., 2007) regarding the important role of social capital in entrepreneurship (which confirms the first hypothesis). However, there was not significant relationship between innovation and social capital. These results are dot in agreement with the findings of Landry et al. (2002) about the positive effect of social capital on innovation (which rejects the second hypothesis). Finally, the results suggested a positive and significant relationship between innovation and entrepreneurship, which is consistent with the findings of Zahra and George (2002) (which confirms the third hypothesis).

To foster entrepreneurship culture, a number of different factors need to be taken into account: individual creativity for developing new products and services, risk taking, exploitation of resources and social capital. It should be noted that entrepreneurship is a social issue which is in the results of an entrepreneur's capacities, social resources and strategic actions. In keeping with the findings, entrepreneurship can create a relationship between social capital and entrepreneurship competencies.

Social capital is a key component of entrepreneurship without which a business cannot be established. Nowadays, most businesses have changed the focus of their activity from social dimension to trust, share norms, principles and values through social networks. All of these factors contribute to long-term success and stability of organizations and open up new opportunities for entrepreneurship.

Whenever an individual suggests an idea for simplifying suggestions or digits processes in an organization or business, this inspires trust and self-confidence in values, principles and structure of the business. The free flow of information in companies and organizations can influence entrepreneurship and innovation

though social networks and mutual communication. Networks can be active at different levels including interaction among employees, interaction with different companies and interaction with society and suppliers. Entrepreneurs can seek for strategies to predict innovative business at their business level through social communications and exchanges. A series of teams and social networks in businesses are required to plan a new market exploration, and the flexibility of individuals in new structures and greater authority in decision making can increase the level of entrepreneurship culture.

Self-actualization potentials, desire for independence and self-employment, social status and leadership role, among others, are main incentives for women entrepreneurs in Ilam. The point is that culture of a society forms these incentives. The culture involves risk taking, his lover employment. Respect for entrepreneurs in a community can be a sufficient stimulus for establishing a business. However, supporting policies and public and media advertising can also be effective and decisive. A cultures that encourages risk-taking, competition, ambiguity tolerance, and acceptance of success or failure allows individual to personalize their motives for entrepreneurship. Today, many rural areas have focused on development of female entrepreneurship in the community. Tourism, rural industries, traditional food, and other areas can be undertaken by rural women and attempts must be taken to resolve deficiencies and gaps

Measurements of entrepreneurial resources can be divided into four groups: (1) Products and services supplied in the market, (2) investments, (3) technologies, and (4) management system.

Although prior knowledge may be of particular importance, acquiring new knowledge of the market and its related adaptive strategies are essential for exploration and exploitation of opportunities. According to results, marketing knowledge skills is a perquisite for female entrepreneurs. In particular, all entrepreneurial businesses need to consider all dimensions of entrepreneurial marketing.

The stronger presence of women in businesses is an undeniable fact in Iranian society and the city of Ilam. Accordingly, entrepreneurial activities are essential to help the growth and development of the country. Despite this fact, women in Iranian society are usually engaged in professions which are characterized by low capital, temporality and lower wages (Radovic Markovic et al., 2013, 2016). In other words, low economic sectors are often host to women. Therefore, in the global arena, creative, innovative and inventive women are source of great changes in industrial, manufacturing and services sectors. They fuel the economic development, industrial expansion and investment incentives. cause of employment, the main option for technology transfer and removal of market distortions and constraints in communities has been explained. Therefore, given the role of women in national economic development and the need to deal with unemployment crisis, the female entrepreneurship needs to be developed so that they can contribute to creation of business and job opportunities and help ease some of the problems in today's economy.

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KNOWLEDGE HIDING AS AN OBSTACLE OF INNOVATION IN ORGANIZATIONS A QUALITATIVE STUDY OF SOFTWARE INDUSTRY

OCULTAMIENTO DEL CONOCIMIENTO COMO OBSTÁCULO PARA LA INNOVACIÓN EN LAS ORGANIZACIONES: UN ESTUDIO CUALITATIVO DE LA INDUSTRIA DEL SOFTWARE

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ABSTRACT

Transmission and popularization of knowledge among personnel leads to a functional synergy in the innovation processes of organizations. It has been found that most research on organizations are related to knowledge sharing, while the knowledge hiding has seldom been investigated. Firms that operate in a software industry are among the knowledge-based organizations in which employees are required to possess specialized knowledge and skills to perform their tasks. The dissemination of knowledge and information can help organizations to be innovative and to improve their competitive advantage. Current study shows that information does not flow through the employees of sample organizations, and employees prefer to hide their organizational knowledge from their colleagues in order to maintain their own portfolios. Using thematic analysis, and interviews as data collection method, some thematic issues were extracted. These themes include, behavioral characteristics, complexity of knowledge, Power of requesting person, organizational incentives for knowledge sharing, Lack of clear responsibility for knowledge sharing, Sense of internal competition, level of trust to colleagues, effect of ubiquitous media, learning ability of the knowledge demandant, Level of personal contacts with colleagues, Deceiving colleagues, Violence, Negative feedback from organizational environment.

KEYWORDS

Knowledge Hiding; Knowledge Sharing; Knowledge Management; Software industry.

RESUMEN

La transmisión y la popularización del conocimiento entre el personal lleva a una sinergia funcional en el proceso de innovación de las organizaciones. Se ha encontrado que la mayoría de la investigación sobre organizaciones está relacionada con el intercambio de conocimiento, mientras que el ocultamiento de conocimiento ha sido raramente investigado. Aquellas empresas que operan en la industria del *software* están entre las organizaciones basadas en el conocimiento en que los empleados requieren poseer conocimiento especializado y habilidades para desempeñar sus funciones. La diseminación del conocimiento y de la información puede ayudar a las organizaciones a ser innovadoras y a mejorar su ventaja competitiva. El presente estudio indica que la información no fluye a través de los empleados de las organizaciones que sirvieron de muestra y que los empleados prefieren esconder su conocimiento organizacional de sus colegas con el fin de mantener sus propios portafolios. Utilizando un sistema temático y entrevistas como método de recolección de información, se extrajeron algunas cuestiones temáticas. Estos temas incluyeron: características comportamentales, complejidad del conocimiento,

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el poder de la persona que hace la solicitud, los incentivos que brinda la organización para el intercambio de conocimiento, el nivel de confianza entre los compañeros de trabajo, el efecto de la ubicuidad de los medios de comunicación, la capacidad de aprendizaje del demandante de conocimiento, el nivel de contactos personales con los compañeros de trabajo, los compañeros que resultan engañosos, la violencia y las reacciones negativas por parte el ambiente organizacional.

PALABRAS CLAVE
Ocultamiento de conocimiento; Intercambio de conocimiento; Gestión del conocimiento; industria del *software*.

INTRODUCTION
Organizational knowledge is identified as a nontangible but very valuable resource in gaining competitive advantage (Huang, 2008; Jarvenpaa and Majchrzak, 2008), Although Khajeheian and Tadayoni (2016) implied on limit of organizational capacity for innovation, organizational knowledge is still the main source of innovation (Xie et al,2016, Cu and Wu,2016). Despite the many efforts to simplify the transfer of knowledge in organizations, remarkable successes have not been achieved (Kelloway, 2000; Huang et al., 2008). In many cases, the personnel are not keen to share their knowledge - even when the organizational design has simplified the knowledge transferring process. And this reluctancy is an obstacle for innovation. This unwillingness occurs even when personnel are encouraged and rewarded to transfer knowledge (Swap and Leonard, 2005; Bock et al., 2001).

Firms that operate in software industry are knowledge-based organizations that are strongly innovation-intensive. The nature of their operations requires that their employees are talented and possess high level knowledge. The sharing of knowledge in such organizations are vital towards keeping the firm in competition in such a highly competitive industry (Bari, et al. 2016; Chen et al., 2016).

With regards to the importance of this obstacle to innovation, this research investigates how personnel in software firms understand, define, interpret and represent their experience of knowledge hiding. What is the subjective meaning of "knowledge hiding" in employees, and what are the main reasons for the current situation. In this research, the author investigates a) whether knowledge hiding happens in software developing companies? b) The knowledge hiding aspects and thereby differentiating this behavior with similar concepts and c) concentrating on distrust as the key reason of knowledge hiding in organizations. Some factors of knowledge transition may be universal, but the degree to which individuals are affected by these barriers may vary across cultures. This study increases the understanding of knowledge transmission in those knowledge based organizations and it further presents a discovery on the barriers presented by knowledge hiding.

LITERATURE REVIEW
Knowledge sharing and knowledge transfer are one of the most widely researched topics by professionals and academics in different fields such as management, information sciences, sociology and economics (Demirkasimoglu, 2015; Serenko

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and Bontis, 2016; Kang, 2016). Conrad and Newberry (2012) and Gonzalez-Perez et al (2014) implied on necessity of practical use of skills and knowledge instead of theoretical understanding or abstract knowledge. For knowledge to be applicable, the foundation and context is needed, to provide a place for implementing knowledge (Khajeheian,2014, p. 177) and knowledge sharing provides such context for practical knowledge (Dong et al., 2016).

A review of research literature indicates that the knowledge hiding process can be classified in three ways: These are evasive hiding, rationalized hiding and playing dumb (Connelly et al., 2012; Zhao et al., 2016). Each of these knowledge hiding behaviors can be explained by an important predictor known as distrust. Distrust, interpersonal relationships, social exchanges and organizational background may influence employees' knowledge hiding behaviors (Blau, 1964). For example in one study, Hernaus et al., (2015) confirmed the importance of interpersonal trust in work relationships and supports the differential role of knowledge complexity in the evasive hiding behavior. Also, Peng (2013) showed that knowledge-based psychological ownership positively affects knowledge hiding. Nevertheless, each of these three behaviors leads to different categories of individual and organizational consequences.

The concept of knowledge hiding in organizations can be used to define this phenomenon. Information hiding is defined as an individual's deliberate effort to avoid or hide the knowledge requested by another person. Therefore, in situations where there is an explicit request for knowledge and the opposite person hides it, a knowledge hiding behavior occurs (Connelly and Zweig, 2012; Wittenbaum et al., 2004).

Besides this, knowledge hiding may have a positive intent or outcome from that person's perspective or can be called a "white lie" in the organization (Saxe, 1991; Greenberg et al., 2007). This behavior may exist in order to protect the feelings of the person requesting the information, maintain confidentiality on some issues, and/or safeguard the interests of a third party; therefore, it is not always considered negative.

In the abovementioned examples, knowledge is requested by individuals and not groups or organizations that has to be attended to. Therefore, in this research we study knowledge hiding between binary groups in organizations, since mutual interactions are the main knowledge transferring route (Duffy, 2006; Duffy and Ganster, 2006). Knowledge transfer is also defined as a mutual transfer of organizational knowledge between one source and a receiving party (Bock and Zmud, 2005; Webster et al, 2008).

Since knowledge hiding occurs among colleagues, the quality of their relationship is very important. It is also important to know how an individual responds to a knowledge request made by other colleagues. Mutual relationships generally exist due to an unspoken social exchange among people in organizations (Blau, 1964). In an organizationally mutual relationship, there are expectations of interpersonal trust where individuals can share their knowledge the more (Buller and Burgoon, 2005). As time passes, the nature of organizational relationships expands and there are more commitments to each other. Finally, trust is built between the parties.

Investigations indicate that trust powerful predicts the fulfilment of duty and an organizational citizenship behavior (Colquitt et al., 2007; Laski and Moosavi, 2016; Zeinabadi and Salehi, 2011). This is why distrust in the sharing of knowledge should be studied in organizations (Majchrzak and Jarvenpaa, 2008). In addition to distrust, the other knowledge hiding factors were investigated. These were: knowledge complexity, relevant types of knowledge and the groundwork for sharing known are among the predictors (Connelly, 2012).

An organizations area of justice (Colquitt, 2002) have similar effects. In particular, it is possible that an unfair individual behavior increases the level of knowledge hiding. An individual's power is also an important factor in knowledge hiding in an organization (Yukl and Falbe, 1996). In other words, an important factor influencing this type of behavior is the power relationships between the knowledge-requesting agent and knowledge requesting individuals (Yukl et al., 1996). Some groups may experience individual injustice and an imbalance on power, such as workers, ethnic minorities, workers with disabilities and women in unimportant jobs.

Since knowledge hiding is a new concept, the first research goal was to investigate the presence of knowledge hiding in organizations from different studies. Another research goal was to establish an initial relationship between distrust and knowledge hiding. The second main research goal is to discover the possible strategies which employees may use to hide their knowledge. It can be stated that researchers have been willing to reveal knowledge hiding in organizations. The aim of this study is to present the factors that result in the phenomenon of knowledge hiding in organizations.

Organizational Innovation has been a subject of serious academic and policy interest for several decades. The 'creative organizations' have been studied for a shorter period of time, but perhaps more intensely (Miles and Green, 2010). Organizational units can produce more innovations and enjoy better performance if they occupy central network positions that provide access to new knowledge developed by the other units. This effect, however, depends on units' absorptive capacity, or the ability to successfully replicate new knowledge (Tsai, 2015). We begin with a critical review of the literature on knowledge management, arguing that its focus on creating a network structure may limit its potential for encouraging knowledge sharing across social communities. Two cases of interactive innovation are contrasted. One focused almost entirely on using IT (intranet) for knowledge sharing (Swan, 2014). In the other, while IT was used to provide a network to encourage sharing, there was also recognition of the importance of face- to- face interaction for sharing tacit knowledge (Amabil, 2013). The emphasis was on encouraging active networking among dispersed communities, rather than relying on IT networks (Cooper, 2014).

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RESEARCH METHODOLOGY

Research design

The methodology of this research follows the qualitative approach and uses thematic analysis as the research method for the interpretation of the collected data. The thematic analysis method determines, analyzes and expresses patterns (themes) within the data. Although this method organizes and describes the data in details, it goes beyond data organization and it interprets different aspects of the subject matter (Thomas, 2008). The formation and selection of themes largely depends on the research structures (Wang, Noe, 2010). The trustworthiness of qualitative content analysis is often presented by using terms such as credibility, dependability, conformability, transferability, and authenticity (Elo et al., 2014). As Elo et al (2014) pointed out, we scrutinize the trustworthiness of every phase of the analysis process, including the preparation, organization, and reporting of results.

Also, as Mohammadpour (2010) noted, Different criteria have been regarded as the indicators of reliability in qualitative research. Therefore, the current study used three methods:

1. Descriptors with low deductions: these descriptors were repeatedly used as quotations to present the findings.
2. Researcher angulation: researchers were involved with data for a long time. Information and experience were regularly and continuously exchanged between the interviewers. Therefore, it was possible to maintain a continuous preoccupation with the data. It was also possible to increase the range and depth of information. The conducted interviews were coded by two coders (authors) again, then the codes were compared and synchronized in a process of exchanging views.
3. External detection: two other researchers were asked to study the research reports, especially the findings, and express their opinions

Data collection and analysis

The context of the phenomenon was observed, the data collected were properly interpreted and the qualitative data were analyzed using the thematic analysis method (Mohammadpour, 2010). Thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data (Braun & Clarke, 2006). It has also been introduced as a qualitative descriptive method that provides core skills to researchers for conducting many other forms of qualitative analysis (Vaismoradi, Turunen, & Bondas, 2013). The snowball sampling technique was used. In this study 20 interviews (Table 1) were conducted. The experts who took part in this study

reflected a variety of specialized fields, from a computer firm in Isfahan, Iran. Out of the 20 engineers participating in the interviews, 17 were male and three were females - aged between 24 and 35. Face-to-face semi-structured interviews were undertaken. Data collection and analysis were conducted simultaneously. Data collection continued until no new issues emerged. Interviews lasted between 45 and 60 minutes and were audio recorded and also transcribed verbatim. In terms of education, majority of the respondents earned either a bachelor's degree (12 people) or a master degree (eight people). The participants signed a consent form prior to a face-to-face interview which was audio recorded.

Table 1. Participant characteristic.

ID	Gender	Education	Age	Role	Time interview (appx)
1	F	Bs	24	Computer programmer	40
2	M	Bs	26	Computer programmer	45
3	M	Ms	30	Computer programmer	45
4	M	Ms	31	Computer programmer	60
5	M	Ms	32	Computer programmer	55
6	M	Ms	29	Computer programmer	50
7	F	Bs	27	Computer programmer	40
8	F	Bs	28	Computer programmer	45
9	M	Bs	26	Computer programmer	50
10	M	Ms	35	Software designer	55
11	M	Ms	34	Software designer	60
12	M	Ms	32	Software designer	60
13	M	Bs	31	Computer programmer	65
14	M	Bs	30	Computer programmer	40
15	M	Bs	29	Computer programmer	55
16	M	Ms	28	Computer programmer	55
17	M	Ms	33	Manager	50
18	M	Ms	32	Manager	45
19	M	Ms	30	Computer programmer	45
20	M	Bs	31	Computer programmer	55

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RESEARCH FINDINGS

At this stage, all key points obtained from the interviews are given titles. About 530 primary codes were extracted. Then, all the codes were placed tables. A sample of primary codes mined from one of the interviews is presented in the table below.

Table 2. Primary codification.

Primary codification (first interview)
1. Only skillful and knowledgeable people can stay in this organization
2. Employees hide their knowledge in order to have competitive advantage
3. Employees are not encouraged by the organization to share their knowledge
4. Individualism is the standard culture in this company
5. They try to serve themselves rather than considering organizational goals
6. Personal characteristics is the main reason for hiding their knowledge
7. The complexity of knowledge cause employees less tendency to transfer their knowledge
8. The power of knowledge applicant is important in information presentation
9. The factor of power is important for updating information
10. Organizational processes do not encourage employees to transfer their knowledge
11. Information sharing is not a main task in organization
12. Most of the time engineer seek for information not related to their job
13. Some engineers hide their information for job competitions and non -job competitions
14. As new media share information with everyone, it is not possible to hide information
15. knowledge hiding is against relationships in organization
16. colleagues usually have requests causes to take my time

In the next stage, primary codes are transformed into conceptual codes and grouped into categories. Similar conceptual codes are turned into a theme. In the following table, for instance, the results are presented based on conceptual codes and themes.

Table 3. conceptual codes and themes.

Themes	Conceptual codes	Abundance
Internal competition	Competitiveness in organization	15
	Weak organizational communication	
	Personal characteristic	
	Organization processes	
Obiquete media	Access to information via online media	11
	Ubiquity of access	
Complexity of knowledge	Professional knowledge	14
	Ability to learn	
	Required time for transit	

In answer to our research questions, the following themes were identified as predictors of knowledge hiding in these organizations.

Behavioral characteristics

The most important reason that software engineers expressed on why they hide information, were related to behavioral characteristics. Some of these characteristics are prevalent in those who hide knowledge from their colleagues (such as jealousy towards colleagues' progress), while some others are related to special individuals. Most engineers had behaviors and characteristics that were institutionalized, which led to hiding information from their colleagues. The phrase "jealousy towards others' progress" was frequently used by the engineers.

"*Since those who stay in this firm are those that have a higher level of knowledge and talent, therefore, if our colleagues acquire knowledge, they will hide it in order to gain a competitive advantage; and if one day the firm decides to lay off personnel, they will be the ones to stay, because their knowledge and talent is greater than the others.*"

However, some engineers consider deeper roots for knowledge hiding. Most believe the organizational culture can be individualist; hence, people tend to serve themselves instead of working towards organizational goals. Therefore, a set of behaviors based on personal traits were stated as the main reason of knowledge hiding.

Some of these engineers considered religious teachings while defending knowledge transfer.

"*There is a charity for everything and the charity of science it its distribution.*"

Therefore, those who do not transfer knowledge to their colleagues are not paying their dues.

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Complexity of knowledge

The complexity and expertise of knowledge in the software design, leads to people becoming less enthusiastic over the transfer of the knowledge. Most claim that if they did explain to their colleagues, they wouldn't learn by themselves.

"*Sometimes my colleagues request information from me, and I feel that it wouldn't be useful to transfer it, because it's so complex that they wouldn't learn with my brief descriptions; therefore, I try to get out of it.*"

"*In our field, knowledge is specialized, and you can't be hopeful to transfer it with a simple explanation.*"

Hence, they believe that knowledge complexity is an important ground for knowledge hiding.

Power of the requesting person

Presenting information to colleagues was easier for the engineers when they felt the requester had a higher and more important position than they. Indeed, the power relations factor influenced their knowledge offers. This implies that if a colleague with power and influence requested information from them, they would easily divulge information with the hope that they would someday use his position.

"If a colleague who has more influence on the managers, requests information from me, I would provide it, since if my relation with him/her deteriorates he/she may use that influence to hurt my position."

"I provide information and knowledge to higher managers, even if they are not my supervisor. Because these people will someday come to my use, and I will need their influence."

Profit-seeking in these people caused them to be indifferent to the knowledge request of their peers or subordinates.

Organizational incentives for knowledge sharing

Almost all the interviewees observed that processes in their company were not designed to encourage information sharing in order to reduce the time and energy spent on cases that colleagues have previously tested.

"*In our company, your level of skill and knowledge is important. Not much value is given to helping your colleagues or providing information to them.*"

"*When the basis of success and bonus is your skills and knowledge and not on how much information you have transferred, will there be a motive to do so?*"

"*When I first entered this company, I tried to extend relations with my colleagues, therefore, providing them with any new information I acquired. After a while, I noticed that instead of increasing my own skills I was using my time for others, and this was not in my favor.*"

Since the process design in most of these companies did not include information sharing as a main responsibility, therefore, these engineers lacked the motive to present their information to others.

Lack of clear responsibility for knowledge sharing

One reason that individuals hide information from their colleagues was this belief that it is related to their responsibilities and there is no need for others to know about it. The lack of clear responsibilities leads to individuals interfering in each other's work; this behavior increasingly caused information hiding.

"When I feel my colleague is requesting information, which is not relevant, I do not consider myself responsible to provide it."

"*Most people request information, which is not related to their job, and if they know so it may even harm their performance.*"

These people considered that the request of information in their specialized field from colleagues an interference. And they felt that, if everyone continues in their specialized field, everything would be better.

Sense of internal competition

For some engineers, work and non-work competition was the ground of information hiding. In these companies those with higher skill and knowledge could soon achieve organizational benefits and success; the basis of receiving a bonus is not the reputation of individuals but the level of skill and knowledge.

"*Since software design is a highly up-to-date talent, individuals should always be upgrading their knowledge and information, or they will fall behind. Those who can't update their knowledge will lose their performance in the company and therefore, position in the eyes of the managers. Hence, people try to hide what they have acquired with much difficulty, in order to maintain their competitive advantage and keep the company needful of their skills.*"

Of course, some believe that knowledge hiding leads to underdevelopment of individuals; since they believe; to be ahead of others and not feel the need to acquire further information and skills, they finally lose competitive advantages.

"*I try to present information to my colleagues to help the company's progress, but in order to stay ahead of others I'm always trying to access the latest information.*"

Level of trust to colleagues

Most personnel don't trust their colleagues to present knowledge.

"Even if I give access to my information, others still won't do so. After they have acquired their necessary information if I ask a question most will avoid answering."

"*I present my information to colleagues, but even if they do so, their answers are incomplete and unusefull.*"

Interviewees had reached these answers after years of working in these firms and these answers are not based on private comments or short-term emotions. Interviewers found that distrust is an important barrier that exists in the minds of most people towards their colleagues.

Distrust was another result identified in these organizations. Colleagues did not trust each other in presenting information, consulting and even cooperating.

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Unless they were forced and requested to do so by their managers, they wouldn't voluntarily cooperate on a work project. They were mostly afraid that a colleague would provide them with false information; therefore, they attempted to acquire information from those they trust and those who work in a higher level (managers) or other departments and rarely among direct colleagues.

"*Why should I base my job on false or incomplete information given to me by my colleague; they don't know more than me. I prefer to obtain this information from higher managers whom I trust.*"

"*I have been harmed by false or incomplete information therefore; I prefer to access information from the main source.*"

Effect of obiquete media

New media acts as a cofounder element and regulate knowledge hiding behaviors. Some interviewees stated that nowadays it is impossible to hide knowledge and information, since new media, especially the Internet, have created an atmosphere where information is accessible to everyone. One of the interviewees stated,

"If I hide information from a colleague, he/she will acquire it from other sources such as the Internet. Therefore, it would be better to present that information and indebt him/her."

Learning ability of the knowledge demandant

One of the issues which held back engineers in presenting their information and talent was this argument that:

"If a colleague of mine has the ability and talent to learn such knowledge, he/she would not need my explanations and could acquire this information from any other place and wouldn't wait on me. If he/she doesn't have the ability, even if I do explain, he/she will not learn, and I have only wasted time."

The learning ability of individuals is a significant problem when assessing the level of knowledge hiding in these organizations.

Level of personal contacts with colleagues

Since knowledge hiding in organizations is inversely related to friendly relations, therefore, those who have developed this behavior normally try to separate themselves from their colleagues; meaning that they do not try to develop close and friendly relations with their colleagues.

"*If I become friends with my colleagues, they may have requests that I cannot provide. Coworkers usually have requests which waste my time; therefore, I try to have the least communication with them.*".

Another code explains that:

"*At the beginning of my employment, I found out that if I mind my own business and not communicate with others I would be more accepted, and that is exactly what I did.*"

Avoiding information presentation

An important result of knowledge hiding behavior is to avoid the presentation of information.

> "*When I ask for information about an issue, most colleagues avoid giving an answer. They do not want to damage the work relation but still hide their information for any reason.*"

This strategy was mainly employed by those who intended to hide knowledge from colleagues, since it is a milder approach.

Deceiving colleagues

The worst and most irresponsible strategy towards hiding information was the deception of colleagues. In order to hide the true and correct information, some presented incorrect information to their colleagues.

> "*In some cases when I' had a request, colleagues have distracted me with false information. They had deceived me in order to block my access to that information*."

This strategy, among the others, leads to more overt and covert violence in interpersonal relations.

Violence

Knowledge hiding has resulted in violence among employees. Some staff stated that violence was the worst result of this phenomenon. Some personnel had experienced violence in different forms. This ranged from strained interpersonal relationships to abusing one colleague in front of others or managers. This violence leads to a cycle of adversarial relations between colleagues who in turn had to hide current and specialized information in the organization.

> "*Last month, I noticed that a colleague had gossiped about me to the manager and distorted his image of me, my talents and actions in the organization. I didn't confront him but I guess he did so because some time ago he had asked me to teach a specific programming language and being busy I didn't fulfill his request.*"
>
> "*Some colleagues hide even the most common information in the organization. For example, when I ask a direct coworker where they were? Why did you come in late? They either avoid my question or answer why do you want to know? Did you need me? They answer me with another question.*"

Negative feedback from organizational environment

Knowledge hiding leads to lack of knowledge sharing in organizations and therefore leads to a decrease in the organization's competitive advantage in complex industrial environments. Since the software-development environment is highly dynamic and steadily changing, it is impossible to grow and surpass the competition while hiding information. This concept is specially emphasized by managers of these firms.

> "*Considering the current situation, in a few years we will not be able to compete against other firms in terms of specialized human resources because information and knowledge do not spread across our firm.*"

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DISCUSSION AND CONCLUSIONS

Managers who try to increase knowledge and information in their organizations, need to be aware of the way their employee's think and the incentives needed to motivate them. In order to improve knowledge sharing in the software development firms, we need to understand the factors that do have an effect on hiding knowledge.

To identify the central themes, open codes were extracted from the interviews.

It is understood that in order to hide information from their colleagues, engineers adopt strategies such as reducing individual and organizational communications with their colleagues. It is noteworthy that this occurs only for those who intentionally hide their knowledge. Knowledge hiding is the main theme that was extracted based on codes, such as:

"*My colleague has been avoiding me since when I requested some information about his expertise. He does not even have lunch with me anymore," or "My colleague prefers to change his room so that he does not provide me with his work information.*"

It can be stated that the behavioral characteristics of people are the main reasons for knowledge hiding. This reason can be seen as the impetus for the emergence of knowledge hiding. Buck (2005) pointed out a group of underlying factors for knowledge hiding such as knowledge complexity. Yulk and Falbe dealt with the power of a knowledge-requesting individual in 1996. This study identified two themes namely: the encouragers of information sharing and the clarity of tasks. These themes were extracted from the following codes:

"*In our company, managers do not reward those who provide their colleagues with their new work information," or "Even in the company, where I work, managers do not want employees to establish extensive relationships with each other.*"

Other intervening factors includes trust between colleagues, pointed out by Luichi (2004); modern means of communication, dealt with Gotiguer and Huang (2008) in separate studies; the learning levels of individuals and the sense of competition. These factors have resulted in knowledge hiding among the engineers in software development companies extracted from the theoretical sample of this study. Based on how much they trust a colleague; the engineer can provide him/her with their knowledge (information). The power behind the knowledge-requesting individual has a great impact on information exposure by a colleague. This theme was backed up by the following code:

"*If the high-ranking managers ask an engineer for specialized information, he/she provides them with the information immediately because he/she thinks that his/her position and promotion depends on close and friendly relationships with them.*"

The abovementioned conditions resulted in the phenomenon of knowledge hiding in software development companies in Isfahan. Engineers put some strategies on the agenda in order to prevent the exposure of hidden knowledge to their colleagues. They reduced the level of individual and organization interpersonal relationships with their colleagues. In some cases, they would avoid sharing information if they had to do so, a fact which was pointed out by Gordon and Miller (2002). However, it is

worth mentioning that such conditions occurred only to people who tried to conceal their knowledge deliberately. Otherwise, such factors and conditions were not true about other employees, and these strategies could not be observed among them.

The important point is that, although knowledge hiding is common in organizations all over the world, few relevant studies were seen in the review of theoretical literature. This indicates the need for an empirical study in which data based on an inductive method, a specific contextual theoretical and situational model can be analyzed. And a groundwork for the perception of the hidden behavior of knowledge hiding in companies.

This study was meant to ascertain the factors resulting in knowledge hiding in organizations. It was also meant to explain that there have been no coherent studies on this subject. According to the research results, the sixteen factors were the most comprehensive indicators of knowledge hiding in knowledge-based organizations in Iran (see, Salamzadeh et al., 2014). Although KhalehKhah and Ebrahimpoor (2015), Rafoa and Abbasi (2015) and Akhavan et al. (2014) conducted separate studies to determine the factors of acceleration or deceleration in sharing knowledge in organizations, none of them dealt with the factors causing knowledge hiding by employees.

Overall, Connelly and Zweig (2015) suggest that not all knowledge hiding is equally harmful. Some types of knowledge hiding may enhance the relationships between colleagues and might break the cycle of knowledge hiding in organizations.

It would be worthwhile to explore which types of knowledge hiding are harmful? And also which types of them are useful for organizations?

Finally, the limitations of the research should be mentioned. The most important limitation was access to engineers for interviewing purposes. Since most firms were privately owned and having access to them was not easy as one needs a prior appointment. As the research subject implies, some engineers tried to hide the fact that there was knowledge hiding in their organizations, although this was resolved through numerous in-depth interviews.

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INNOVATION ACCEPTANCE AND CUSTOMER SATISFACTION. A SURVEY ON TAX INFORMATION SYSTEMS

ACEPTACIÓN DE LA INNOVACIÓN Y LA SATISFACCIÓN DEL CLIENTE: UNA ENCUESTA SOBRE LOS SISTEMAS DE INFORMACIÓN TRIBUTARIA

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ABSTRACT

The pace of introducing innovation-based products and services to the market is increasingly fast and it significantly affects customer satisfaction, not only for consumer products and services, but also in the delivery of public service services. This paper uses innovation acceptance and technology adoption models to investigate the acceptance and satisfaction of taxpayers from introduction of new tax information system in Iran. By a review of existing models and related effective factors, a conceptual model has been developed based on DeLone-McLean model, and was applied on users in the Iranian tax information system. Findings of this research show that factors that lead to information transparency and more participatory users have a positive effect on innovation acceptance and the satisfaction of users of such technologies.

KEYWORDS

Innovation Acceptance; Customer Satisfaction; E-government; Tax Information System.

RESUMEN

El ritmo de introducción al mercado de productos y servicios de base innovadora es cada vez más rápido y afecta significativamente la satisfacción del cliente, no sólo por los productos y servicios de consumo, sino también en la prestación de los servicios públicos. Este artículo utiliza los modelos de aceptación de la innovación y de adopción de tecnología para investigar la aceptación y satisfacción de los contribuyentes en cuanto a la introducción de nuevos sistemas de información tributaria en Irán. A través de una revisión de los modelos existentes y los factores efectivos relacionados, ha sido desarrollado un modelo conceptual basado en el modelo DeLone-McLean y fue aplicado en usuarios en el sistema de información tributario iraní. Los hallazgos de esta investigación muestran que los factores que contribuyen a la transparencia en la información y a generar usuarios más participativos tienen un efecto positivo en la aceptación de la innovación y la satisfacción de los usuarios de dichas tecnologías.

PALABRAS CLAVE

Aceptación de la innovación; Satisfacción del cliente; Gobierno electrónico; Sistema de información tributaria.

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INTRODUCTION

Information and Communications Technology (ICT) has changed the way people interact as well as the way governments serve the public, in a process that we know it as digital government or e-government (Kyem, 2016). This process enhances the delivery of government services to citizens, the interaction of government and industry, the provision of information to citizens; and for a more efficient management of government (Raghunathan, Kumar and Thamaraiselvi, 2015).

E-governance is defined with more than one definition. Chen and Hsish (2009) define it as improvement of the quality of services and governance by the use of ICT. UNESCO defines it as follow: "E-Governance is the public sector's use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective" (Unesco,2016). The United Nation Public Administration Network, E-Governance defines e-government as "the application of ICT tools in (1) the interaction between government and citizens and businesses, and (2) in internal government operations to simplify and improve democratic governance." (UNPAN, 2016).

Governments, all around the world and at different levels, adopt new technologies to modernize public sector processes and service delivery so that they can improve citizen–government relationship (Dawes, 2010; Dawes & Helbig, 2010; Lathrop & Ruma, 2010; Merkel, 2013; Noveck, 2009); and to achieve outcomes such as efficiency, accountability, enhanced public services, cost-savings and similar management benefits (OECD, 2003; Gant, 2004; Gil-Garcia, 2005). But the delivery of new technologies becomes successful when customers accept innovations and adopt the offered technologies. The aim of this study is to determine the acceptation of the tax information systems, and to examine what factors can encourage and persuade the tax payers to use tax information systems. Since these factors raise people to use the new offered technology, it is important to identify those factors. The aim of this paper is to assess the factors that affect the acceptance of innovation by tax payers toward the new tax information system in Iran.

LITERATURE

Innovation Acceptance and Technology Adoption

Innovation studies have been conducted in various fields of research during the time (Baregheh, Rowley & Sambrook, 2009). Such studies have been associated with productivity, growth, business development and similar concepts (Fagerberg, 2005; Kaplinsky et al., 2009, Khajeheian, 2014). Innovation promotes entrepreneurship and new venture creation (Khajeheian, 2013; Salamzadeh and Kawamorita, 2017) and it allows companies to stay competitive (Khajeheian, 2016). Considering such impact, innovation has always been a popular research topic for many of researchers in the field of management as well as practitioners in the field of Information Systems (Avgerou, 2008). Gonzalez-Perez and Velez-Ocampo argues that managerial

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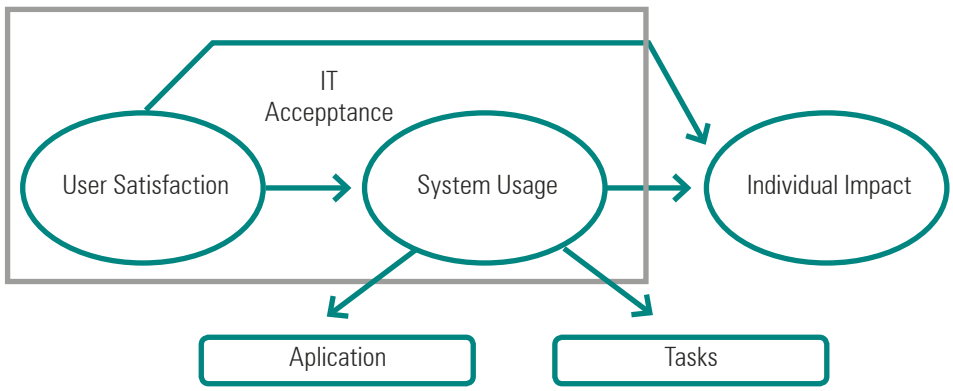
commitment lowers the cost of adaptation with technology (2014, p. 541). However, the increasing application of innovations, especially technological innovations in services, is not without challenge and part of the challenge come from the acceptance of Innovation and technology readiness. By Parasuraman & Colby (2015), Technology readiness describes the individual's propensity to use new technologies for different purposes. Technology readiness associates with Innovation acceptance (Lippert and Govindarajulu, 2015) and is one of the important factors that determine the success of application of an innovation in a society.

Parasuraman (2000) developed a 36-item technology readiness index (TRI). That scale consisting of four dimensions: optimism, innovativeness, insecurity and discomfort. Since then, technology readiness index has been applied for example in the context of self-service technologies (Gelderman et al.2011; Liljander et al., 2006), mobile services (Chen et al., 2013; Sophonthummapharn & Tesar, 2007) and wireless technology users (Chang & Kannan, 2006). Researches have incorporated technology readiness with other technology adoption models such as Unified Theory of Acceptance and Use of Technology (UTAUT) (Chiu, Fang, & Tseng, 2010), Technology Acceptance Model (TAM) (Lin et al.2007; Walczuch et al., 2007) and Expectation-Confirmation Model (Chen et al., 2013). Also cross-cultural validity of the scale has been assessed (Meng et al., 2009). Technologies change over time and the rapid development of new technologies led to the development of an updated and streamlined technology readiness index, that called TRI 2.0 (Parasuraman & Colby, 2015). TRI 2.0 scale has been updated to match with the recent changes in the technology environment, and at the same time the scale has been streamlined to a compact 16- item scale to be more easily adopted as a part of research questionnaires.

the Technology Acceptance Model (TAM) of Davis et al (Davis,1989; Davis, Bagozzi, Warshaw,1989) is one of the most widely used models of information systems (IS) that explain or predict the motivational factors in user acceptance of technology. Perceived ease of use refers to the degree to which an individual belief that the use of an information system is free from effort, while perceived usefulness is a perception that using a particular system enhances one's job performance (Davis et al., 1989). It is generally assumed that personality does influence an individual's technology adoption behavior (McElroy et al., 2007; Devaraj et al., 2008). Thus technology acceptance model and technology readiness have been integrated in the prior research (e.g. Walczuch et al., 2007; Lin et al., 2007).

Igbaria and Tan (1997) presents relationship of IT acceptance and individual impact, that was based on the theoretical perspectives of DeLone and McLean and conceptualization of Rogers (1983) of innovation. As it is shown in Figure 1, this model includes three variables of user satisfaction, system usage and individual impact. This model proposed that the degree of user satisfaction has a positive effect on the level of usage. Also user satisfaction and system usage effect on individual impact.

Figure 1. The impact of IT acceptance on individuals: A nomological net model.



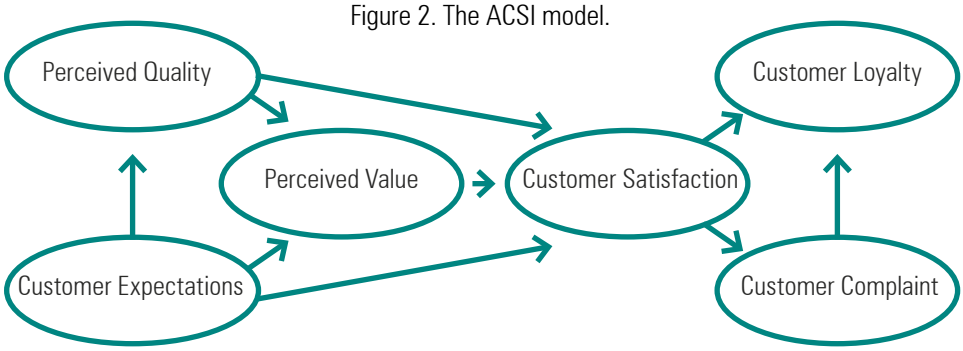
Source: Igbaria and Tan, 1997, p. 115.

Two variables of user satisfaction and system usage are frequently used for evaluation of IT success. Fishbein and Ajzen (1975) state that individual's attitudes play a vital role in the respective behavior. Some other researchers confirm the relation of user attitudes to their technology acceptance (Dillon and Morris, 1996; Venkatesh et al., 2003; Mun et al., 2006; Bhatti, 2007).

American Customer Satisfaction Index (ACSI)

The American Customer Satisfaction Index (ACSI) raised based on the Swedish Customer Satisfaction Barometer (SCSB), that successfully introduced in 1989 as a tool to assess the customer satisfaction (Fomell, 1992). The ACSI based on two theories of QSP (Quality, satisfaction and performance) and Hirschman's exit-voice theory (1970). This model measures the cause and effect relationship that drivers of satisfactions (customer expectations, perceived service quality, perceived value) are on the left side, satisfaction in the center and outcomes of satisfaction (customer complaints, customer loyalty) on the right side. (see Figure 2).

Figure 2. The ACSI model.



Source: http://www.theacsi.org/about-acsi/the-science-of-customer-satisfaction.

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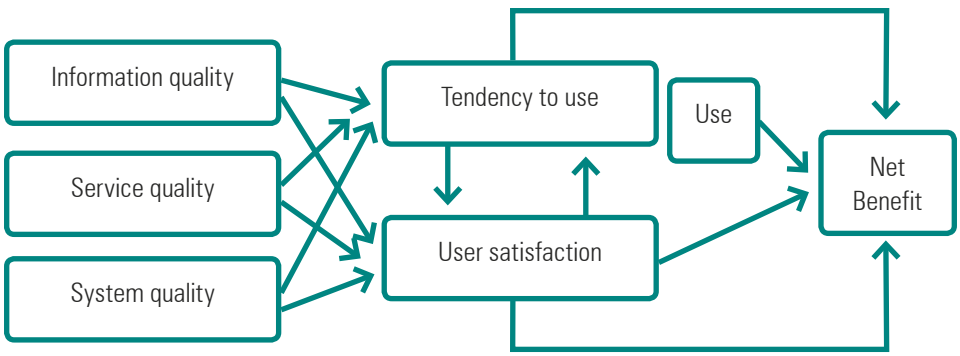
DeLone-McLean Model of Information Systems Success

Model of Information Systems Success of DeLone and McLean (2003) incorporates six elements of system quality, information quality, use, user satisfaction, individual impact, and organizational impact. Information quality (semantic level) and system quality (technical levels) are two key antecedents of user satisfaction. Information quality assessed by measuring information attributes and system quality assessed by measuring of ease of use (Doll & Torkzadeh, 1988; Rai & Welker, 2002). DeLone and McLean added service quality to the original model and identified it as an additional antecedent of user satisfaction. Figure 3 shows their model.

Figure 3. The updated version of DeLone-McLean success model, 2003.



Source: DeLone, W. H. & McLean, E. R., 2003, p. 24.

Factors affecting this model are defined as follows:

- Quality System: Adaptability, Availability, Reliability, Response Time, Usability
- Quality of Information: Completeness, Ease of Understanding, Personalization, Relevance, Security
- Service Quality: Assurance, Empathy, Responsiveness
- Use: Nature of Use, Number of Visits to the Sites, Number of On-Line Transactions
- User Satisfaction: Repeated Purchase, Repeated On-Line Purchase, Applied Survey
- Advantages: Cost Savings, Expansion of Markets, Additional Sales, Reduced Search Cost, Time Saving. (DeLone-McLean, 2003)

Studies in other countries

Three studies have been conducted regarding the evaluation of satisfaction rate of users of information systems in Azerbaijan, Malaysia and Taiwan.

Government of the Republic of Azerbaijan has undertaken a series of corrective actions to be linked with the global economy and enhance the quality of people's lives

including changes in the tax system that began in 2005. Using the Automated Tax Information System (ATIS) in 2006 could be considered as one of the achievements that led to the creation of an e-government initiative. Its main purpose is to provide an opportunity for taxpayers to fill out and submit their income tax returns via the Internet without having to go to the tax office. In the country's bid to the modernize the government, VAT and electronic invoices were introduced as a product since January 2010. As a result, taxpayers can send electronic invoices for sold products and provided services. For Satisfaction Evaluation, the first step should be providing services to assess knowledge and satisfaction. In the next stage, taxpayers should be aware of the existence of this service. The third step should be taken to evaluate the knowledge and satisfaction. And the final step is to improve the system with regard with the results of previous step. In the survey implemented in August-September 2010, Key parts of the final report on behalf of the selected areas were determined to check every service structure as follows: General Information Services, the level of understanding of the services, the differentiation of services and the level of public satisfaction, Recommendations for improving service. (Shikhaliyev,2011)

In 2006, the Malaysian Inland Revenue Board (MRIB)proposed the adoption of electronic forms as part of an e-government initiative. This was to happen in the context of customer to government relationship., Here, the users could fill out forms manually or electronically. Since then, electronic forms have been on the increase in Malaysia. However, the issues related to the quality of electronic services lead to user dissatisfaction. Although the number of e-forms has increased, the issue of user dissatisfaction discussed above impeded the achievement of the objectives for adopting electronic forms by up to 80%. Hence, considering the nature of the system quality is vital. This research is based on an updated version of the Delone- McLean model. Here the three factors of service quality, information quality and system quality have been considered in order to achieve information systems success, where the following results have been achieved: 1) the data quality has a direct relationship with the users' consent, 2) the existence of a quality system is directly related to user satisfaction, 3) Quality of service is directly related to the user satisfaction, 4) User satisfaction is directly related to the main perceived benefits (convenience) of users, 5) User satisfaction has a direct relationship to the main perceived benefits (efficiency) of users (Islam et al., 2012).

In Taiwan, the National Tax Administration (NTA) is responsible for collecting tax returns and the income tax returns are filled out in three ways namely: manually, electronically and via the usage of two-dimensional barcodes. Although, the use of barcodes is considered as an electronic method. Taiwan launched its on-line tax-filing system since 1998. The on-line tax-filing system reduced the costs of printing and distribution. The satisfaction of the users of the system is based on the usefulness of the system, in which, DeLone- McLean model is used. In this study, the information quality, system and service quality have been divided into the sub- factors as follow: 1) Information Quality: a) Informative, b) Accuracy; 2) System Quality: a) Access, b) Interactivity, c) Ease of use; 3) Service Quality: a) Responsiveness, b) Reliability, c) Empathy (Chen, 2010).

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METHODOLOGY

This study is an applied research. The aim of applied research is to develop the practical knowledge in a particular area. This study is a survey and is descriptive. Questionnaires were used to gather data from the taxpayers. These questionnaires contained information on the demographics of the respondents, general questions regarding the project and 24 questions measured with Likert scale of 5. The Likert scale ranged from totally agree to totally disagree. The questionnaire questions are reported in this study in blocks of factors: 2 for training,2 for respecting rights, 4 for facilities and perceived values, 5 for perceived quality, 3 for complaints and 5 for satisfaction. The questionnaire gathered the opinion of taxpayers with different types of personality. Demographically, on average, respondents reported 46.4 years of job experience. The most common levels of education were BA and MA. The most common age of the respondents was between 30-40 years old. The gender of respondents was reported as 37.1% women and 58.8% men. (See appendix).

SPSS 20.0 was used to analysis the data. Data analysis involved descriptive statistics for demographic information and inferential statistics to study the correlation coefficient between independent and dependent variables and linear regression. It has been used to test 11 hypotheses that were extracted from the theoretical framework.

Data Collection

The sample population of this research was selected from value added taxpayers in Tehran. The random sampling method was used for sampling. The five scale Likert questionnaire were distributed among the taxpayers at the Tehran Taxpaying services for 15 days. Since, the VAT system has greatly reduced the number of in-person refers, and many real taxpayers use internet café services, the number of respondents produced 150 questionnaires. After removing wrongly filled questionnaires, 102 questionnaires formed the sample of study. The questionnaire is attached in the appendix of the paper.

Theoretical Framework

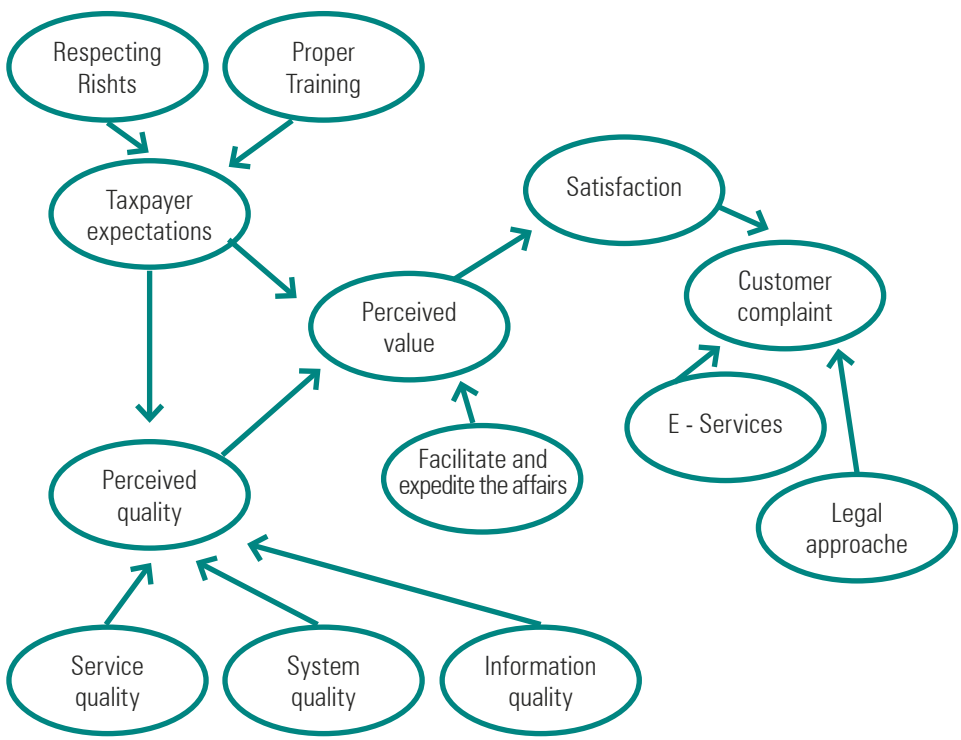
ACSI is the basis for this model. The variables: taxpayer exceptions, perceived quality, perceived value and satisfaction are extracted from this model with the difference that loyalty is not applicable for taxpayers, because there is no other alternative to compete with. Since perceived quality in the ACSI has an effect on Satisfaction and based on DeLone -McLean model information service and system quality is related to satisfaction, so we can extend the perceived quality on ASCI model to service quality, system quality and information quality. In other words, each of the three sections do have an impact on the perceived quality from user and consequently on its satisfaction.

Increasing awareness and knowledge is one of factors that was studied in Azerbaijan which has an effect on satisfaction and the acceptance system by users.

In this model, for increasing awareness, training was considered and the training has been named as one of the expectations from taxpayer. Especially, given that many users are advanced in age and are phrase not computer literate. Another user expectation is to respect for their rights. In some cases, may be due to system errors such as disruption of the Internet, the user wiped out part of the information. In this case, appropriate solutions must exist for respecting the rights of the users. On the other hand, the integrated tax systems; especially in the audit section, creates the need to establish a uniform procedure for the whole country. This will also prevent discrimination between taxpayers.

In the complaints section, attention has been drawn to two issues. The first complain is as result of the establishment of procedures and legal processes and may indirectly lead to dissatisfaction with the system. The second complain is specific to the system, such as system outages, sluggishness and the lack of confidence in the system which directly leads to the user dissatisfaction. Thus, the framework of this research is presented based on the following: expectations and perceived quality effect on the value perceived; the value perceived influences on the user satisfaction and that increased satisfaction will have an influence on the rate of compliant effectively.

Figure 4. Conceptual model of user acceptation of VAT system.



Source: Authors.

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Hypotheses

Eleven hypotheses were extracted to be tested:

- The user complaints on the rules and procedures has an impact on his/her dissatisfaction of the system.
- Facilitating and the quality of service provided by the system has an impact on user satisfaction of the system.
- Proper training has an impact on user satisfaction of the system.
- Respecting the rights of user has an impact on his/her satisfaction of the system.
- Information quality has an impact on user satisfaction of the system.
- Service quality has an impact on user satisfaction of the system.
- System quality has an impact on user satisfaction of the system.
- Meeting the perceived quality has an impact on user satisfaction of the system.
- Meeting the user expectations of the value-added tax system has an impact on user satisfaction of the system.
- Perceived value has an impact on user satisfaction of the system.
- Reduction of complaints increases user satisfaction of the system.

STATISTICAL ANALYSIS

In this section, the statistical analysis was presented by using SPSS software.

Table1. Evaluating the reliability of the research tools by the Cronbach's alpha measurement.

Research variables	Cronbach's alpha values
Proper training	0.935
Facilitate and expedite of the affairs	0.804
Respecting the right of	0715
Quality	0.813
Complaints of electronic services	0.703
Complaints of legal procedures	0.765

Source: Authors.

The Cronbach's alpha coefficients for all variables are higher than the significant level of 0.7; therefore, all variables have good reliability.

Data Analysis Techniques

SPSS software was used to analyze the data. Descriptive statistics involving central indicators and dispersion in the form of mean and standard deviation on one hand, and inferential statistics in the form of calculations of correlation coefficients and linear regression model on the other hand. Then, the standardized coefficient beta (β) has been used in the regression equations to determine the presence and power of corresponds in a given model.

Research Findings

The following information is obtained of all the respondents:

Table 2. Demographic information of respondents.

Frequency	Frequency percentage	Job experience
45	46.4	5-10 years
22	22.7	10-15 years
8	8.2	15-20 years
11	11.3	20-25 years
7	7.2	25-30 years
2	2.1	More than 30
Frequency	**Frequency percentage**	**gender**
57	58.8	male
36	37.1	female
Frequency	**Frequency percentage**	**Education**
11	11.3	diploma
19	19.6	associate degree
29	29.9	BA
28	28.9	MA
6	6.2	PhD
Frequency	**Frequency percentage**	**Age**
13	13.4	Under 20 years old
20	20.6	Between 20-30 years old
27	27.8	Between 30-40 years old
20	20.6	Between 40-50years old
10	10.3	Between 50-60 years old

Source: Authors

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Table 3 shows the mean and standard deviations values for independent variables.

Table 3. Descriptive statistics of independent variables.

Mean	Standard deviation	Independent variables	Research variables
2.8723	0.79360	User complaints of rules and processes	
3.4276	0.84147	Facilitate and expedite the affairs by the system	
3.0851	1.04119	Proper training	
3.6593	0.83737	Respecting the user rights	
3.1474	1.10095	Information quality	Dependent variable: the degree of user satisfaction
3.2234	1.10866	Service quality	
3.3511	1.02346	System quality	
3.1073	0.82827	Meeting the perceived quality	
3.5208	1.00503	Meeting user expectations	
3.0947	1.59227	Perceived value	
3.4869	1.09540	Complaint decrease	

Source: Authors

According to Table 4, it can be seen that the mean of the variable, user complaints of rules and procedures is 2.87; the mean of the variable, facilitation and expedition of the affairs by the system is 3.42; the mean of the variable, proper training is 3.08; the mean the variable, respecting the user rights is 3.65; the mean of the variable, the information quality is 3.14, the mean of the variable , service quality is 3.22; the mean of the variable, system quality is 3.35; the mean of the variable, meeting the perceived quality is 3.10; the mean of the variable, meeting user expectations is 3.52; the mean of the variable, perceived value is 3.09, and the mean of the variable, complaint decrease is 3.48.

In the table below, the correlation coefficient between independent and dependent variables of the study is examined.

Table 4. The correlation coefficient between independent and dependent variables.

Number	Level of significance	Correlation coefficient	Independent variables	Research variables
97	0.555	-0.63	user complaint of rules and processes	
97	0.000	0.484**	Facilitate and expedite the affairs by the system	
97	0.048	0.207*	Proper training	
97	0.000	0.417**	Respecting the user rights	
97	0.000	0.644**	Information quality	Dependent variable: The degree of user satisfaction
97	0.000	0.537**	Service quality	
97	0.000	0.472**	System quality	
97	0.000	0.744**	Meeting the perceived quality	
97	0.000	0.525**	Meeting user expectations	
97	0.000	0.458**	Perceived value	
97	0.000	0.599	Complaint decrease	

Source: Authors.

According to the table, there is a relationship at the significance level of 0.05 between the independent variables and dependent variables (except user complaints of rules and procedures that has the lowest correlation with the degree of user satisfactions; so, it was not significant) in all cases. Among the independent variables, the variable that indicates the meeting of the perceived quality with the correlation coefficient of 0.744 has the highest correlation with respect to user satisfaction. Likewise, the variable that indicates proper training has the lowest correlation with respect to user satisfaction.

As it was mentioned earlier, the linear regression model has been used to test the hypotheses. The level of significance of regression that is shown with beta standardized coefficient is considered as the basis of inference to display existence and the power of relations between variables in all the assumptions. Table 4 shows the results of hypotheses tests in the form of regression model.

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Table 5. Results of the research hypotheses tests in the form of regression analysis

Durbin-Watson statistic	β	F	R^2	Regression model first hypothesis		
1.531		0.035	0.004	Characteristics of the model	User satisfaction	
	3.441			Fixed value		
	-0.063			User complaints of rules and procedures		
Durbin-Watson statistic	**β**	**F**	**R^2**	**Regression model second hypothesis**	User satisfaction	Dependent variable
1.845		25.732	0.234	Characteristics of the model		
	1.155			Fixed value		
	0.484			Facilitate and expedite the affairs by system		
Durbin-Watson statistic	**β**	**F**	**R^2**	**Regression model third hypothesis**	User satisfaction	
1.543		4.108	0.043	Characteristics of the model		
	3.812			Fixed value		
	0.207			Proper training		
Durbin-Watson statistic	**β**	**F**	**R^2**	**Regression model fourth hypothesis**	User satisfaction	
1.713		18.562	0.174	Characteristics of the model		
	1.239			Fixed value		
	0.417			Respecting user rights		
Durbin-Watson statistic	**β**	**F**	**R^2**	**Regression model fifth hypothesis**	User satisfaction	
1.671		65.23	0.415	Characteristics of the model		
	1.277			Fixed value		
	0.644			Information quality		
Durbin-Watson statistic	**β**	**F**	**R2**	**Regression model sixth hypothesis**	User satisfaction	
1.798		36.931	0.289	Characteristics of the model		
	1.564			Fixed value		
	0.537			Service quality		

Table 5. Results of the research hypotheses tests in the form of regression analysis. Continued

Durbin-Watson statistic	β	F	R2	Regression model seventh hypothesis	User satisfaction	Dependent variable
1.541		26.059	0.223	Characteristics of the model		
	1.575			Fixed value		
	0.472			System quality		
Durbin-Watson statistic	**β**	**F**	**R2**	**Regression model eighth hypothesis**	User satisfaction	
1.903		103.877	0.523	Characteristics of the model		
	0.291			Fixed value		
Durbin-Watson statistic	**β**	**F**	**R2**	**Regression model ninth hypothesis**	User satisfaction	
1.502		35.408	0.276	Characteristics of the model		
	1.217			Fixed value		
	0.525			Meeting user expectations		
Durbin-Watson statistic	**β**	**F**	**R2**	**Regression model tenth hypothesis**	User satisfaction	
1.578		24.405	0.210	Characteristics of the model		
	1.790			Fixed value		
	0.458			Perceived quality		
Durbin-Watson statistic	**β**	**F**	**R2**	**Regression model eleventh hypothesis**	User satisfaction	
1.522		42.206	0.312	Characteristics of the model	User satisfaction	
	1.282			Fixed value		
	0.559			Complaints decrease		

Source: Authors.

First Hypothesis: User complaints of Rules and Procedures Impacts on User Satisfaction

The result of the first hypothesis**:** The modified coefficient of determination (R2) is 0.4% of the available variance in the user satisfaction variable. The standardized

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coefficient beta is not significant at 0.05 level for the variable of user complaints of the rules and procedures (β = -0.063). Accordingly, we reject the first hypothesis. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5 and there is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Second Hypothesis: Facilitate and Expedite Affairs by System Impacts on User Satisfaction

The result of the second hypothesis: As it is seen, the modified coefficient of determination (R2) explains 23.4% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for facilitating and expediting the affairs by the system's variable (β = 0.484). Accordingly, the second hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model.

The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Third Hypothesis: Proper Training Impacts on User Satisfaction

The result of the third hypothesis: The modified coefficient of determination (R2) explains 4.3% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for variable of proper training (β = 0.207). Accordingly, the third hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Fourth Hypothesis: Respecting User Rights Impacts on User Satisfaction

The result of the fourth hypothesis: The modified coefficient of determination (R2) explains 17.4% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for variable of respecting user rights (β = 0.417). Accordingly, the fourth hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Fifth Hypothesis: Information Quality Impacts on User Satisfaction

The result of the fifth hypothesis: The modified coefficient of determination (R2) explains 41.5% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for information quality variable (β = 0.644). Accordingly, the fifth hypothesis will be accepted. The results show that Durbin-

Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Sixth Hypothesis: Service Quality Impacts on User Satisfaction

The result of the sixth hypothesis: The modified coefficient of determination (R2) explains 28.9% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for service quality variable (β = 0.537). Accordingly, the sixth hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Seventh Hypothesis: System Quality Impacts on User Satisfaction

The result of the seventh hypothesis: The modified coefficient of determination (R2) explains 22.3% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for system quality variable (β = 0.472). Accordingly, the seventh hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Eighth Hypothesis: Meeting Perceived Quality Impacts on User Satisfaction

The result of the eighth hypothesis: The modified coefficient of determination (R2) explains 55.3% of the available variance in user satisfaction variable. The standardized coefficient beta) is significant at 0.05 level for meeting perceived quality variable (β = 0.744). Accordingly, the eighth hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Ninth Hypothesis: Meeting User Expectations Impacts on User Satisfaction

The result of the ninth hypothesis: The modified coefficient of determination (R2) explains 27.6% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for meeting user expectations variable (β = 0.525). Accordingly, the ninth hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

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Tenth Hypothesis: Perceived value Impacts on User Satisfaction

The result of the tenth hypothesis: The modified coefficient of determination (R2) explains 21% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for perceived value variable (β = 0.458). Accordingly, the tenth hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Eleventh Hypothesis: Complaints Decreasing Impacts on User Satisfaction

The result of the eleventh hypothesis: The modified coefficient of determination (R2) explains 31.2% of the available variance in user satisfaction variable. The standardized coefficient beta is significant at 0.05 level for complaint decrease variable (β = 0.559). Accordingly, the eleventh hypothesis will be accepted. The results show that Durbin-Watson statistic is ranged from 1.5 to 2.5. There is no strong autocorrelation between the errors of the regression model. The lack of autocorrelation between errors is accepted as one of the basic assumptions of the regression in the fitted model.

Totally, 10 hypotheses out of 11 research hypotheses are confirmed and one hypothesis is not confirmed. Also, satisfaction of the value added tax system was assessed at 63.79%.

CONCLUSION

With the emergence and spread of innovations in information technology, satisfying the users is a crucial factor in the success and the acceptance of technology. The more the level of satisfaction, the more the usage of electronic services, and it applies especially in e-governance services. This research contributes towards more knowledge on the acceptance of innovation by investigating taxpayers' satisfaction from the new installed value added tax system.

Since e-governance services are offered to citizens in the form of the electronic media, the quality of these service is investigated based on the DeLone-McLean model. In this model the quality of information systems is divided to three parts: quality systems, quality of service and quality of information; and all three parts impact on perceived quality in American satisfaction index. There is no concept of loyalty in the use of VAT electronic systems, because by law, the taxpayers must submit their tax return in the manner determined by the authorities in Organization of Tax Affairs.

The model examined for this study showed that complaints are considered from two perspectives: complaints about the electronic services and complaints arising from legal procedures. The former has an indirect impact on the user. While the latter has a direct impact on the user satisfaction. Data analysis showed that user dissatisfaction with procedures and tax laws do not affect the acceptance of VAT

electronic system and the hypothesis dealing with this issue was not confirmed. Moreover, it was found that the perceived value has a significant impact on user satisfaction. Also the perceived quality effects on perceived value and the user satisfaction, and the user satisfaction rate has an impact on complaint rate.

Finally, this model of satisfaction is recommended for consideration on the other information systems in future researches. Also it is suggested that the sample population be expanded to cover whole country. Since, the loyalty factor is not applied in this model, it is suggested that the systems with assessment on loyalty to be studied. At the end, it is suggested the model be reviewed and evaluated to identify factors contributing to acceptance of mobile applications as well.

MANAGERIAL APPLICATION

The following are recommended to IT managers and public authorities from the findings of the research:

- Perceived quality in information systems consisted of three parts. These are system quality, quality of information and quality of service. These three quality attributes should be considered and improved simultaneously.
- It is time-consuming for seniors and aging users to adopt new technology. So, free training courses as well as easy instructions are essential to enhance their ability to use the technology and increase their satisfaction. The setup of call centers can also be an effective solution.
- The introduction of new electronic systems, alongside existing poor infrastructure increases the chances of failure in the system. For this reason, it is important to consider measures and procedures that would not violent the user rights.

Paying attention to user complaints and resolving the issues will improve user satisfaction and increase system utilization.

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APPENDIX
Questionnaire

Row	Question	Very little	Little	Average	Much	Too much
1	Training course is required to use the VAT system.					
2	Guideline and additional explanations are essential for filling the necessary forms.					
3	VAT system leads to facilitate matters.					
4	VAT system leads to accelerate matters.					
5	Value added tax leads to transparency of information and can save time and money.					
6	VAT system results in availability of information.					
7	Similar procedures in VAT systems are required to maintain payers' rights.					
8	Similar procedures in VAT systems are necessary to prevent acts of tastes.					
9	A mechanism to protect the rights of payer is necessary in case of error in VAT system.					
10	VAT system is accessible, usable, reliable, and its response time is going to be appropriate.					

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APPENDIX
Questionnaire. Continued

Row	Question	Very little	Little	Average	Much	Too much
11	VAT system is safe, understandable and complete.					
12	VAT system is responsive and aligned.					
13	Quality of system of value added tax is appropriate.					
14	Quality of system of value added tax is in accordance with expectations.					
15	There are Problems and complaints in the implementation of legal and administrative procedures.					
16	Problems or complaints arise due to the VAT system using.					
17	Legal and administrative proceedings problems lead to dissatisfaction of the system of VAT.					
18	Benefits and value of VAT system are appropriate.					
19	What is the extent of your complaints and problems of VAT system?					
20	Perceived quality of system of value added tax is effective on the satisfaction of the system.					
21	Meeting user expectations of VAT system impacts on satisfaction of the system.					
22	Reducing complaints of VAT system will cause increasing user satisfaction.					
23	Your satisfaction is triggered by facilitating and expediting the affairs by the VAT system.					
24	What is the extent of your satisfaction of VAT system?					

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COMPETITIVE INTELLIGENCE AND DEVELOPING SUSTAINABLE COMPETITIVE ADVANTAGE

LA INTELIGENCIA COMPETITIVA Y EL DESARROLLO DE UNA VENTAJA COMPETITIVA SOSTENIBLE

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ABSTRACT

Privatization, partial tariff liberalization and entrance of foreign insurance companies in Iranian market pose serious challenges to domestic insurance companies. This paper discusses competitive intelligence as a means of gaining competitive advantage for insurance companies and seeks to study its effects on creation of sustainable competitive advantage. A sample of 123 middle and senior managers working in Iran Insurance Company in Tehran were surveyed. Data were collected via questionnaire and analyzed using Structural Equation Model (SEM) in PLS software. Results showed that competitive intelligence had a positive effect on creation of competitive advantage based on two sets of process and contextual factors, with the former exerting greater effect in this regard. It was concluded that companies were required to gain competitive advantage by establishing a strategic unit to collect, analyze and share intelligent information derived from internal and external environment.

KEYWORDS

Competitive intelligence; competitive advantage; insurance; Iran Insurance Co.; structural equation model.

RESUMEN

La privatización, la liberalización parcial de los aranceles y la entrada de empresas extranjeras de seguros en el mercado iraní plantea importantes desafíos para las empresas locales de seguros. Este artículo discute el caso de la inteligencia competitiva como un medio para ganar ventaja competitiva para las empresas de seguros y busca estudiar los efectos en la creación de ventaja competitiva sostenible. Se encuestó una muestra de 123 gerentes en posiciones medias y altas de la Iran Insurance Company en Teherán. La recolección de los datos se realizó a través de un cuestionario y fue analizada con el modelo de ecuaciones estructurales (SEM, por sus siglas en inglés) en el *software* PLS. Los resultados mostra-

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ron que la inteligencia competitiva tuvo un efecto positivo en la creación de ventaja competitiva basada en dos conjuntos de factores de procesos y contextuales, donde el primero tuvo en efecto mayor en este aspecto. Se concluyó que las compañías requirieron obtener ventaja competitiva al establecer una unidad estratégica para recolectar, analizar y compartir información inteligente derivada del ambiente interno y externo.

PALABRAS CLAVE
Inteligencia competitiva; ventaja competitiva; seguros; Iran Insurance Co.; modelo de ecuaciones estructurales

INTRODUCTION

In the 21st century, new types of organizations based on knowledge and networks have emerged in response to a complex, vague and changing environment characterized by indistinct organizational boundaries (Ahmad, 2015). Companies are faced with an increasingly competitive environment that makes it difficult to keep a sustained competitive advantage (Nenzhelele & Pellissier, 2014). To survive in such a marketplace, they must monitor business environment, gather intellectual information, and make proper and immediate decisions when encountering different opportunities and market threats to improve their performance compared to other competitors. Competitive intelligence (CI) is a strategic tool that allows organizations to achieve information in a systematic manner. CI is a process in which actionable intelligence is produced and published through planning, legal and ethical information gathering in the competitive environment, information processing and analysis to help decision making and develop competitive advantages in organization (Pellissier & Nenzhelele, 2013). In other words, this intelligence portrays a comprehensive image of current and future nature of competition in the marketplace for managers to make more informed decisions.

Recently, there has been a growing need for CI because organizations are continuously changing their services and marketing messages to maintain their successful performance. In today's unpredictable economy, companies resort to CI as a way of building and maintaining competitive edge. Insurance companies, which used to be oblivious of market research, have changed their outlook to include CI (Lanzoni & Marcus, 2004; Johns & Van Doren, 2010).

Insurance is one of the sectors contributing to economic growth. Insurance companies act as a source of risk management for enterprises and individuals. By providing protection, insurers can contribute to economic growth through channels of marginal productivity of capital, technological innovations and saving rate (Ćurak et al., 2009). In fact, economic growth is reflected in the soundness of a national insurance market (Han et al., 2010). In recent years, extensive measures have been taken to improve this industry in Iran, including privatization, tariff liberalization in some of insurance fields and encouragement of foreign companies to enter domestic market (Article 113 of Fifth Development Plan, p.137), which have changed the insurance industry and created a competitive marketplace in which companies are obliged to gain advantages over their competitors. Since foreign companies have great financial and experiential resources, technical power, and freedom in investing

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their resources, they wield great competitive power; therefore, if internal insurance companies fail to prepare and achieve sustainable competitive advantages, they would be unable to survive in this competitive marketplace (Mazloomi & Dadvand, 2011). In today's fast-changing business environment, innovation is a perquisite of retaining competition (Khajeheian and Tadayoni, 2016). Innovation is not simply the incorporation of new technologies into new products or services, but in many cases it involves finding new models of doing business in the face of change and opens up new opportunities (Khajeheian, 2016a). It often entails changing the rules of the game (Afuah, 2009). Service innovation has become essential for achieving a competitive advantage (Dörner et al., 2011).

Iran Insurance Co. is the only public insurance company which has been active in recent years. This insurance company has hold the greatest portfolio share in insurance industry market for a long time thanks to its wealth of experience (established in 1935), experienced managers, and absence of active insurance companies in Iranian market. However, a variety of factors such as elimination of state market monopoly, unhealthy competition, lack of employees' motivation in state-run companies compared to their counterparts in private companies, and growth of insurance companies have accelerated the decline of portfolio share of this company in recent years (Statistical Annals of Insurance, 2013).

According to Article 116 of the Fifth Development Plan, the monopoly of Iran Insurance Co. over the insurance of executive authorities was terminated. Also, according to Article 113, foreign insurance companies are allowed to forge partnership with internal insurance companies with the aim of developing a joint business insurance company in Iran and attracting foreign investments by domestic insurance companies, with priority given to private companies.

As a result of privatization, many private companies with enormous financial resources have been established without any affiliation with administrative bureaucracy, which grans them flexibility in employing skilled workforce. Moreover, liberalization of insurance tariffs has deteriorated the competitive environment of the insurance market. In other words, imposition of impractical tariffs for insurance has driven them towards attracting customer and increasing their portfolio share. Another important issue is lack of employees' motivation in state-run companies, which is mainly provoked by difference systems of job promotion, payments, and remuneration in state-run and private companies. Indeed, private insurance companies have more flexible systems for payments and remuneration compared to Iran Insurance Co. and the process of job promotion is faster in private companies.

Finally, considering the aforementioned issues and a host of other reasons, Iran Insurance Co. should compete with other domestic and even foreign insurance companies to regain its proper portfolio share and redeem the trust of insured entities covered by this company. Therefore, the main goal of this research is to explore the effect of competitive intelligence on creating sustainable competitive advantage in Iran Insurance Co.

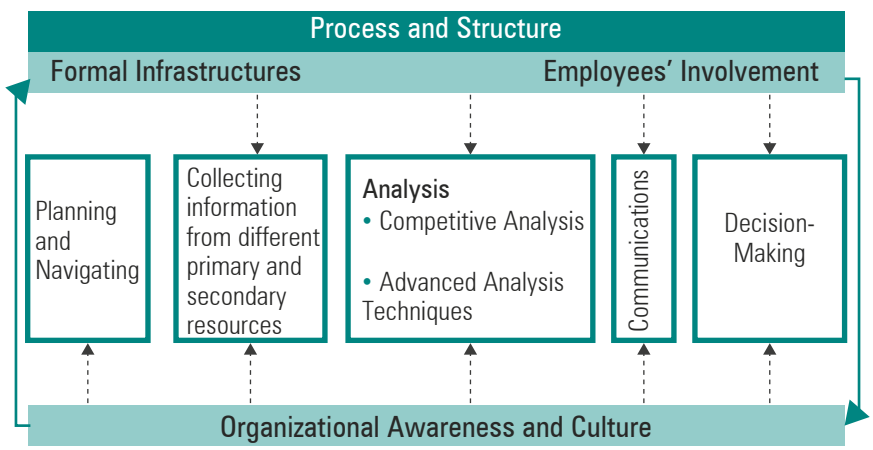
LITERATURE

Competitive intelligence: The concept of competitive intelligence dates back to 5000 years ago in China. One well-known early work in this area is "Art of War" by Sun Tzu, which was the base of military intelligence development (Calof & Wright, 2008).

Competitive intelligence refers to knowledge and foreknowledge of the entire business environment that may result in subsequent action (Sharp, 2009, p.15). It is a process which barely depends on dynamic and competitive situations in business environment; therefore, a variety of definitions have been proposed for this concept in literature (Brody, 2008). Some of these definitions are as follows: competitive intelligence is a process in which an organization collects information about competitors and competitive environment to be used in planning and decision makings related to performance improvement (Wright et al., 2009). According to Bulley et al. (2014), Kotler & Keller (2009), and Fleisher & Blenkhorn (2001), competitive intelligence is a process that improves planning and decision making through gaining information from competitors and industrial environment. Santo & Correia (2010) and Herring (1999) presented the same definitions but Herring (1999) focused on planning for gaining and collecting information to achieve competitive intelligence. Jones & Van Doren (2010) presented four main advantages for competitive intelligence in service-oriented businesses: differentiation, preparation of integrated marketing communication plan, pre-sale of ideas to target audiences, and creation of validity for the company.

Competitive intelligence process: Competitive intelligence or intelligent is a continuous integrated process (Bulley et al., 2014), which encompasses a number of activities, steps, and structures that need be implemented in a sequence (De Pelsmacker et al., 2005). The common stages of competitive intelligence process cited in many studies include focus and planning, collection, analysis, communication, process and structure, organizational awareness, and culture (Dishman & Calof, 2008; Saayman et al., 2008).

Figure 1. Competitive intelligence process.



Source: Dishman & Calof, 2008

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Focus and planning: In this stage, the organization specifies necessary information, their significance and validity period (Gilad & Gilad, 1985; Herring, 1999; Bose, 2008). In other words, an effective competitive intelligence process instead of gathering all possible information for organization or studying every purpose-related issue focuses on issues that are critical to senior managers (Gilad & Gilad, 1985; Herring, 1999).

Collecting Information: This stage involves identifying all potential information resources and their collection method including an analysis of environmental factors, telephone interviews, surveys, and observation of different Media and networks. Then, it is time to gather and study the data legally and ethically from all available resources (Bose, 2008; Dishman & Calof, 2008; Nasri, 2011). Also, resource selection depends on the type of data necessary information and factors such as cost, availability, ease of resource processing, and quality and quantity of information (Nasri, 2011).

Data analysis: This is the most important and challenging stage of the process as it demands great skills on the side of competitive intelligence team (Bose, 2008). This step also requires identification of patterns, communications, distributors, customers and competitors' affairs (Bose, 2008), interpretation and translation of raw data into organized and interpreted data to identify patterns, procedures, and mutual relationships with competitors (Miller, 2001).

Communications: In this step, the results of competitive intelligent are shared with all employees through various channels such as reports, e-mail, seminars, short notes, etc. (Fleisher & Blenkhorn, 2001). Moreover, this step entails the evaluation of competitive intelligence process, identification of advantages, and evaluation of effectiveness in decision-making process (Nasri, 2011). In other words, this stage provides feedbacks for improving intelligent process between decision-makers and intelligence team.

The objective of a competitive intelligence system is to help companies develop and sustain distinct competitive advantages by drawing on the organization's networks to develop actionable insights about various components of the business environment (West et al., 2015, p.81). Adopting to new environment and development of inter-firm linkages provides specific competitive advantages (Gonzalez-Perez and Velez-Ocampo, 2014, p. 535).

Competitive advantage: Nowadays, competitive advantage is vital for development and survival of a business in the market (Awuah & Gebrekidan, 2008). For most organizations, the Holy Grail is the successful attainment and retention of inimitable competitive advantage (Wright, 2013). Competitive advantage constitutes a key concept in strategy field discussed by Michael Porter. As early as 1980, it was referred to as "competitive strategy", but later it was replaced by "competitive advantage". Thus, identification of resources reflects a key issue in strategic management of companies (Barney, 1991).

The resource-oriented model of Hill & Jones (2009) discusses four factors that help development and maintenance of competitive advantage. Each of these factors

are derived from distinctive qualifications of the company. In fact, these are "general" distinctive qualifications of a company that allow the provision of more distinctive products tailored to customer's demands, and reduction of costs (Hill & Jones, 2009). The main dimensions of competitive advantage are:

- **Efficiency:** In broad sense of the word, efficiency refers to the ratio of output to input. Here, input is used to mean the force of insurance and management of issuing and compensations of insurance fields. Also, output refers to a company's services such as insurance and payment of compensations. In most companies, efficiency is measured through evaluating employees' productivity. This helps a company achieve competitive advantage through costs saving (Hill & Jones, 2009).

- **Quality:** There is no comprehensive definition for quality, but most researchers argue that quality is defined by customers, which is the satisfaction derived from buying insurance or obtaining compensation fee, and can improve the competitive edge of services (Reed et al., 2000).

Innovation: Hill & Jones (2009) assert that innovation is the art of creating a new process and product which encompasses product innovation and process innovation. Innovation is a key factor in achieving sustainable competitive advantage. Khajeheian (2014) explains innovation as a competence building factor, and Hill & Jones (2009) argue that Innovation gives unique advantages to companies that is inimitable by competitors.

- **Responsiveness to customers:** Customers are the core of a business (Alharthi, 2012). Therefore, high level of responsiveness requires a company to identify and fulfil customers, and as a result the perceived value of customers would bring competitive advantage for company. Customer satisfaction can be achieved through high quality, product innovation and personalized products and services for satisfying the unique demands of customers. This dimension results in loyalty (Hill & Jones, 2009).

Innovation: Innovation allows competitive operation of firms and their survival in markets (Khajeheian, 2013, 2016b). In a competitive environment, a natural strategy of revenue-maximization requires increasing market share either by cutting costs, improving productivity or devising and introducing other product-related advantages (Gonzalez-Perez & Gutierrez-Viana, 2012). Camisón & Villar-López (2011) found that different types of non-technical innovation promotes the achievement of sustained competitive advantage. Bowonder et al. (2010) posit that innovation strategy can help a company in three ways: exciting customers, outperforming competitors, and building a new product portfolio. They found that innovation strategies allowed leading global companies to dominate their markets, outperform competition through innovation, and create competitive advantages. Innovation is defined as products, processes and organizational changes that do not necessarily originate from new scientific discoveries, and may be the outcome of applying existing technologies to new contexts (Žižlavský, 2011). Innovations not only cover technical and technological changes and improvements, but also address specific practical applications that originate from research (Hana, 2013).

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Developing a conceptual model

Cory (1996) offered a guidance for the analysis of competitive intelligence activities. He first considered competitive intelligence activities as an important means of increasing efficiency and effectiveness of company's operations, and then based on 4 questions of "VIRO" resource-oriented model, determined whether "competitive intelligence was a valuable, scarce, and inimitable source", and "whether the company was able to get advantage from this source". Results of this research showed that all competitive intelligence activities did not yield sustainable competitive advantage. For example, activities such as data analysis are more probable to create sustainable competitive advantage whereas actions like storage and information protection are less likely to develop sustainable competitive advantage. Finally, he offered a discussion of how competitive intelligence activities developed competitive intelligence.

Auxiliadora do Nascimento Mélo & Dumke de Medeiros_(2007) developed a competitive intelligent system to improve management and modernize competitive market in Brazil. By reviewing the literature on intelligence, competitive intelligence system in health insurance companies, and quality of health services, they identified the main components of intelligence necessary for achieving competitive advantage. According to results, the designed model of this study could contribute to the survival of health insurance companies in Brazil by providing intelligent information and proper decision-makings under different circumstances.

Pellissier & Kruger (2011) studied the effect of strategic intelligence (business intelligence, competitive intelligence, and knowledge management) on identifying threats and opportunities in universal market, maintaining competition, and creating innovation and advantage for an organization. In this study, data were gathered through questionnaires distributed among 61 life insurance companies. According to findings, there were differences in intelligence strategies (competitive intelligence) of small and large organizations, but as a whole, intelligence strategy offered a proper framework for macro decision-makers.

Bulley et al. (2014) investigated the role of competitive intelligence in organizations, explored its intensity and complexity, and determined the importance of information gained through competitive intelligence of organization. This study adopted an explorative method and data was gathered by distributing questionnaires among 12 members of the research team and development unit of Ghana's XYZ Company. According to findings, this company had utilized formal and informal methods of producing intelligence information in R&D unit of XYZ Company, with most respondents believing that competitive intelligence played a critical role in their organization. Also, intelligence needs were identified by managers.

Rezaei Dolatabadi et al. (2011) developed a model that studied the effect of competitive intelligence and its components on competitive advantage of scientific companies in Isfahan, Iran. Data were gathered via questionnaires and analyzed by LISREL software. Results show that the application of a competitive intelligence plan

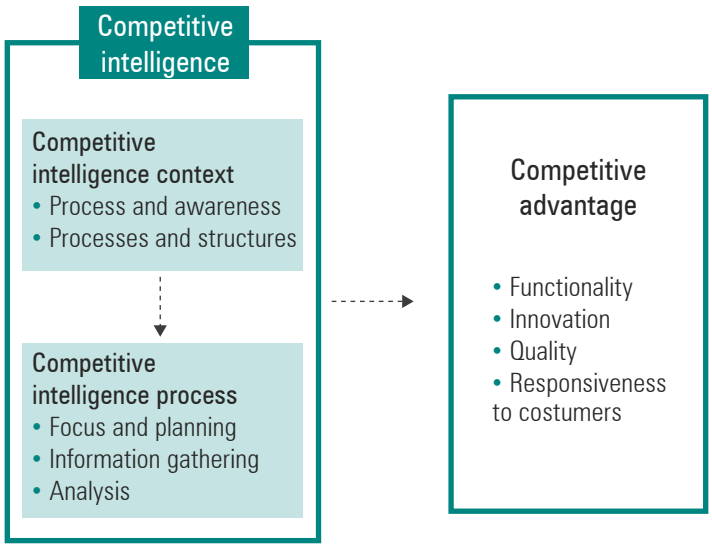
gave companies competitive advantage over their competitors and insured their survival. In other words, planning and focusing, collecting, analyzing, sharing and evaluating information improved the competitive power of company in achieving top positions in the market.

Nematizadeh et al. (2013) examined the effect of competitive intelligence in a descriptive study in which data was gathered via questionnaires distributed among 114 agents of Iran Insurance Co. in Kermanshah, Iran. Results revealed a significant relationship between competitive intelligence and insurance products sale in these agent companies. Agents also asserted that knowledge of competitors was integral to competitive intelligence.

Hamidzadeh et al. (2014), developed a dynamic competitive intelligence model to achieve sustainable competitive advantage in Insurance Industry during 2008-2013. They adopted a descriptive- explorative method in which data were gathered by distributing questionnaires among senior managers of Asia Insurance Company (central branches) of Tehran. In this study, the effective factors of competitive intelligence in Insurance Industry were described and confirmed. Results showed that managers were aware of competitive intelligence dimensions such a; employees› training, employees' communicative skills and loyalty to company, among others.

The conceptual model of this study integrates competitive intelligence model and competitive advantage model. In this mixed model, competitive intelligence directly affects competitive intelligence process and competitive intelligence process influence competitive advantage. Competitive intelligence model was adapted from Saayman et al. (2008) and competitive advantage model was derived from Hill and Jones' Strategic Management book (2009).

Figure 2. Conceptual Model.



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Based on the conceptual model, the following research questions were raised:

- **Main questions:**
  - * Does the competitive intelligence affect the development of competitive advantage in Iran Insurance Company?
- **Secondary questions:**
  - * Do contextual factors of competitive intelligence affect the development of competitive advantage in Iran Insurance Co.?
  - * Do process factors of competitive intelligence affect the creation of competitive advantage in Iran Insurance Co.?

METHOD

This is an applied research with a descriptive method of data collection. Also, the library method was used to gather information form the literature and theoretical bases, to design questionnaires, and to develop an initial model of research. The main data gathering instrument was self-administered questionnaire the validity and reliability of which were confirmed. Study population consisted of 180 operational, middle, and senior managers of Iran Insurance Co. in Tehran. Using non-experimental research sampling method and Cochran's formula, 123 participants were selected.

The questionnaire comprised of 65 items that included; demographic questions (5 items), competitive intelligence (36 items), and competitive advantage (24 items), which were scored on a 5-point Likert scale (strongly agree, agree, no idea, disagree, strongly disagree) and option "never, rarely, sometimes, often, and always" were scored 5, 4, 3, 2, 1, respectively. The content validity of questionnaire was confirmed by professors and its structural validity was evaluated through exploratory and confirmatory factor analysis. By focusing on internal consistency of items and based on Cronbach's alpha, the reliability of competitive intelligence (94.0%)and competitive advantages (89.0%)) was estimated. Results showed desirable reliability of scales. Also, the results of exploratory and confirmatory factor analysis confirmed the convergent and divergent validity of the questionnaire. Therefore, it is safe to assume the acceptable validity of the questionnaire. Furthermore, average test of population, Pearson correlation coefficient, and Kolmogorov-Smirnov test were used for data analysis and the relationship between variables was evaluated through structural equations and smart PLS software.

DATA ANALYSIS

In this section, demographic of respondents such as age, organizational unit, level of education, major, position and experience of organizational activity are presented. According to results, 23.64% of managers were majored in management. 22% worked in staff units (planning and budget unit, training unit, research and development unit, etc.) and 5.75% had 11-40 years job experience. Also, more than 5.89% of respondents had a university degree (2.51% had BA and 3.38% MA and PhD) and 5.54% were 35-45 years old. Generally, most respondents were educated with high job experience, which

helped them understand the goals of insurance company and answer questions. At first, to investigate study variables such as competitive intelligence and competitive advantage, Kolmogorov-Smirnov test was used. According to results, all dimensions had normal distribution except for communications (Table 1). Therefore, parametric statistical tests can be used to answer research questions.

Table1. Results of Kolmogorov-Smirnov test for each variable.

Variables	No	Average	Variance	Sig	Results
Competitive intelligence	123	2.90	0.601	0.813	Normal
Competitive advantage	123	2.88	0.552	0.997	Normal
Awareness and culture	123	2.93	0.773	0.512	Normal
Structure and process	123	2.86	1.04	0.342	Normal
Focus and planning	123	2.71	0.856	0.281	Normal
Information collecting	123	2.84	0.854	0.169	Normal
Analysis	123	2.85	0.894	0.51	Normal
Communications	123	3.27	0.708	0.032	Abnormal
Functionality	123	2.1688	0.823	0.409	Normal
Quality	123	2.46	0.907	0.330	Normal
Innovation	123	3.01	0.927	0.259	Normal
Responsiveness	123	3.16	0.825	0.569	Normal

One-sample t-test was used to examine each variable. Considering the 5-point Likert scale, the null hypothesis in all research variables was:

$H0: \mu=3$

$H1: \mu\neq3$

Table 2. Research variables in statistical population.

Variables	No	Average	Variance	Variance error
Competitive intelligence	123	2.90	0.601	0.054
Competitive advantage	123	2.88	0.552	0.049
Awareness and culture	123	2.93	0.773	0.069
Structure and process	123	2.86	1.04	0.094

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Table 2. Research variables in statistical population.Continued

Variables	No	Average	Variance	Variance error
Focus and planning	123	2.71	0.856	0.077
Information colleting	123	2.84	0.854	0.077
Analysis	123	2.85	0.894	0.08
Communications	123	3.27	0.708	0.063
Functionality	123	2.1688	0.823	0.074
Quality	123	2.46	0.907	0.081
Innovation	123	3.01	0.927	0.083
Responsiveness	123	3.16	0.825-	0.074

Sample scores and results of one-sample t-test are shown in Table 3 & 4.

Table 3. Dimensions of research variables.

Variables	Variable results	Confirmed hypothesis
Competitive intelligence	Equal	H0
Competitive advantage	Lower	H1
Awareness and culture	Equal	H0
Structure and process	Equal	H0
Focus and planning	Lower	H1
Information collecting	Lower	H1
Analysis	Equal	H1
Communications	More	H0
Functionality	Equal	H0
Quality	Lower	H1
Innovation	Equal	H0
Responsiveness	More	H1

Table 4. One-sample t–test of research variables.

Variables	Test value=3					
	T	Df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					lower	Upper
Competitive intelligence	-1.676	122	0.096	-0.09085	-0.1982	0.0165
Competitive advantage	-2.389	122	0.018	-0.119048	-0.21769	-0.02041
Awareness and culture	-1.002	122	0.318	-0.069919	-0.20803	0.06819
Structure and process	-1.459	122	0.147	-0.137195	-0.032337	0.04898
Focus and planning	-3.705	122	0.000	-0.286179	-0.43908	-0.13327
Information collecting	-2.005	122	0.047	-0.154472	-0.30698	-0.00196
Analysis	-1.815	122	0.072	-0.146341	-0.030593	0.01325
Communications	4.293	122	0.000	0.274390	0.014786	0.40092
Functionality	-1.611	122	0.110	-0.0119628	-0.26667	0.02741
Quality	-6.558	122	0.000	-0536585	-0.69856	-0.37461
Innovation	0.208	122	0.835	0.017422	-0.14808	0.18292
Responsiveness	2.185	122	0.031	0.0162602	0.01525	0.30995

According to results, variables and the dimensions were on average satisfactory. It is estimated that less than 3 in some cases and it is estimated more than 3 in other cases, the variance extent is not sufficient to say it is good or not good.

Pearson correlation test. As shown in Table 5, there is a significant relationship between variables.

Table 5. Results of correlation test for main variables.

Variables	Competitive advantage	Contextual factors of competitive intelligence	Process factors of competitive intelligence
Competitive advantage	1	-	-
Contextual factors of competitive intelligence	0.6786	1	-
Process factors of competitive intelligence	0.7136	0.5751	1
Significant level of 0.01			

Test of model. Figure 3 and 4 show the structural equation model related to

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secondary questions of research at two standard and significant levels where contextual factors (CF) and process factors (PF) variables were considered as endogenous latent and exogenous latent respectively.

Figure 3. Main model in standard coefficients level.

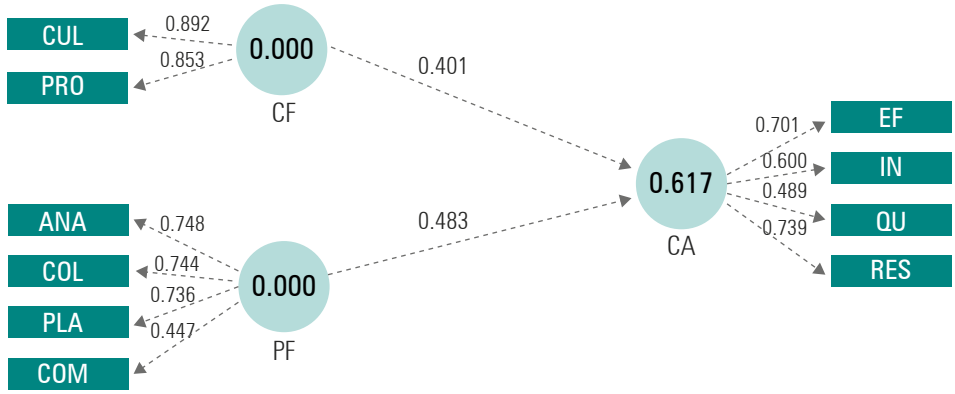
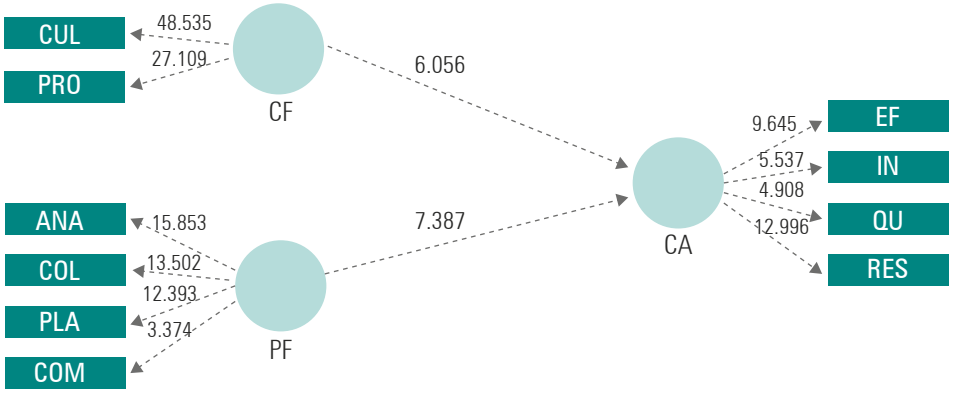


Figure 4. Main model in the significant level.



The results of path analysis of secondary questions are shown in Table 6.

Table 6. Results of path analysis for main research hypotheses.

Questions	Relationship in conceptual model	Characteristic	Path effect coefficient	T-value	Result
2	Contextual factors on competitive intelligence	CF-CA	0.401	6.066	YES
3	Process factors on competitive intelligence	PF-CA	0.483	7.387	YES

To evaluate the model of study, smart PLS software was used. Bootstrap non-parametric test (Tenenhaus et al., 2005) with a frequency of 300 was used for evaluating standard errors and answering questions. For the evaluation of structural model, the significant factor Z (T-value), R^2 and Q^2 criterion of structural model were evaluated. All criteria were at a significant level (Table 7).

Table 7. Model fitness for structural hypothesis.

Anticipant variable	Criterion variable	Path effect coefficient	T-value	R2	Q2
Contextual factors	Competitive advantage	0.401	6.066	0.617	0.761
Process factors	Competitive advantage	0.483	7.387	0.617	0.461

General model fitness. The general model included both measurement and structural models. In path modelling of PLS, there was no criterion for evaluating the entire model. Nevertheless, a general criterion proposed by Tenenhaus et al. (2005) for goodness of fitness was used for anticipating the general model performance. Geometric mean of statistical communality and R^2 average were employed to measure this criterion. As shown in Table 8, the statistical population that confirmed suitability of model was greater than 0.5. The acceptable level of statistical population was greater than 0.5 (Table 8).

Table 8. The extracted variance average.

Variables	Indices	AVE	R^2
Competitive advantage	CA	0.519	0.617
Contextual factors of competitive intelligence	CF	0.76	-
Process factors of competitive intelligence	PF	0.563	-

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$GOF=\sqrt{\overline{communality} \times \overline{R^2}}$

Communality= (563.0+ 76.0+ 519.0)/3

R2= 617.0

The communality average (386.0), R2 average (617.0) and goodness of fitness index (448.0) were evaluated. This value is greater than the threshold of 36.0 for the value of R2 effect (Cohen, 1988). Thus, it can be said that the model under study had desirable anticipation power compared to other threshold values (small goodness of fitness (1.0), average goodness of fitness (25.0), and big goodness of fitness (36.0)). Therefore, the results confirmed the general validity of the model.

Answering the main research questions. Before testing the model, the correlation of variables were evaluated with the results reflecting a strong relationship between competitive intelligence and competitive advantage (Table 9).

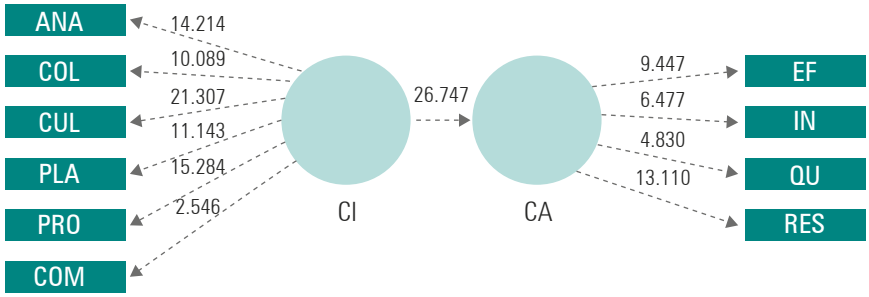
Table 9. Correlation matrix of main variables.

Variables	Competitive intelligence	Competitive advantage
Competitive intelligence	1	-
Competitive advantage	0.785	1

Figure 5 and 6 show the structural equation model related to main research question at two levels of standard and significant where competitive intelligence (CI) was exogenous latent variable and competitive advantage (CA) was endogenous latent variable.

Figure 5. Main model at the standard level.

Figure 6. Main model at the significant level.



Path analysis result of main question of research is shown in Table 10.

Table 10. Path analysis of main question.

Question	Relationship in model	Indices	Path effect coefficient	Result
1	Competitive intelligence on competitive advantage	CI-CA	0.785	yes

Results of evaluating the structural model fitness, Z significant factor (T-value), R2, and Q2 criteria are shown in Table 11. As can be seen, all criteria were at the acceptable level. Also, as shown in Table 12, GOF was used to evaluate model goodness of fitness.

Table 11. Model fitness of structural hypothesis.

Predictive variable	Criterion variable	Path effect coefficient	T-value	R2	Q2
Competitive intelligence	Competitive advantage	0.785	27.721	0.617	0.251

Table 12. Extracted variance average.

Variables	Indices	AVE
Competitive intelligence	CI	0.544
Competitive advantage	CA	0.509

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The communality average (526.0), R2 average (617.0) and consequently GOF (7.0) were estimated. This value was greater than the threshold (36.0) regarding the effect of R2 value (Cohen, 1988). It can be said that the studied model had desirable anticipation power compared to other threshold values. The results confirmed overall validity of the general model. Table 13 summarizes research results.

Table 13. Overall results.

Questions	Relationship in model	Indices	Path effect coefficient	T-value	Results
1	Contextual factors on Competitive advantage	CF-CA	0.401	6.339	YES
2	Process factors on Competitive advantage	PF-CA	0.483	7.234	YES
3	Awareness and culture effect on competitive advantage	CUL-CA	0.325	4.944	YES
4	Structure and process effect on competitive advantage	PR-CA	0.179	2.717	YES
5	Focus and planning effect on competitive advantage	PLA-CA	0.063	0.99	NO
6	Information collection effect on competitive advantage	COL-CA	0.298	4.38	YES
7	Analysis effect on competitive advantage	ANA-CA	0.192	2.617	YES
8	Communications effect on competitive advantage	COM-CA	0.086	1.182	NO
9	Competitive intelligence on competitive advantage	CI-CA	0.785	26.744	YES

CONCLUSION AND SUGGESTIONS

Results show the effect of competitive intelligence on developing competitive advantage. It means that managers of Iran Insurance Company believe in the fact that competitive advantage can serve as a tool of achieving competitive advantage in insurance industry. By discovering new opportunities and threats, this intelligence acts as a radar that enables the company to identify the environment carefully and promptly (Rezaeian & Lashkar Bolooki, 2010). These findings are consistent with the literature (Cory, 1996; Ghannay & Mamlouk, 2012; Pellissier & Nenzhelele, 2013; Rezaei Dolatabadi et al., 2011). In other words, focus and planning, collecting, analyzing, sharing, and evaluating information would reinforce the company's competitive power for achieving a top position in the market. Also, as noted in

the literature, competitive intelligence functions and objectives of the company include maintaining and developing distinctive competitive advantages of company (Dishman & Calof, 2008), promoting the company's competitiveness (Johns & Van Doren, 2010), informing top-level decision-makings (Pellissier & Nenzhelele, 2013), facilitating the understanding of customers, regulators, and competitors and creating new opportunities (Nasri, 2011). Similar to the results of this research, contextual factors such as awareness, culture, structure, and process can influence developing competitive advantage in Iran Insurance Company, with factors of awareness and culture exerting the greatest effect. This results are in agreement with those of Hamidzadeh, et al. (2014) regarding the case of Asia Insurance Co.. Process factors such as focus and planning, information gathering, analysis, and communication also affect competitive advantage in Iran Insurance Co., with information gathering leaving the greatest effect. Not all competitive intelligence activities do result in sustainable advantage, as reflected in the results of Cory (1996). The study of Rezaei Dolatabadi et al. (2011) in Iran showed that information gathering had the greatest effect and information sharing the information had the lowest effect on creating competitive advantage.

Also, results suggested that competitive intelligence could bring about competitive advantage in Iran Insurance Co. Therefore, senior managers of Iran Insurance Co. are recommended to not only rely on the precedent of company's activity and its government affiliation, but anticipate and implement an ethical and codified plan to gain information about internal, external, and industry environment at the strategic level by developing a separate unit with professional and trained workforce in the organization for collecting such information. Results also show that planning and focus in Iran Insurance Co. do not have any effect on competitive advantage, but as shown in the literature, planning and focus are critical to competitive intelligence process and can increase effectiveness of competitive intelligence plan. Therefore, it is suggested that Iran Insurance Co. mainly focuses on this stage using key planners and decision- makers in competitive intelligence team.

On the other hand, information analysis is one of the most important and challenging stages of intelligence process, which is highly dependent on high skills of competitive intelligence team. Managers are advised to use professional internal and external analysts in their team. According to results, information sharing does not have any effect on competitive advantage in Iran Insurance Co. Therefore, it is suggested to reinforce informal relations and knowledge management, because in addition to sharing the results of intelligence, this stage allows an analysis of intelligence plan and its effectiveness.

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SUSTAINABLE AND FLEXIBLE HUMAN RESOURCE MANAGEMENT FOR INNOVATIVE ORGANIZATIONS

LA GESTIÓN SOSTENIBLE Y FLEXIBLE DEL RECURSO HUMANO EN LAS ORGANIZACIONES INNOVADORAS

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ABSTRACT

In response to the changes in economies and technology in recent decades, research in organizational theories have been focused toward innovative and entrepreneurial organizations. A research issue in this evolving research endeavor is adaptation of human resource management and the establishment of a sustainable human resource management. This paper investigates the main characteristics of a sustainable HRM in innovative organizations. The aim is to identify sustainable HRM as a key toward competing in turbulent markets. The problem statement is to find the relationship between psychological capital, HR flexibility and sustainable HRM in innovative organizations. Three main variables of HR flexibility, HR sustainability and psychological capital form the theoretical model of this study; and four hypotheses are developed based on this model. Findings do not reject any of four hypotheses, so it is concluded that psychological capital and HR flexibility has positive and meaningful effect on sustainable HRM; and in addition, psychological capital has positive and meaningful effect on sustainable HRM. Moreover, flexibility has moderate role in relationship between psychological capital and sustainable HRM.

KEYWORDS

Innovative Organization; Sustainability; Psychological Capital; Flexibility; Human resource management.

RESUMEN

En respuesta a los cambios en las economías y la tecnología en las décadas recientes, la investigación en las teorías organizacionales ha estado enfocada en las empresas innovadoras y emprendedoras. Un tema de exploración en estos esfuerzos por una investigación cambiante se trata de la adaptación de la gestión del recurso humano (GRH) y el establecimiento de una gestión sostenible del recurso humano (GRH sostenible). Este artículo investiga las principales características de la GRH en las organizaciones innovadoras. El objetivo es identificar la GRH sostenible como clave para competir en mercados turbulentos. El problema planteado radica en encontrar la relación entre el capital psicológico y la flexibilidad en los recursos humanos y la GRH sostenible en organizaciones innovadoras. Tres importantes variables de la flexibilidad de los recursos humanos, la sostenibilidad de los recursos humanos y el capital psicológico forman el modelo teórico de este estudio; y se desarrollan cuatro hipótesis basadas en este modelo.

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Los hallazgos no rechazan ninguna de las cuatro hipótesis, por lo cual se concluye que el capital psicológico y la flexibilidad en los recursos humanos tienen un efecto positivo y significativo en la GRH sostenible, y adicionalmente, el capital psicológico tiene un efecto positivo y significativo en la GRH sostenible. Además, la flexibilidad desempeña un rol moderado en la relación entre capital psicológico y la GRH sostenible.

PALABRAS CLAVE
Organización innovadora; Sostenibilidad; Capital psicológico; Flexibilidad; Gestión del Recurso Humano.

INTRODUCTION

The concept of sustainability has evolved over the past three decades (Kramar, 2014) and has been an essential theme for business (Le Roux and Pretorius, 2016). But the full potential of the concept for HRM is yet to be revealed (Ehnert, 2009; Ehnert, 2012). This concept is related to treat with human resources (Ehnert et al., 2016) and for a long time has been one of the important subjects in the field of management.

Innovation, from the other hand, is a fundamental factor success of firms and organizations (Fraj et al, 2015; Mahmoud, et al, 2016). Innovation is a fundamental factor in the creation of new ventures (Khajeheian, 2013) and it allows existing companies to survive in competitive markets (Khajeheian, 2016; Khajeheian and Tadayoni, 2016). The more innovative a product/service is, the more complexity and the less risk of imitation by rivals there will be (Emami and Dimov, 2016). And to be innovative, "the organizations have to understand the importance of investing in human resources; training talent and professionals to think and act innovatively; to pose positive psychological capabilities; and to present a highest sense of authenticity in order to contribute to the achievement of the organizational objectives" (Toor et al, 2009). Zarraga-Rodriguez and Alvarez (2015) and van Kerkhoff and Szlezak (2016) Implied on success of innovative organizations. McGuirk et al (2015) showed the importance of innovative HRM on success and performace of small firms. Fay et al (2015) showed the moderating role of HRM on innovative organizations. For this purpose, innovative organizations must develop positive psychological capacities among their employees, both leaders and followers (Toor et al, 2009). George and Zakkariya (2015) implied on the importance of flexibility in the innovativeness of organizations when markets are sutured. Findings of Kiron et al (2012) showed that 67% of respondents among 2800 managers and executives, believe that sustainability is a critical issue for organizations' competitive advantage in competitive markets and 70% of them treat the issue of sustainability as a key factor of their management. Considering the abovementioned findings, this research investigates how human resource management in innovative organizations may benefit from psychological capital and the flexibility of human resources.

LITERATURE REVIEW

Sustainability has been a "hot topic" (Wilkinson, 2005) and "a mantra of the 21st Century" (Dyllick & Hockerts, 2002) and this term has been used as a synonym

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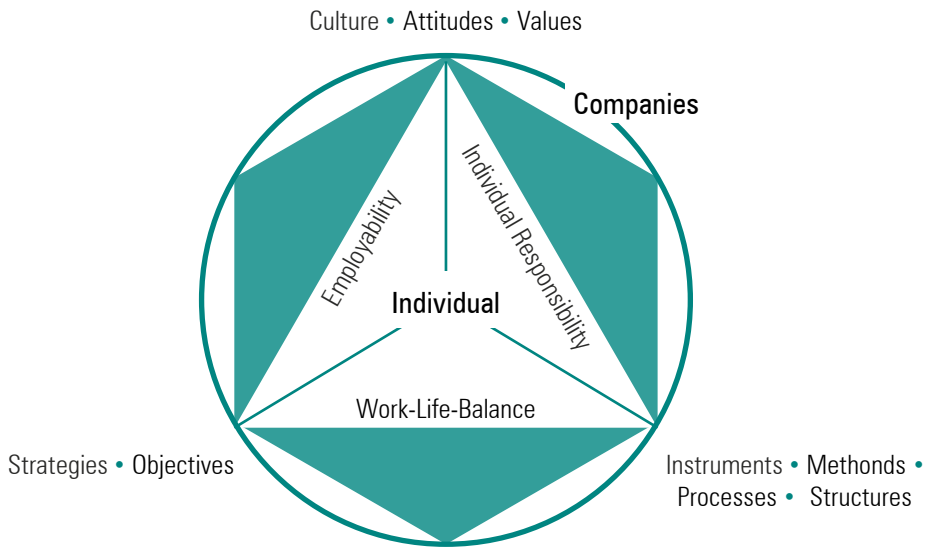
for concepts such as: "long-term", "durable", "sound" or "systematic" (Leal Filho, 2000). Employees are one of stakeholders of corporates and part of the corporate responsibility is addressed to them (Gonzalez Perez and McDonough 2005) Different training and experiences among managers result in the change in approaches toward human resource management regarding how to manage organizational assets in order to achieve organizational performance (Jerome, 2013).

The present study is based on conceptual model of Zaugg et al, 2001). This conceptual model has three objectives: to increase the employability of the employees; to enhance individual responsibility by using participatory management models; and to harmonize work-life balance. This model has shown in figure 1.

Figure 1. Sustainable human resource management aspects.

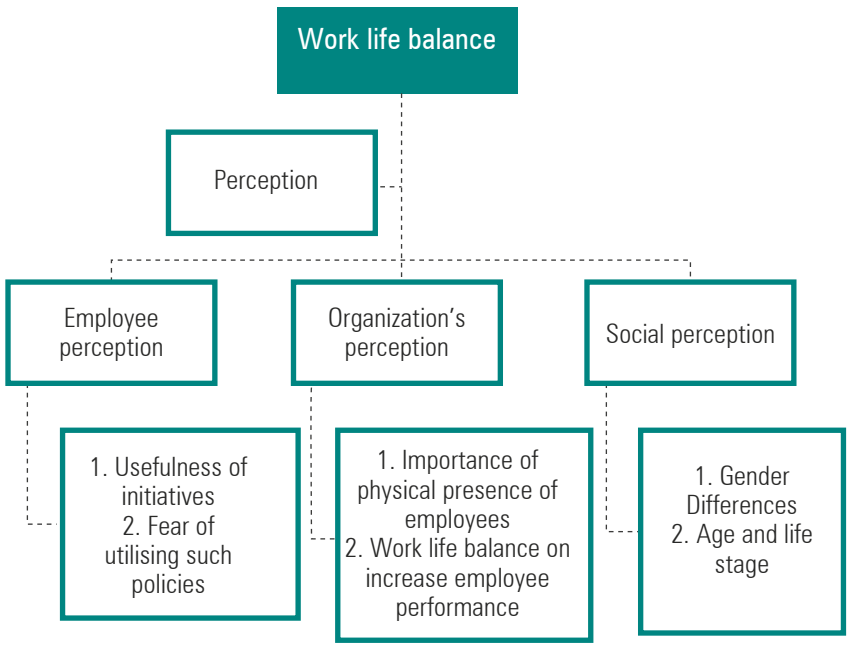


Source: Zaugg et al., 2001.

Theories of Work-Life Balance

Dave and Purohit (2016) proposed a framework about the three different types of perceptions about the direct effects of the work-life balance as well as the work life policies of an organization. These three types have been identified as individual perception, organizational perception and social perception. They found that a greater sense of control over work and family schedules, make individuals mentally fit, thus the individual's perception affects their work-life balance. Organizations with fit of attitudes and perception take benefit of loyal and committed employees.

Figure 2. Work-life balance framework.

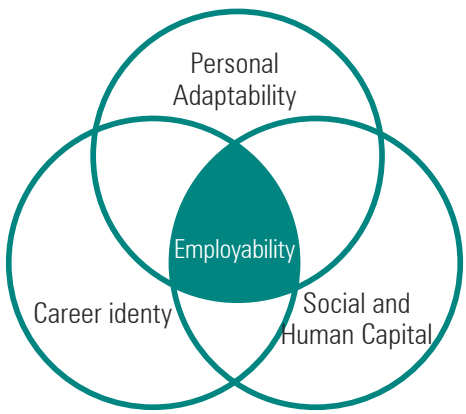


Source: Dave and Purohit, 2016, p. 100.

Foundations of employability

Fugate et. al (2004) explained employability as "a form of work specific active adaptability that enables workers to identify and realize career opportunities". Based on their explanation, "an individual is employable to the extent that he or she can parlay person factors effectively to negotiate environmental demands" (p. 16). Such relationship has shown in figure 3.

Figure 3. Heuristic model of employability.



Source: Fugate, 2004, p. 19.

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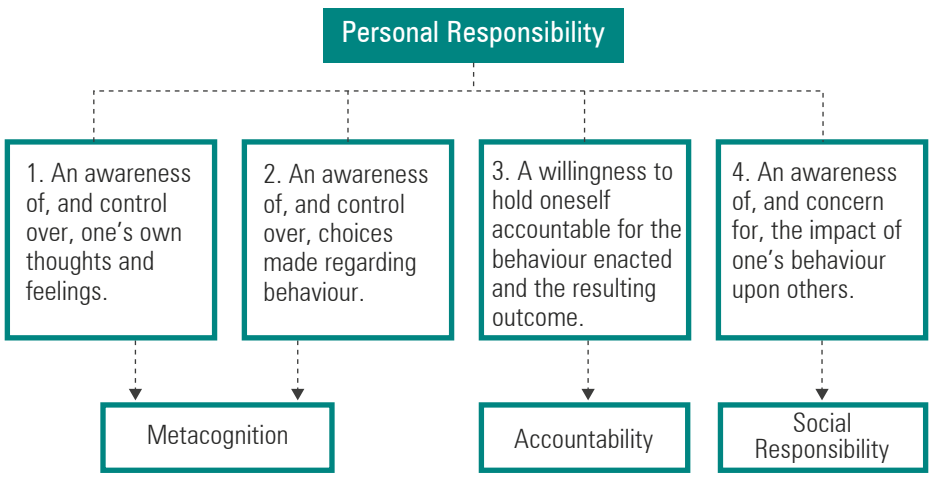
Personal responsibility

By Mergler (2007), Personal responsibility has four components: Control over thoughts and feelings; (2) Control over choices made regarding behaviors; (3) Control over the impact of one's behavior upon others and 4) being accountable for the enacted behavior and the resulting outcome;" (Mergler, 2007).

Figure 4. Four component and three subsections of personal responsibility variable.



Source: Mergler, 2007, p. 67.

HR Flexibility

Many researches have shown the importance of HR flexibility (Akingbola, 2013; Chang at al., 2013; Bal and De Lang, 2015; Zhang et al, 2015). Wright and Snell (1998) theorized that "HR flexibility is an internal trait or characteristic of the firm that can be addressed through three conceptual components: employee skills, employee behavior, and HR practices". Flexibility of employee skills is the "number of potential alternative uses to which employee skills can be applied" (p764) and "How individuals with different skills can be redeployed quickly" (p765). "Employee behavior flexibility represents adaptable as opposed to routine behaviors; it is the extent to which employees possess a broad repertoire of behavioral scripts that can be adapted to situation-specific demands. Flexibility of HR practices is the extent to which the Firm's HR practices can be adapted and applied across a variety of situations, or across various sites or units of the firm, and the speed with which these adaptations and applications can be made" (Bhattacharya et al, 2005, p. 24), develop the flexibility of such resources so that individuals can have the motivation and the capacity to dedicate their efforts to both exploitative and exploratory activities (Lepak et al., 2003; Úbeda-García et al., 2016).

Psychological Capital

Psychological capital is the assemblage and the simultaneous presence of four component positive psychological resources. While each can stand on its own merits, it is when they are all present and linked together that they can provide an insight into individual satisfaction and the potential for improved performance. It is this simultaneous composite presence of the individual elements that makes it a higher-order construct (Luthans et al., 2007). The individual psychological elements of psychological capital are hope, efficacy, resilience, and optimism (Ibid). Each of those needs to be considered independently in order to understand the composite higher-order construct. Hope is the sense of individual agency, or control, to work toward one's goals, and it is the first element (Snyder, 2000). The second element is self-efficacy, the sense that one has the capacity to put forward the effort to achieve a goal (Bandura & Locke, 2003). The third element is resilience, characterized as one's positive ability to cope with adversity or stress often found in conflicts or failures, the idea being that I can bounce back to attain success when faced with deep adversity or challenge (Masten and Reed, 2002). The final attribute is optimism.

Optimism, is the sense that one can succeed both now and in the future and is based in the concept that positive events are internal, fixed, and have a global sense is the third component of the construct (Levene, 2015).

Figure 5. Conceptual Model.

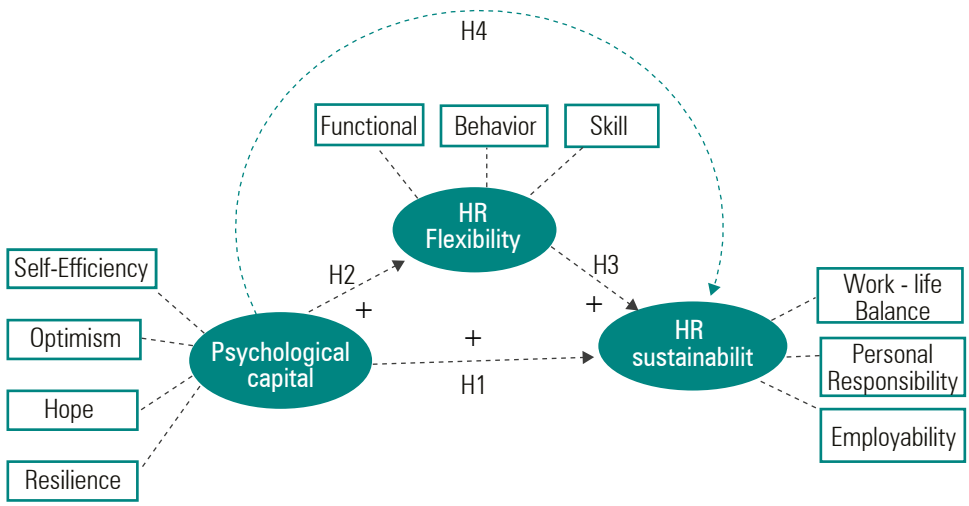


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Table 1. Research Hypotheses.

Hypothesis 1	Psychological capital has positive and meaningful effect on HRM sustainability.
Hypothesis 2	Psychological capital has positive and meaningful effect on HR flexibility.
Hypothesis 3	Flexibility has positive and meaningful effect on HRM sustainability.
Hypothesis 4	Flexibility has moderate role in relationship between psychological capital and HRM sustainability.

METHODOLOGY

The overall objective of the research was to identify and analyze the relationship between psychological capital with HR flexibility, and relationship between HR flexibility with HR sustainability. This study was aimed of identifying and understanding whether psychological capital has effects on HR sustainability or not? The authors tried to discover relevance between sustainability and psychological capital with flexibility as the moderate role. And after this process, their target was to check for the effective factors on sustainable human resource. This research survey was conducted with questionnaires.

THE RESEARCH SAMPLE

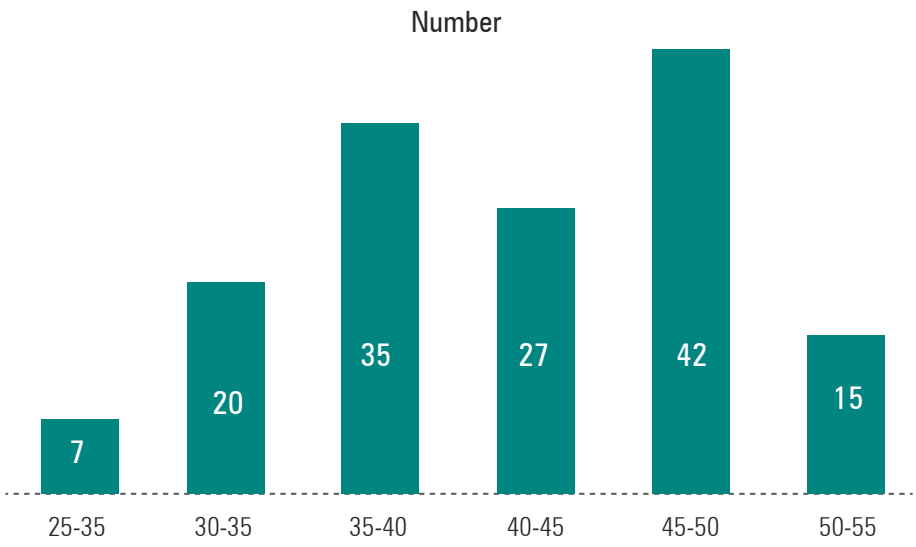
To establish the sample size, it is necessary to use the following formulas.

$$n = \frac{Nz^2 * 0.25}{[d^2 * (N-1)] + z^2 * 0.25}$$

Where: n = sample size;
N = total number of employees = 155 employees
d = level of accuracy (if the study is 3% = 0.03 in absolute terms)
Z = 1.96 corresponds to a confidence level of 95%

After the calculations, and the sample size was 136 subjects. Based on some previous experience, the authors added 10 more questionnaires to the sample size. The respondents were grouped by their age groups as seen in Figure 6, and by sex in Figure 7.

Figure 6. Sample Structure by Age.



The age range of the respondents were: Ages 45-50 years (28.3%). The age between 25-30 years (5%).

Figure 7. Sample structure by sex.

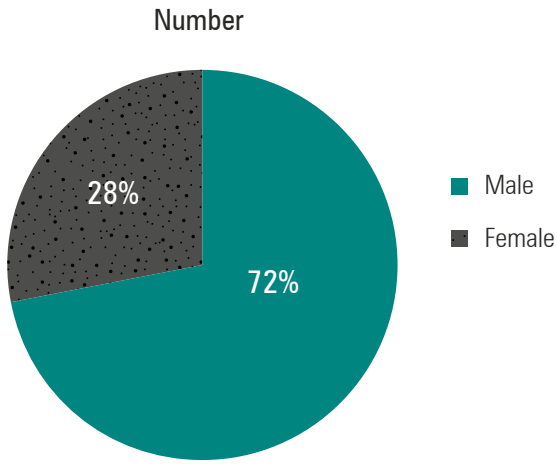


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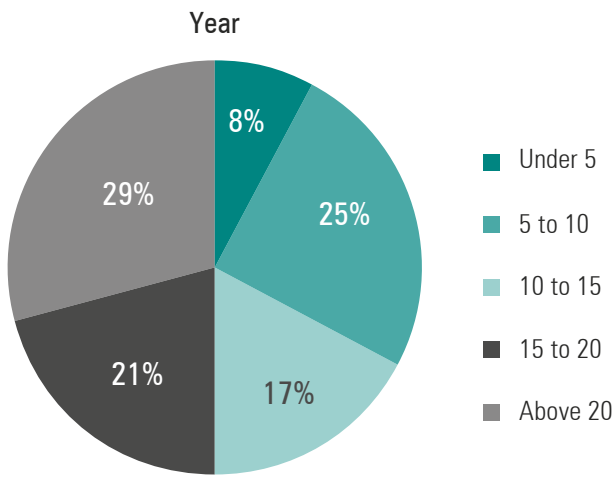
Figure 8. Employee Duration.



Development and validation of research tool

This study utilized questionnaires as a tool for data collection. A questionnaire with Likert 5 scale was developed by the authors. The Likert scale measured from "Strongly Disagree to Strongly Agree". The questions developed were based on three main elements of HR Flexibility, Psychological Capital and HR Sustainability. For HR Flexibility and psychological capital, there was a standard questionnaire but there was no standard questionnaire for HR Sustainability. For this purpose, the authors developed new questions and after measuring of reliability and credibility, developed final questionnaire.

To prepare the questionnaire, the component of the issue of HR Sustainability were clearly identified. The questions were designed for each of the components independently. These questions were distributed between professors and HR experts to measure the relevance of the questions and HR Sustainability components. After collecting initial questionnaire, the questions that have less relevance with HR Sustainability components eliminated. The validity of questionnaire measured by distribution of two questionnaires under two titles among 30 respondents. First, HR Sustainability and other HR Flexibility and Psychological Capital. HR Sustainability Cronbach's alpha is equal 0.885, HR Flexibility Cronbach's alpha is equal 0.857 and Psychological Capital Cronbach's alpha is equal 0.903. Eliminate a limited number of questions to raise the Cronbach's alpha. Then, the final questionnaire that included 80 questions distributed among 146 people in Iranian Oil Company Institute. Structural Equation Modeling (SEM) was used to analyze the relationship between HR Sustainability, HR flexibility and Psychological Capital.

Table 2. (HRM Sustainability Questionnaire).

Num.		Questions	Standard Coefficient	t-value
1		I adjust my personality trait to the work environment.	0.455	3.80
2		I adjust my behavior to the work environment.	0.440	3.89
3		According to the job requirement, I adjust my organizational position accordingly.	0.436	2.95
4		Our staff possess the ability to think in ways that provide economic value to our products	0.425	4.98
5		Our staff competency level is equivalent to the most ideal competency level.	0.410	5.69
6		Our staff, are considered creative and clever.	0.407	2.22
7		Our employment plan, attract the best volunteers.	0.404	2.09
8	Employability	The staff learn from each other.	0.399	4.00
9		I believe that the effect of my behavior encourages others to collaborate.	0.365	3.55
10		My behavior in the work environment, attract others.	0.357	3.04
11		In work the environment, I have confidence in others.	0.349	2.55
12		In the work environment, I show self-sacrifice in dealing with others.	0.349	3.57
13		I have common targets and values with others in the organization.	0.341	3.24
14		I have selflessly collaborated with members of other organization	0.302	5.29
15		I feel I am member of a common family in the organization.	0.660	5.66
16		There is honesty and camaraderie between me and my colleague.	0.455	5.08
17		I am aware of my career path.	0.440	4.05

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Table 2. (HRM Sustainability Questionnaire). Continued

Num.		Questions	Standard Coefficient	t-value
18	Employability	Career targets are important for me.	0.436	2.99
19		I aware of the role I am required to play in the organization.	0.425	5.69
20		I identify myself with my organization.	0.410	2.22
21		I am aware of my organization's believes, values and norms.	0.407	4.24
22		I control my feelings in the work environment.	0.404	4.00
23		I control my thought in the work environment.	0.399	3.56
24	Personal responsibility	I dominate self-behavior in the work environment.	0.365	2.98
25		I make intentional choices in work environment.	0.349	5.23
26		I am responsible for my behavior in the work environment	0.349	3.02
27		I am responsive to the implications of my performance in the work environment	0.341	4.15
28		I aware of the effect of my behavior to other staffs.	0.304	3.57
29		I emphasize the effect of my behavior to other staffs.	0.305	6.57
30		I lose the leisure time I spend with family or friends because of the pressure at work .	0.455	5.29
31		I always feel, tired and depressed.	0.440	5.66
32		I have special innovations for managing my diet.	0.436	4.48

Table 2. (HRM Sustainability Questionnaire). Continued

Num.		Questions	Standard Coefficient	t-value
33	Work-life balance	The Individual health plan is suitable for me.	0.425	6.67
34		I use sports facility.	0.410	4.85
35		I spend enough time in special groups (charity community).	0.407	5.55
36		I collaborate with others.	0.404	3.55
37		I normally work more than 6 days in week.	0.399	2.55
38		I normally work more than 12 hours in day.	0.365	3.57
39		I think about my work or worry about it (when I'm not working)	0.349	6.67
40		I have separate policy for work-life balance.	0.349	5.29
41		My work hours are flexible.	0.341	5.66
42		The opportunity to Return to work after childbirth (for women)	0.302	5.08
43		Our organization encourage family take part in work reward plan.	0.660	6.08
44		Work-life balance policy is exclusive to individual needs.	0.455	4.98

Table 3. (HRM Sustainability Cronbach's Alpha).

Aspect/Question num.	Employability/ 1-23	Personal Responsibility/ 24-32	Work-life Balance/33-44	HRM Sustainability
Cronbach's Alpha	.848	.840	.790	.885

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Table4. (Psychological Capital Questionnaire).

Num.		Questions	Standard Coefficient	t-value
1	Self-Efficiency	I believe that I have the self-confidence to find long time problem analysis.	0.440	5.69
2		I believe, I will be able to connect with people from otherorganizations (for example suppliers and customers) and debate about problems.	0.436	3.55
3		I believe that I can work under high pressure conditions and challenge.	0.425	2.55
4		I believe that I can achieve my work targets.	0.410	3.57
5	Optimism	I am optimistic about future events that may occur to me.	0.407	6.67
6		I believe that there are solutions for any problems.	0.404	5.29
7		I believe that all problems that occur in a work environment, always has a positive aspect.	0.399	5.66
8		If I am forced to face to bad conditions, I believe that all things are better.	0.365	5.08
9		I believe that success in current work, occurs in the future.	0.349	5.34
10		When I am stuck in trouble, I understand that trouble can't affect me.	0.349	4.98
11	Hope	Now, I track my work targets with great energy.	0.341	5.69
12		I have different ways to arrive at my work targets.	0.304	3.55
13		When I my performance evaluation is less than my expected target, I always try to find ways to enhance them and then commence on making improvements.	0.305	2.55
14		*I am energetic towards achieving organizational goals*	0.455	3.57
15		When, I determine targets and plan for work, I focus my energy to arrive at the targets.	0.440	6.67
16		I work for a determined target and believes. " where there is volition, there is a way "	0.436	5.29
17	Resilience	I often manage with a one way problems at work.	0.425	5.66
18		When my work fails, I will trying again in order to achieve success.	0.410	5.08
19		Although, more responsibility in the work environment results in my having an awkward feeling, I can go in the direction of success .	0.407	3.76
20		I don't become despondent and I am prepared to face problems in the work place.	0.455	4.98

Table 5. (Psychological Capital Cronbach's Alpha).

Aspect/ Question num.	Self Efficiency/1-4	Optimism/ 5-10	Hope/ 11-16	Resilience/ 17-20	Psychological capital
Cronbach's Alpha	.754	.894	.810	.720	.903

Table 6. (HR Flexibility Questionnaire).

Num.		Questions	Standard Coefficient	t-value
1	Functional	Human resource flexibility help us to adjust with the change in environmental demands.	0.440	5.69
2		Human resource practices changes Synchronously with the change in organization plans	0.436	3.55
3		Human resource practices changes continuously to conformity with changing needs.	0.425	2.55
4		Changes in human resource practices results in residual market competition.	0.511	3.55
5		Human resource practices are flexible at all and generally.	0.407	2.55
6		Human resource practices are with commercial conditions.	0.404	3.57
7		Our human resource practices meaningfully changes the commercial scenario.	0.399	6.67
8	Behavior	I am able to do various tasks in work environment.	0.365	5.29
9		When Faced with problems in the work environment, I try to understand the root of this problems.	0.378	5.66
10		Synchronous with, organization conditions changes, my work conditions are changed.	0.349	5.08
11	Skill	In work environment, have high skills.	0.341	3.09
12		Continuously update my skills and career talent	0.376	4.98
13		Learn new procedures and processes quickly.	0.660	5.69
14		Willing to learn relative skills within the career field.	0.455	3.55
15		When I can't do a specific task in the work environment, I try to learn it quickly.	0.455	2.55
16		In our organization, there are enough personnel with various skills, to deal with tasks suitable to theirs, when occur changes in market demand.	0.440	3.57

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Table 7. (HR Flexibility Cronbach's Alpha).

Aspect/ Question num.	Functional/1-7	Behavior/8-10	Skill/11-16	Flexibility
Cronbach's Alpha	.857	.782	.725	.857

DATA ANALYSIS

Figure 9. Final Model.

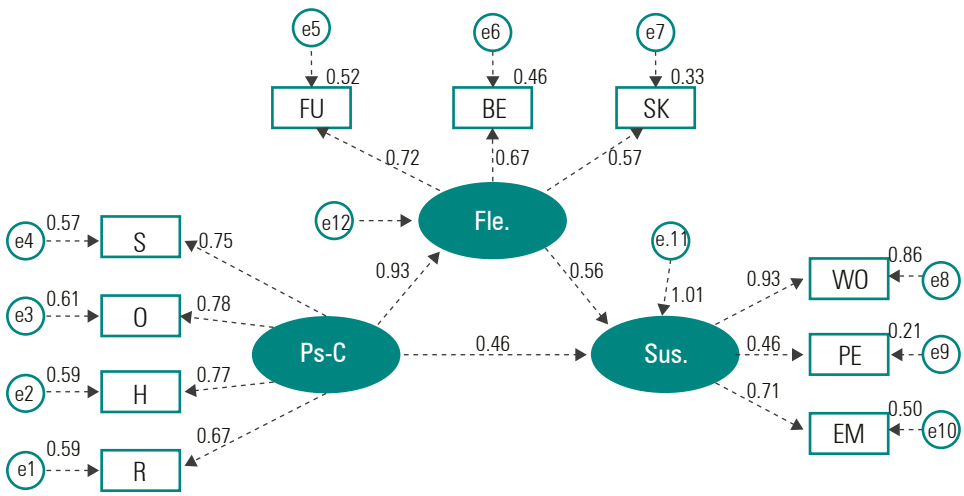

Table 8. (Hypothesis test).

Psychological capital(H1) →	Hr sustainability	.46	Accepted
Psychological capital(H2) →	HR flexibility	.93	Accepted
HR flexibility(H3) →	HR sustainability	.56	Accepted
Flexibility(H4) →	Relationship between psychological capital and HRM sustainability	.52	Accepted*

*Note: If H2 ×H3 <H1 then hypothesis is accepted
.93 × .56 =.52 > .46 then hypothesis is accepted

Table 9. Paths.

Paths			Standardized coefficients	Status
Functional	→	Sustainability	.40	accepted
Behavior	→	Sustainability	.38	accepted
Skill	→	Sustainability	.32	accepted
Psychological capital	→	Work-life balance	.33	accepted
Psychological capital	→	Personal responsibility	.30	accepted
Psychological capital	→	Employability	.43	accepted
Self-efficiency	→	Sustainability	.35	accepted
Optimism	→	Sustainability	.36	accepted
Hope	→	Sustainability	.35	accepted
resilience	→	Sustainability	.31	accepted
Self-efficiency	→	HR flexibility	.70	accepted
Optimism	→	HR flexibility	.73	accepted
Hope	→	HR flexibility	.72	accepted
resilience	→	HR flexibility	.62	accepted

Note: The coefficient on arrows is positive and greater than 0.3 and so all of coefficient is meaningful in Pvalue =0.001. Then all of Paths are accepted.

CONCLUSIONS

The result of the path analyze for the effectiveness of variables and hypothesis test shows that psychological capital has positive and meaningful effect on HR flexibility (path coefficient equal 0.93). This means that an increase in psychological capital causes a flexibility in human resources; in some research variables in psychological capital, the maximum effect on HR sustainability, is optimism (coefficient effect equal 0.73). This means that The success probability and self-confidence can facilitate improved flexibility variable confidence. This means human resources (staff) with self-confidence can do better in terms of skills and functional and behavior in innovative organizations. Based on the test model, the effect of HR flexibility on HR sustainability is accepted (path coefficient equal 0.56). This means that as flexibility increases, so will sustainability. Among HR flexibility aspects, functional HR flexibility has maximum effect on HR sustainability (path coefficient equal 0.4). This means if staff have more ability to adjusting themselves to environment practices, HR sustainability increases.

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According to the tested model, the effect of the psychological capital on HR sustainability is accepted (path coefficient equal 0.46). Among the psychological capital aspects, optimism has maximum effect on HR sustainability (path coefficient equal 0.36). Maximum effect of psychological capital is on the employability aspect of HR sustainability (path coefficient equal 0.43). The positive effect of psychological capital on HR sustainability shows that if optimism, self-efficiency, hope and resilience increases, the organizations grow to become more sustainable. This means that if the personal responsibility increases, the work-life balance improves and the skills and the employability increases. Although among checked relationship, the minimum respective effect on HR sustainability is the psychological capital and personal responsibility aspect (path coefficient equal 0.3).

The moderate role of flexibility in the relationship between psychological capital and HR sustainability is accepted. In this way, when HR flexibility is introduced into the relationship between psychological capital and HR sustainability, the level of effectiveness increases from 0.46 to 0.52. This means the organization that has a suitable psychological capital status, with flexible HR, has been more sustainable. Human forces that have more flexibility and faced the environmental variable needed, with higher adjustable power that prepare organization survival, is more sustainable in terms of behavior, skill and functional.

If organization's manager engaged in psychological capital management and the improvement of optimistic feeling, resilience, hope and self-efficiency effort has a more sustainable purpose, he/she must pay attention to HR flexibility. That means adjusting better will occur more easily and effective.

Sustainability is an inevitable necessity for innovative organizations to stay in an uncertain environment. The sustainability concept in a variety of ways was a disturbance to organizations a few years ago. This disturbance occurred in knowledge-based and innovative organizations that rely on knowledge forces with respect to HR sustainability.

Organization managers can increase HR sustainability with psychological capital management. Optimism, resilience, hope and responsible staff, most probably, have high flexible and high adjustability power in terms of skills, functionally and behavioral with changing environment. And its staff develop a high possibility towards being responsible, employable and developing a balance between their personality and work-life. And the staff are likely to be flexible and sustainable at all.

DISCUSSION

The objective of this paper is to identify and explore HR sustainability in innovative organizations. The findings from this research provide some initial indications about Sustainable Human Resource management, especially innovation leader organizations. Some similarities observed in organizations that work on development of new products in an evolving market, despite of differences in the

context. It was clear that in all organizations studied, innovativeness is important for knowledge. Learning and development of human resources is linked with knowledge development. in the organizations that provide less formal or traditional off-the-job training ae more likely to involve employees in sustainable development activities such as experimentation and challenging projects.

Moreover, this paper suggests that Human resource management may have a direct or indirect impact on the specific phases of the innovation cycle. It is recommended to the future researchers to identify specific innovation practices and how they relate with HRM practices in innovative organizations.

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THE IMPACT OF EDUCATIONAL EXPENDITURES OF GOVERNMENT ON ECONOMIC GROWTH OF IRAN

EL IMPACTO DEL GASTO PÚBLICO EN EDUCACIÓN EN EL CRECIMIENTO ECONÓMICO DE IRÁN

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ABSTRACT

Using the annual data of Iran's economy from 1981-2012, this study examines Wagner's law and the Keynesian hypothesis about the relationship between the real government expenditure and the real GDP. In this regard, this paper investigated the relationship between the total government expenditure, the GDP and the relationship between government educational expenditure and GDP using bivariate and multivariate models. The multivariate model is used to reduce the specified error issues that has not been considered in many studies. The co-integration was examined using the auto regressive distributive lag method (ARDL) of both long-term and short-term relationships. In making the estimations of the Wagner's view, the variables: real GDP, capital stock and labor force stock respectively, had a positive, a negative, and a positive impact on total government expenditure and the long-term relationship is true in this regard. Additionally, in the estimation of Keynesian model, the educational expenditures, unlike real expenditures of government, had a long-term relationship. In addition, the variable, capital, in both models had a similar effect on the real GDP, and the labor force coefficient in the presence of the total expenditures and educational expenditures were negative and positive respectively.

KEYWORDS

Wagner; Keynes; total expenditures; educational expenditures; government expenditure; ARDL; ECM.

RESUMEN

Utilizando datos anuales de la economía de Irán desde 1981 hasta 2012, este estudio examina la Ley de Wagner y la hipótesis keynesiana en cuanto a la relación entre el gasto público real y el PIB real. En este aspecto, este artículo investigó la relación entre el gasto público total, el PIB y la relación entre el gasto público en educación y el PIB usando modelos bivariables y multivariables. El modelo multivariable es utilizado para reducir los errores específicos que no han sido considerados en muchos estudios. La co-integración fue examinada utilizando el modelo autorregresivo con retardos distribuidos (ARDL, por sus siglas en inglés) tanto para las relaciones a largo como a corto plazo. Al realizar las estimaciones de la perspectiva de Wagner, las variables: PIB real, capital social y fuerza laboral, tuvieron, respectivamente, un efecto positivo, negativo y positivo en el total del gasto del gobierno y la relación de largo plazo es verdadera en este sentido. Adicionalmente, en la estimación del modelo keynesiano, los gastos educativos, a diferencia de los gastos públicos reales, tuvieron una relación de largo plazo. Además, la variable

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capital, en ambos modelos tuvo un efecto similar en el PIB real y el coeficiente de fuerza laboral en presencia de los gastos totales y los gastos en educación fueron negativos y positivos, respectivamente.

PALABRAS CLAVE
Wagner; Keynes; total de gastos; gastos educativos; gasto público; ARDL; ECM.

INTRODUCTION

The relationship between the government expenditure and national production is important for issues related towards policy making. For example, in a recession, the authorities try to save the economy by increasing the share of public expenditure to GDP. The issue of public sector intervention towards controlling short-term fluctuations in economic activities has always been discussed among economists. However, classical economists disagree with such measures of government, while they propose Keynesian fiscal policy to improve the economy in periods of recession. Classical economists believe that market forces are able to guide economy to a long-term equilibrium through moderations in the labor market. But Keynesians believe that self-regulation mechanism is unable to improve the economy due to labor market inflexibilities. To avoid long-term recessions, Keynesian economists propose expansionary fiscal policies. As a result, there are two alternative situations for these two directions of opposed causality. One situation is presents a trajectory from expenditures to income (for the case of Keynesians) and the other situation presents a trajectory from the income to public expenditures (for Wagner theory) (Magazzino, 2012). Examining the reasons for increased government expenditures is one of the key issues in the economy for the public sector. Many theories have been proposed in this regard. They can be divided into two general categories of economic theories situated at the micro and macro levels. Wagner's law is one of the macroeconomic theories in the field. Wagner's law is the first and most famous model to determine public expenditures (Akitoby et al.,2006). The famous German economist Adolph Wagner (1835-1917) proposed his theory in 1883 with regard to developing government expenditure. According to Wagner, there is a linear relationship between the growth of government activities and economic growth. Additionally, the rate of public sector growth is higher than economic growth. At the same time, market inefficiencies especially in the case of externalities or that of superior goods make government interventions necessary towards supplying optimal value in the supply of the goods and services by facilitating subsidies and direct supply. Wagner also states that the goods supplied by the public sector have higher income elasticity. According to the way of Keynesian thinking, the public sector expenditure is an important tool in developing and increasing economic activity. In the Wagner hypothesis, the direction of a causality emanates from economic growth and development to government expenditures. He examined the growth of the public sector in a number of European countries, America and Japan in the nineteenth century. Wagner defines the factors determining the impact of relative growth of the public sector on GDP in terms of political and economic factors. Wagner's law or Wagner's theory, especially since 1960s, has attracted much attention. This hypothesis has been tested

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in many countries using time-series and cross sectional data. Examples of academics that have tested this theory are Goffman (1968), Gandhi (1971), Ram (1987), Chang (2002), Halicioglu (2003), Narayan et al (2008), Huang (2006). Extensive empirical analysis of Wagner's law has achieved mixed results in literature. The development of a nation depends on the development of its people. If talents are not identified and fostered, material, economic, political, and cultural development will not be possible. The main problem in many underdeveloped countries is not lack of natural resources but lack of human capital. Therefore, the first duty of such countries is to prepare and develop their human capital. Government expenditure on education can be an effective factor towards encouraging and gaining knowledge, improving education and strengthening the spirit of innovation and originality in a community. On the other hand, promoting the level of education of people in the society represents increased human capital of that country, leading to improved efficiency and strengthened production capacity. As a result, it might have a positive impact on economic growth. Therefore, the present study sought to examine the impact of the government's educational expenditure on economic growth of Iran

THEORETICAL PRINCIPLES AND LITERATURE REVIEW

The relationship between government expenditure and economic growth has attracted the attention of many economists over the past few decades (Kolluri et al, 2000; Govindaraju et al, 2011). For a long time, there was no model to determine public expenditure. While some classical economists, such as Adam Smith, studied the long-term trend in public expenditure, no attempt was made to turn such observations into a general model. In fact, one of the fundamental aspects of the public sector and the size of government is the issue of public sector expenditure. These expenditures in some areas represent policy-making in the public sector. The changes within the public sector justifies the size of government. The only theoretical discussion that presents a relationship between the size of the public sector and economic growth is Wagner's law. The law explains that economic growth leads to the increase in the government expenditure. Wagner is the first researcher who realized a positive relationship between the level of economic development and the size of the public sector (Ranjan & Chintu, 2013). Wagner introduced factors such as urbanization and work division along with industrialization, real income growth, the need to manage natural monopolies as well as areas where the private sector is not able to finance (for example railroad) as reasons for the growth of public expenditures in the economy (Durevall & Henrekson, 2011, pp. 709). According to Wagner's law, government services such as judicial system, education, health and infrastructures lead to economic growth. In other words, the government expenditure of an elastic government is an income, in the sense that the public sector will grow in line with economic development. Experimental studies that have tested the validity of the law, in many cases led to conflicting results. Wagner's law shows the long-term equilibrium relationship between public expenditures and GDP. According to this law, the causality is from GDP to public expenditures. Wagner determines the

growth of public expenditures for education, culture, health and well-being in terms of the income elasticity of demand. In his view, the income elasticity of such services is high. Thus, by increasing the real income in the economy, public expenditures for these services increase. Wagner identified three main reasons for government expenditures as follows:

1) When the social relations are complicated, the need for increased public support and regulatory activities increases. In addition, urbanization, more division of work, and industrialization require higher expenditure for the execution of the contract, law enforcement, and ensure economic performance. 2) Real income growth leads to a relative increase of the income in cultural and welfare expenditures. Wagner stressed that the public sector in the field of education and culture are much more efficient than the private sector. 3) To develop the economy and technological changes, the government should take the responsibility to manage natural monopolies to improve economic performance. The investment required in some areas is so high (for example railways) that the private sector is not able to finance in that areas (Durevall & Henrekson, 2011, pp. 709). According to Wagner reasoning ($Y \rightarrow G$), meaning that economic growth is the cause of the growth of the public sector), by increasing the country's per capita income in the process of industrialization, the share of public expenditures in the total expenditures increases. On the other hand, Keynes argued that public expenditure is an exogenous factor. Thus, the direction of causality in the relationship between public expenditures and national income is from expenditures to income ($G \rightarrow Y$) (Babatunde, 2011). In addition, according to the Keynesian thinking, public sector expenditures are real means of boosting and increasing economic activities and a means to stabilize short-term fluctuations in the total expenditures. The role of a financial policy in the increase of an economic growth rate and - in agreement with part of literature on the issue of endogenous growth is that government expenditures directly affect the production functions of the private sector. In contrast, Wagner's approach is that the public sector expenditure is a natural result of economic growth (Dritsaki & Dritsaki, 2010). In the Keynesian approach, government expenditures, in the first place, increases the total demand. Then, it will have greater impact on economy through an increasing coefficient. Therefore, government expenditures affect economic growth and reduce unemployment. In this view, the public sector plays a significant role in the provision of public goods and services - solving problems related to externalities, and achieving the optimal level of investment. The task of government is complementary to the activities of the private sector as they stabilizing institutions necessary for a useful performance of the market. In fact, contrary to the Wagner's law, the Keynesian view believes that public expenditures are an exogenous policy instruments that affect GDP growth. Both hypotheses have been tested experimentally in developed and developing countries and they led to mixed results. For example, in studies conducted by Chow et al (2002), Thornton (1999) and Ansari et al. (1997) Wagner's law was confirmed experimentally. While in the study conducted by Ram (1986), Afxentiou and Serletis (1996) and Wahab (2004), Wagner's law could not be confirmed experimentally.

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In some studies, there are evidences suggesting the experimental confirmation of both hypotheses postulated by Wagner and Keynesian respectively. For example, in experimental study conducted by Devlin and Hansen (2001) and Biswal et al. (1999), a bidirectional causality was confirmed between real GDP and real public expenditures. However, in the study by Huang (2006), in comparison with other studies, none of the hypotheses was experimentally confirmed. Therefore, it is clear that issues related to Wagner's law and the Keynesian theory still hold. It is noteworthy that in a large number of studies, only the test for Wagner's law and the Keynesian hypothesis is done using estimations based on a simple regression equation and that includes only one independent variable. However, as it is clear that a great number of factors also affects GDP growth. Government expenditures, including expenditure on education also affect GDP growth. As a result, a simple regression including GDP and government expenditures led to specification error (Chow et al. 2002). The main objective of this study was to test the Wagner's law and the Keynesian hypothesis in the Iranian economy using data from 1991 to 2012. The focus is in the relationship between government expenditures and GDP. In addition, Samudram et al (2000) and Kolluri et al (2009) examined the relationship between GDP and the components of government expenditures¨.

Qi (2016) investigated the impacts of government education expenditure on economic growth in China taking into account the spatial third-party spillover effects. The result revealed that (1) as a whole, government education expenditure in China has significantly positive impact on economic growth, but expenditure in different educational level shows different results. Government education expenditure in below high-education is positive related to local economic growth, whereas the effect of education expenditure in high-education is insignificant. (2) Neighboring government education expenditure shows spatial spillover effects on local economic growth, and spatial spillover effects in two education level is different. (3) Other input factors of third-government also have spatial effects. Some policies about education and economic development are proposed. Meanwhile this study recommends that corporation relationship among regions is very important.

Dissou et al. (2016) estimated the growth implications of alternative methods of financing public spending on education in a small open economy. They developed a multisector endogenous growth model with human capital accumulation and consider several fiscal instruments to finance the increase in government spending: transfers to households, output, capital and labor taxes. They found a significant difference in the growth impact generated by the choice of the financing method. Their simulation results also suggest that even though all methods of financing considered in this paper are growth-inducing in the long-run, their transitional impacts differ.

Using data on educational spending for 31 OECD countries over the years 1988–2008 by level and type of expenditure, Wolff (2015) first re-examined the so-called cost disease model on the basis of a new formulation of the model and, in so doing, provide a new implicit price deflator for educational expenditures. The cost disease

effect in education is estimated to be one to two percentage points per year relative to constant prices based on the GDP deflator. Next, unlike many previous studies, he found a positive and significant effect of secondary educational spending deflated using the traditional GDP deflator on both PISA math scores and literacy scores (both significant at the one percent level).

Abington and Blankenau (2013) considered the consequences of a reallocation using an overlapping generations' model - with private and public spending on early and late childhood education. By the assumption that the early childhood investment has higher return, their survey showed that the current allocation may nonetheless be appropriate. With a homogeneous population, this can hold for moderate levels of government spending. But with a heterogeneous population, this can hold for middle income workers. Lower income workers, by contrast, may benefit from a reallocation. Prasetyo & Zuhdi (2013) investigated the efficiency level of government expenditure per capita in health and education sectors and transfers and subsidies in 81 countries. The investigation was towards human development in the respective countries, using the Data Envelopment Analysis (DEA) approach from 2006-2010. They found that there are countries that will always be positioned in the efficient frontier during the sample period. By studying the expenditure in education, human capital and growth in Canada using OLS analysis, Annabi et al (2011) have shown that budget policies do have a powerful effect. Education increases the rate of capital accumulation and reduces the negative effects of the reduction of growth in labor force. Nevertheless, this depends on the efficiency of government investments in education. Jung and Thorbeck (2003) have studied the effect of general expenditures in education on human capital, growth and poverty in Tanzania. They utilized the method of Computable general equilibrium (CGE). Their research findings indicate that the expenditure in education increase economic growth. Gupta et al (2001) have studied the impact of government expenditures on education and health in developing economies using the panel data collected from 50 countries based on OLS and 2SLS. The research results demonstrated that with the increase in government expenditure in education and health, there was a decrease in the number of child deaths. And the impact from education is more powerful than that of health. Levy and Clements (1996) have studied the government expenditure on education and private investment in developing countries using the panel data. The empirical test of the model was performed using data from the Caribbean peninsula. The data shows that education has a significant effect on private investment.

There are important reasons for Government expenditures in education. These reasons include: First of all, education is considered as important by governments. Therefore, an increase in expenditure towards education is remarkable. Education is one of the key variables that are effective in reducing poverty (Grubb and Michelson 1974). Meanwhile, growing global competition has caused policymakers to pay much attention towards expenditure spent on education in Iran. As Secondly as previously stated in several studies conducted, governmental expenditure in education have

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been used as means of producing human capital (Romer 1990; Jurges and Schneider 2004). In developing countries, economic growth is preferred over education expenditures, due to budgetary limitations (Al-Yousif, 2008). Though the effects and implications of government expenditure and other fiscal instruments are important, understanding the causal relationship between education expenditures and GDP growth is important for political reasons. Thirdly the relationship between education and growth is like a double-edged sword, regardless of causal direction of the relationship. In many studies (for example Rehme, 2007), the econometric models were proposed based on the assumption that the expenditure in education expenditures have direct impact on economic growth. Bidirectional causality can be estimated using appropriate statistical methods that have not been considered. The implication of the issue implies to the studies has used the public educational expenditures as an indicator for human capital (Blankenau and Simpson 2004). Therefore, the investigation of the causality in relation to Iran's economy would probably increase our understanding of the complex relationship between educational expenditures and economic growth. In investigating the relationship between public expenditure and the total educational expenditures and GDP growth, the two schools of thought -of Wagner and Keynesian - can be considered. Unlike existing studies, in order to minimize the error of estimation, some control variables are included.

In addition, a long-term relationship between economic variables were examined using a suitable estimate technique.

MODEL, METHODOLOGY AND DATA

In most of the current studies, there has been an attempt to test Wagner's law using the following methodologies. The methodologies are as follows:

1. Peacock and Wiseman (1961) used government expenditure to GDP
2. Gupta (1967) used the government expenditure and per capita GDP
3. Goffman (1968) used the government expenditure as a share of GDP and per capita GDP.

Since this study is conducted in one country, the three methods mentioned will not produce significantly different results. The Wagner hypothesis can be tested using the share of public expenditure in GDP and per capita income. However, in many studies, the Wagner hypothesis is evaluated using government expenditure and GDP. The use of government expenditure and GDP is preferable because the long-term elasticity of government expenditures compared to GDP can be estimated. In this study, the Peacock and Wiseman's methodology is used leading to adoption of a two-way model in the literature as follows:

$$G_t = \beta_O + \beta_1 Y_t + v_t \qquad (1)$$

Where, G and Y are respectively natural logarithm of real government expenditure, real GDP and V_t is error term. In addition to examining the relationship between real GDP and real government expenditure, the between real educational expenditure

of the government (Et) and real GDP were also investigated. In order to reduce the severity of bias, omitted variables of equation (1) were considered after considering the capital stock and labor force as control variables:

$$G_t = \alpha_O + \alpha_1 Y_t + \alpha_2 K_t + \alpha_3 L_t + \mu_t \qquad (2)$$

In equation (2) K and L respectively are natural logarithms of real capital stock and labor force and μ_t is error term. Equation (2) can be interpreted as a function of total production and it can be rewritten as G [Y = f (K, L, G)]. Total production (i.e. Y) depends on capital, labor force and real government expenditures. Real GDP can be considered as combined public goods/input or infrastructure that is effective in increasing productivity. In addition, one special part of government expenditure, educational real expenditure, is human capital. The endogenous growth theory emphasizes on the importance of human capital and government expenditure in the long-term economic development of a country (Barro 1990, 1991 and Romer 1990). Equation 2 can be estimated using the ARDL method that is based on a system of equations. As a result, the co-linearity of government expenditures (or educational expenditures), capital stock, and labor force can be reduced. The ARDL approach used in this study also provides long-term estimates of compatibility even when right-sided variables are endogenous (Inder, 1993). Pesaran and Shin (1999) showed that by using the proper order of the ARDL model, simultaneous correction for serial correlation in the residuals is possible. However, in order to control the power of the model and to consider the omitted variable bias, a bivariate model is also estimated. The experimental analysis in this study is conducted based on data collected from the Central Bank Website. All nominal variables such as GDP, total government expenditures, educational expenditures, and capital stock have been converted to real values. Peacock and Scott (2000) have suggested that the co-integration approach alone is sufficient to describe the Wagner's view with long-term relationship test. In the present study, this model was tested by using the autoregressive distributed lag (ARDL) method. This test based on ARDL method for Equation (2) is as follows:

$$\Delta Y_t = \varphi_{y0} + \pi_{y1} Y_{t-1} + \pi_{y2} K_{t-1} + \pi_{y3} L_{t-1} + \pi_{y4} G_{t-1}$$

$$+ \sum_{i=1}^{p} \lambda_{iy} \Delta Y_{t-1} + \sum_{i=0}^{p} \gamma_{iy} \Delta K_{t-i} \qquad (2.1)$$

$$+ \sum_{i=0}^{p} \alpha_{iy} \Delta L_{(t-i)} + \sum_{i=0}^{p} \gamma_{iy} \Delta G_{t-i} + \varepsilon_{1t}$$

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$$\Delta K_t = \varphi_{k0} + \pi_{k1} K_{t-1} + \pi_{k2} Y_{t-1} + \pi_{k3} L_{t-1} + \pi_{k4} G_{t-1}$$

$$+ \sum_{i=1}^{p} \lambda_{iy} \Delta Y_{t-1} + \sum_{i=0}^{p} \gamma_{ik} \Delta K_{t-i} \qquad (2.2)$$

$$+ \sum_{i=0}^{p} \alpha_{ik} \Delta L_{t-i} + \sum_{i=0}^{p} \beta_{ik} \Delta G_{t-i} + \varepsilon_{2t}$$

$$\Delta Y_t = \varphi_{l0} + \pi_{l1} L_{t-1} + \pi_{l2} Y_{t-1} + \pi_{l3} K_{t-1} + \pi_{l4} G_{t-1}$$

$$+ \sum_{i=1}^{p} \lambda_{il} \Delta L_{t-1} + \sum_{i=0}^{p} \gamma_{il} \Delta Y_{t-i} \qquad (2.3)$$

$$+ \sum_{(i=0)}^{p} \alpha_{il} \Delta K_{t-i} + \sum_{i=0}^{p} \beta_{il} G_{t-i} + \varepsilon_{3t}$$

$$\Delta G_t = \varphi_{e0} + \pi_{e1} G_{t-1} + \pi_{e2} Y_{t-1} + \pi_{e3} K_{t-1} + \pi_{e4} L_{t-1}$$

$$+ \sum_{i=1}^{p} \lambda_{ie} \Delta G_{t-i} + \sum_{i=0}^{p} \gamma_{ie} \Delta Y_{t-i} \qquad (2.4)$$

$$+ \sum_{i=1}^{p} \alpha_{ie} \Delta K_{t-i} + \sum_{i=0}^{p} \beta_{ie} L_{t-i} + \varepsilon_{4t}$$

Where, j = y, k, l, e and Δ is the first-order difference operator; $\varphi j0$ is constant value; πs shows long-term coefficients, λ, γ, α, β are short-term dynamics, and εt is the randomized variable assumed to be white noise. Accordingly, bivariate model can be tested using the same method without K and L.

RESEARCH METHODOLOGY

When an estimation method is about to be utilized, it is important to note that using the OLS method in the long-term relationship estimation would not provide necessarily estimation without bias. This is because the short-term dynamic interactions between the variables is ignored.

Therefore, it is necessary to consider the models - including the short-term dynamics - that leads to a more accurate estimation of the coefficients of the model to be estimated. The ARDL method is a dynamic method that enables us to test co-integration between the variables. It also enables us to estimate the long-term coefficients of the model. The results obtained by estimation of the considered models will be provided later in brief. The model was estimated using Microfit4 software and *Schwartz-Bayesian* Information Creterion (SBC) were considered in this regard. The advantage of this criterion on the Hannan–Quinn information criterion (HQC), Akaike information criterion (AIC) and R2 is that it saves in the number of lags and consequently it is less damaging to the model's degrees of freedom. The proposed model was estimated based on autoregressive distributed lag (ARDL) models and error correction during the considered period. First, it is necessary to examine the stationarity tests before the above-mentioned tests.

EXAMINING THE STATIONARITY OF DATA

Before using the data, to prevent spurious regression analysis, augmented Dicky *Fuller* regression was used. Using Eviews6 software, time series were examined. If the absolute value of the test statistic is larger than absolute value of critical quantity, null hypothesis is rejected.

Table 1. Dicky Fuller test: Examining the stationarity of data.

	LnE	LnG	LnY	LnL	LnK
1% Critical Value*	-3.83	-3.81	-2.69	-2.69	-4.50
5% Critical Value	-3.03	-3.02	-1.96	-1.96	-3.66
10% Critical Value	-2.65	-2.65	-1.62	-1.62	-3.27
ADF Test Statistic	-3.89	-3.08	-1.63	2.23	-3.72
Examination of stationarity	It is stationary with one lag	It is at stationary level	It is stationary with one lag	It is at stationary level	It is at stationary level

Source: researcher calculations

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Based onthe results presented in the table 1, except for the real GDP and government educational expenditure which are stationary at the first order difference level, other variables are at the stationary level. It is worth noting that one of the advantages of autoregressive distributed lag over other methods is the lack of concern about the I(0) or I(1) of the variables. Therefore, without considering the reliability of the variables, adjustment estimates of long-term coefficients can be achieved. In the next stage, the short-term dynamic model was estimated to assess the presence or absence of co-integration relationship. The estimation results using Microfit4 software are as follows:

Estimation of Wagner's theory:

In the following estimation, the model presented by Wagner is estimated using ARDL method, with an emphasis on factors affecting government public expenditures.

$$LnG=5.08+0.78\ LnG(-1)+1.53LnY-2.67LnK+1.71LnL$$

$$(1.04) \qquad (7.66) \qquad (1.65) \qquad (-2.28) \qquad (1.55)$$

$$R^2=0.95 \qquad DW=1.75$$

Based on the coefficients obtained in the short-term relationship, the logarithm of both the real GDP and labor force stock had significant and positive impact on government expenditures and a 1 percent increase in each of the coefficients increases public expenditures of the government by (1.53) and (1.71) percent, respectively. This result indicates that as the country produces more and growth of labor force is higher, the government expenditure would be also greater. On the other hand, the variable, capital stock, has a negative and significant effect on government expenditures. On the other hand, the reduction in the capital stock is more than the increase in any of the previous two variables. In addition, when the dependent variable coefficient LNG (-1) is smaller than 1, the dynamic pattern will tend towards a long-term pattern. The explanatory power of the model is equal to 95%, which implies a relatively good explanatory model. Before extracting the long-term relationship, it is necessary to examine the presence or absence of a long-term relationship. One of the tests commonly used for this investigation is Banerjee, Dolado and Mastre test. To perform this test, the sum of the lagged coefficients of dependent variable must be deducted from 1 and divided by its standard deviation that is calculated as follows:

Since in the estimated model for the real expenditures of the government, the dependent variable has been obtained with one lag, its t-statistic is as follows:

$$t=\frac{.78-1}{.102}=-2.102$$

Due to the critical value provided by Banerjee, Dolado and Mastre at 95% confidence level (-2.10), it can be seen that the absolute quantity of statistic calculated from the absolute value of the presented critical quantity is greater. Therefore, it can be concluded that the hypothesis of lack of co-integration between the variables of the model is rejected. As a result, there is an equilibrium relationship between the variables of the Wagner's model according to the dependent variable of real expenditures of the government as follow:

$$LnG=23.62+7.13LnY-12.43LnK+7.96LnL$$
$$(0.83) \qquad (1.61) \qquad (-2.26) \qquad (2.18)$$

The coefficient of real GDP variable shows that a one percent increase in the production and labor force stock increases the real government expenditure by 7.13% and 7.96%, respectively. And the obtained coefficient for capital stock changes is negative. It also indicates that a one percent increase would reduce the real expenditures of the government by 12.43 percent in the long-term. The obtained results are similar to the short-term equation, but with larger coefficients, which suggests that variables will show their strong effects in the longer period. Then, we will estimate the error correction model of Wagner's equation. Error correction models are mainly used in the experimental studies since they link the variables to their long-term equilibrium values. The results of Error Correction Model (ECM) are as follows:

$$LnG=5.08dC+1.53dLnY-2.67dLnK+1.71dLnL-0.21ecm(-1)$$
$$(1.04) \qquad (1.65) \qquad (-2.28) \qquad (1.55) \qquad (-2.10)$$

As you can see, all coefficients of the labor force, capital stock, real GDP, and error correction term are significant. On the other hand, the coefficient of error correction is (-0.21), which indicates that about 21 percent of the disequilibrium error in the each period is adjusted at the next period. Additionally, these coefficients suggest the ***adjusted rate*** from short-term period to long-term equilibrium. Accordingly, changes in the mentioned variables of the formula lead to the reduction of error term in the short-term relation compared to long-term relation. Generally, the similarity that is present in the Wagner's model in the short-term and long-term period is justified by the fact that variables of capital stock, real GDP, and labor force stock have always had positive, positive, and negative effects, respectively.

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ESTIMATION OF KEYNES'S THEORY: WITH THE IMPACT OF TOTAL EXPENDITURES OF THE GOVERNMENT

At this stage, Keynes model is estimated based on the mentioned factors affecting the real GDP.

$$LnY=-0.79+0.04\ LnG+3.72LnK-2.73LnK(-1)-0.08LnL$$

(-1.17) (2.79) (6.45) (-4.67) (-0.49)

$R^2=0.98$ DW=1.62

Based on the coefficients obtained in the short-term equation, the logarithm of real government expenditure has a positive effect on the logarithm of real GDP. It means that by increasing one percent in government expenditures, GDP will increase by 0.04 percent. On the other hand, the variable of capital stock has a significant positive effect on the logarithm of real GDP, but this variable would have a negative and a significant effect on real GDP logarithm with a lag. In addition, the labor force variable has a negative and an insignificant impact on the real GDP logarithm. This result indicates that human capital has increased slightly in Iran and not in a significant way , and it is not in line with labor force market. Therefore, its labor force cannot cause an increase in real GDP. Additionally, as there is no coefficient of dependent variable in the estimation, hence the dynamic pattern will not tend toward a long-term pattern. In general, the explanatory power of the model 98%, which implies that the model has relatively good explanatory power.

ESTIMATION OF KEYNES'S THEORY: WITH THE IMPACT OF GOVERNMENT EDUCATIONAL EXPENDITURES

For the effectiveness, the value of public expenditures of the government and educational expenditures of the government on real GDP, the Keynesian model is estimated this time with an emphasis on educational expenditures.

$$LnY=-0.36+0.35LnY(-1)+0.005\ LnE+2.95\ LnK-2.49\ LnK(-1)+0.23\ LnL$$

(-0.43) (2.07) (0.17) (3.93) (-3.71) (1.87) (1.96)

$R^2=0.98$ DW=1.39

Based on the coefficients obtained in the short-term equation, the logarithm of the educational expenditure by the government has a positive effect on the logarithm of real GDP. It means that if there is a one percent increase in educational expenditures of the government, GDP will increase by 0.005 percent. In addition, the variable of the labor force stock has a negative effect on the real GDP logarithm. Additionally, the dependent variable coefficient LNY (-1) is smaller than 1, so the dynamic pattern will tend towards a long-term pattern. The explanatory power of the model is 98 percent, which suggests that the model has relatively good explanatory power. Before extracting the long-term equation, it is necessary to examine the presence or absence of the long-term equation calculated, using the Banerjee, Dolado and Mastre test. As the dependent variable has been obtained with one lag in the pattern estimated for real GDP, its t-statistic is as follows:

$$t=\frac{.35303-1}{.17050}=-3.79$$

Due to the critical value provided by Banerjee, Dolado and Mastre at 95% confidence level that is equal to (-3.79), it is seen that calculated absolute value of statistic is greater than the absolute value of the critical value. Therefore, it can be concluded that the hypothesis of lack of co-integration between the variables of the model is rejected. As a result, there is a long-term equilibrium relationship between the variables of Wagner's model presented - based on dependent variable of real expenditures of government as follows:

$$LnY=-0.57-0.008\ LnE+0.71\ LnK+0.35\ LnL$$
$$(-0.46)\qquad (0.17)\qquad (3.96)\qquad (1.91)$$

The GDP variable coefficient indicates that an increase in capital stock and labor force stock leads to an increase in real the GDP real by (0.71) and (0.35) percent. And the obtained coefficient is negative for government educational expenditure changes. This outcome suggests that a one percent increase in the educational expenditure of the government reduced the GDP by 0.008 in the long run. It can be due the fact that investment in education is a long-term activity and the effects of the costs accumulated in this sector cannot show its returns in the short-term. We will estimate the error correction model of Wagner's model. Error correction models are mainly used in experimental works since they link the short-term fluctuations of the variables to their long-term equilibrium values. The results of ECM model are shown below:

$$LnY=-0.37\ dC+0.005\ dLnE+2.95\ dLnK+0.23\ dLnL-0.65ecm(-1)$$
$$(-0.43)\qquad (-0.17)\qquad (3.94)\qquad (1.96)\qquad (-3.79)$$

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As it is seen in the equation above, all of the coefficients of labor force stock, capital stock, and educational expenditures of governments have a positive effect. However, among the set of variables, the effect of educational expenditure by the government is not significant. On the other hand, the coefficient of error term is equal to -0.65. This value is a suggestion that about 0.65 percent of the error of disequilibrium in each period is adjusted in the next period. In addition, this coefficient represents the adjusted rate from short-term period to long-term equilibrium, when the adjusted rate in the Keynesian model is higher than that in long-term model of Wagner. Generally, unlike the previous Keynes equation in this model, the coefficient of the capital stock variable has positive impact on real GDP. The index represents the speed of adjustment in the short term to the long-run equilibrium period - although compared to the long-term adjustment in the Wagner model. The labor force stock also has a positive impact in this regard. On the other hand, the educational expenditures variable has a positive impact in the short-term, while its impact is negative on the long-term. It is perhaps due to the fact that increasing expenditures in the short-term leads to a quantitative growth in human capital and an increased production. But if the long term effect is a positive/ negative effect; maybe it's because of the increase in expenditure in education on the short term growth of the quantitative human capital and increase production. But much qualitative growth is not seen in the long-term. Therefore, an increase in these set of expenditure leads to a waste of material resources.

COMPARING THE ESTIMATED KEYNESIAN MODEL

In concluding the Keynesian model estimations, it can be generally said that educational expenditure unlike real expenditure of the government, has a long-term relationship. And this indicates that this variable has a greater effect compared to the total expenditure and it will lead to increased GDP in the future. The variable, capital stock, in both models has a similar effect on real GDP. It can be analyzed on the basis that the educational expenditures and total real expenditures do not change the role of capital stock in the short-term model. Additionally, it leads to a change in the labor force coefficients of these two models. So by changing the labor force variable in the presence of the total expenditure and educational expenditure, the coefficient is negative and positive respectively. It means that educational expenditure will influence the labor force to play a more effective role in the real GDP.

CONCLUSION

Using annual data of Iran's economy during 1981-2012, this study examined Wagner's law and the Keynesian hypothesis about the relationship between government real expenditure and real GDP. In this paper, we have used bivariate and multivariate models. In this regard, the relationship between total government expenditures and GDP and the relationship between government educational expenditure and GDP were studied. Using a multivariate model to reduce the specified error issues that have not been considered in many studies, the co-integration was examined

using auto regressive distributive lag method (ARDL) of long-term and short-term relationships. In Wagner's view, the variables of real GDP, capital stock, and labor force stock having a positive, negative, and positive impact on the total expenditure of the government, respectively, on a long-term relationship is true in this regard. In addition, capital stock in both models, with its lagged variable, have similar effects on real GDP. And the variable of labor force, in the presence of total expenditures and educational expenditures, the coefficient is negative and positive respectively. Generally, the similarity in the Wagner's model, during the long-term and short-term period, is that the variables of capital stock, real GDP, and labor force stock have always had positive, positive, and negative impacts. In the Keynesian model, unlike the equation that emphasizes on public expenditures of the government in the educational expenditure model, the coefficient of capital stock variable has positive impact on real GDP. In addition, labor force stock also had a positive impact. On the other hand, the variable educational expenditures have a positive impact in the short-term, while its impact is negative in the long-term.

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SERVICE PERFORMANCE IN PUBLIC HEALTHCARE SYSTEM: DATA ENVELOPMENT ANALYSIS

LA PRESTACIÓN DEL SERVICIO EN EL SISTEMA PÚBLICO DE SALUD: ANÁLISIS ENVOLVENTE DE DATOS

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ABSTRACT

As well as companies that compete in market, in public health system organizations compete to satisfy customer's need, and therefore identifying those needs and delivering the value is critical in success. Return to Scale and Damage to Scale are measures. In this study data envelopment analysis is developed to measure the Return to Scale and Damage to Scale in public health organization. Two new assumptions for production possibility set are proposed as Weak Natural Disposability and weak managerial disposability. Then three types of models including efficiency evaluation, Return to Scale determination, and Damage to Scale determination are proposed based on radial and non-radial models. A case study is handled using real data of 33 hospitals in Tehran. Each hospital is assumed as a decision-making unit with 4 inputs, 2 desirable outputs, and 2 undesirable outputs. The proposed approaches are straightforward and applicable for real world problems.

KEYWORDS

Scale Efficiency; Return to Scale; Damage to Scale; Healthcare performance; Hospital Performance.

RESUMEN

Al igual que las empresas que compiten en el mercado, las organizaciones del sistema público de salud compiten para satisfacer las necesidades de los clientes y, por lo tanto, es fundamental identificar dichas necesidades y entregar valor para alcanzar el éxito. Los Rendimiento de Escala y Daños de Escala se utilizan como medidas. En este estudio, el análisis envolvente de datos se desarrolla para medir los Rendimientos y Daños de Escala en una organización pública de salud. Se proponen dos nuevos supuestos para la posibilidad de producción: Baja disponibilidad natural y baja disponibilidad de gestión. Seguidamente, se proponen tres tipos de modelos basados en modelos radiales y no radiales que incluyen la evaluación de la eficiencia, la determinación de los rendimientos de escala y la determinación de los daños de escala. Se maneja un estudio de caso que utiliza datos reales de 33 hospitales de Teherán, Irán. Cada hospital se asume como una unidad de toma de decisión de cuatro insumos (*inputs*), dos productos (*outputs*) deseables y dos productos (*outputs*) indeseables. Los enfoques propuestos son sencillos y aplicables a los problemas del mundo real.

PALABRAS CLAVE

Eficiencia de escala; Rendimientos de escala; daños de escala; desempeño del Sistema de salud.

INTRODUCTION

Data envelopment analysis (DEA), as a linear programming technique, serves several benefits in comparison with the other techniques for performance

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measurement. DEA requires no preference articulation on priority of inputs/outputs, and can estimate the production function as a non-parametric approach. DEA determines the efficient DMUs among others, and suggests the projection of efficiency for the inefficient DMUs. Moreover, Return to Scale (RTS) issues can be determined using an especial variants of DEA models. There are several successful applications of DEA models in the healthcare systems (Chowdhury and Zelenyuk, 2015). Thanassoulisa, Portelab and Graveneyc (2016) identify the usefulness of the length of stay of each episode and explores the differences between hospitals and between the care teams within the hospitals.

Thus, in this study DEA models are developed in order to measure the efficiency scores, RTS and Damage to Scale (DTS) issues of Iranian public health organizations in Tehran. The main objectives of this research are:

1. The development of DEA models to measure the efficiency scores of public health organization with multiple inputs/outputs.
2. The development of mathematical models in order to measure the return/DTSs in public health organizations.
3. And finally, the application of the proposed models in a real case study.

The structure of this paper is as follows. In Section 2, literature of past works is reviewed. In Section 3 the proposed models are developed. In Section 3, new models for assessing Tehran's health systems are presented, decision-making departments, factors would be defined. the solution algorithm that is applied for finding the application of scale in radial and non-radial position is presented. The justification of the application of such models will be discussed in Section 3. In Section 4, the case study and data analysis are presented. The results and findings are presented in Section 5. On the other hand, in Section 5, the Weak Natural Disposability (WND) and weak managerial disposability (WMD) models' results are presented in both radial and non-radial status. The models are used for the evaluation of public health organization of Medicinal Universities using desirable and undesirable outputs. And also, the economics of scale of public health organization has been defined using radial, non-radial models and the obtained results were compared using the collected data. Finally, the paper will be summarized in Section 6 with concluding remarks and future research directions.

LITERATURE OF PAST WORKS (APPLICATION OF DEA MODELS IN HEALTHCARE)

Although hospital efficiency analysis has attracted a large number of studies (e.g., see Goldstein et. al., 2002; Hollingsworth, 2003; O'Neill et al., 2008; Garcia-Lacalle and Martin, 2010; Rosko and Mutter, 2011; Mitropoulosa et al., 2015 and Thanassoulisa et al., 2016), there are less research whose focal point is on analyzing the determinants of hospital efficiency (e.g., Grosskopf et al., 2004; Lee et al., 2008; Blank and Valdmanis, 2010; Tsekouras et al., 2010; Cristian and Fannin, 2013; Ding, 2014). DEA is a method which evaluates service providers and defines a rate as the ratio of perceived performance to its closed potential. Or it shows the amount of the

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desirable efficiency of resources. In a juxtapose with the above results, Gok and Sezen (2013) showed that efficiency of small hospitals is relatively more, and satisfaction is higher compared to medium and large hospitals.

The theoretical improvement of the DEA approach commences with the influencing study of Charnes, Cooper and Rhodes (1979) towards the efficiency evaluation of DMUs. Mentioned in the first application of DEA in the health care sector was the works by Nunamaker (1983). Since then, DEA was vastly used for technical efficiency of public health organization in US and other parts of the world. Sherman (1984) was the first scholar who applied DEA for technical efficiency evaluation of public health organization in the US. Sherman (1984) analyzed factors like budget, day beds, number of full-time physicians, +65 years old patients, -65 years old patients, instructed nurses and interns as inputs and outputs. Butler and Li (2005) evaluated the benefits of RTS in DEA for rural public health organization of Michigan State. They used the BCC model and considered all the costs except salaries, the number of hospital beds, number of services and total number of employees as inputs, and the number of days of care for a patient, number of surgery operations, number of emergency rooms and number of hospitalized patients as outputs. Al-Shammari (1999) investigated the efficiency of 15 public health organization. He considered the number of beds' active days, number of physicians, and number of personnel as input and number of hospitalized days, number of emergency surgeries, and number of general surgeries as output.

Tsai and Mar (2002) surveyed the scale efficiency in five departments of public health organizations in Britain using the variable RTS assumption that considered sum of operational costs, number of hospitalized, and emergency patients as main criteria Nayar and Ozcan (2008) investigated efficiency of Virginia public health organization using DEA. The results demonstrated that in most cases, working on quality resulted in an increase in hospital costs and hence efficiency was decreased. Joses et al., (2008) measured the efficiency of 54 public health organization in Kenya - although they found that there was a big gap between scientific and real-life evaluation of health care departments in Africa's central Sahara. The obtained results showed that %26 of public health organization were inefficient. The projection of inefficient DMUs towards efficient frontier was calculated.

Kawaguchi, Tone and Tsutsui (2014) applied DEA for evaluating the efficiency of governmental public health organization. They applied both static and dynamic DEA models and categorized public health organization into two namely: managerial and operational departments. The obtained results demonstrated that there was a slight difference between static and dynamic models.

FORMULATION OF PROPOSED MODEL

There are several approaches and perspective when measuring efficiency scores using DEA models. In this section, some commonly used approaches are briefly presented.

WEAK AND STRONG DISPOSABILITY

Assumeas $Y \in R^m$ input vector, $Y \in R^s$ as desirable output vector, and $Y \in R^h$ as undesirable output vector. Therefore, the possibility production set (PPS) in a weak consumption environment would be defined as (1).

$$P^W = \{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B = \sum_{j=1}^{n} \lambda_j B_j, X \geq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, (j = 1 \dots n)\} \quad (1)$$

Where, DMU_j is assessed under weak disposability approach if it seeks to increase desirable outputs and decrease inputs while the undesirable outputs are assumed to be constant (Sueyoshi, and Goto, 2011a; Sueyoshi and Goto, 2012a).

In a strong disposability approach, DMU_j attempts to increase both desirable and undesirable outputs while the inputs are assumed to be decreased (Sueyoshi, and Goto, 2011b; Sueyoshi and Goto, 2012b). In this way, the PPS is defined as (2).

$$P^S = \left\{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B \leq \sum_{j=1}^{n} \lambda_j B_j, X \geq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, (j = 1 \dots n)\right\} \quad (2)$$

NATURAL AND MANAGERIAL DISPOSABILITY

The natural and managerial consumption approach was presented first in a study by Sueyoshi and Goto (2012c) and later in many other researches (Cooper, Seiford and Zhu, 2011; Sueyoshi and Goto,2012d; Sueyoshi and Goto,2012e; Sueyoshi and Goto,2012f). Under such conditions, the influence of the input vector on the increase and decrease of inputs is discussed. In the natural disposability approach, with an increase in input vectors, we attempt to decrease undesirable output vectors and increase desirable vectors. In this way, the PPS is defined as (3).

$$P^N = \{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B \geq \sum_{j=1}^{n} \lambda_j B_j, X \geq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, (j = 1, \dots n)\} \quad (3)$$

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But in some cases, a DMU tries to develop available resources assuming an increase in inputs leads to an increase in desirable outputs and a decrease in undesirable outputs. In this way, the preliminary hypotheses of classic CCR and BCC models are not supported. In this way, the PPS would be shown as (4).

$$P^M = \{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B \geq \sum_{j=1}^{n} \lambda_j B_j, X \leq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, (j = 1, \dots n)\} \quad (4)$$

NEW PROPOSED PPSS: NATURAL/ MANAGERIAL CONSUMPTION CONSIDERING WEAK DISPOSABILITY

In this study, based on the requirement of case study, a new condition for PPS is proposed in which a combination of natural and managerial approaches under weak disposability condition is used. Assume that DMU is not responsible for any changes made in undesirable outputs. Moreover, DMU tries to increase desirable outputs through increasing inputs, therefore the two types of PPS would be shown as follows.
- A PPS under natural consumption approach considering weak disposability can be shown as (5).

$$P^{WN} = \{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B = \sum_{j=1}^{n} \lambda_j B_j, X \geq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, j = 1 \dots n \quad (5)$$

And a PPS under managerial consumption approach considering weak disposability can be shown as (6).

$$P^{WM} = \{(G,B): G \leq \sum_{j=1}^{n} \lambda_j G_j, B = \sum_{j=1}^{n} \lambda_j B_j, X \leq \sum_{j=1}^{n} \lambda_j X_j, \sum_{j=1}^{n} \lambda_j = 1, \lambda_j \geq 0, j = 1 \dots n \quad (6)$$

Thus, in this study, two new types of PPS are used to develop the radial and non-radial DEA models. The developed models under such circumstances are used to determine the return and DTSs at some public health organization in Tehran.

FORMULATION

In this subsection, the proposed models of this study, under several assumptions, are developed. All models are proposed in both radial and non-radial situations. In radial models, inputs and outputs are changing simultaneously but in non-radial models, one of the inputs or outputs would change per request and the changes are separate. In order to making a better sense for readers, Models are proposed in two main classes known as the WND models, and weak managerial disposability models. In each classes several models are discussed. On the other hand, in each classes radial and non-radial models are proposed, and for each case a model is proposed to calculate for efficiency evaluation, and a procedure is proposed to determine the scale efficiency and RTS situation.

Table 1 presents indices, parameters, decision variables, and sets which are used in this section.

Table1. Notations used in the proposed models.

Sets	
m	Number of inputs
n	Number of DMUs
s	Number of good outputs
h	Number of bad outputs
Indices	
j	Index of DMUs, $j=1,2,\ldots,n$
k	DMU under assessment
i	Index of Inputs $i=1,2,\ldots,m$
r	Index of good outputs, $r=1,2,\ldots,s$
f	Index of bad outputs, , $f=1,2,\ldots,h$
Parameters	
x_{ij}	i-th Input of DMU_j
G_{rj}	r-th good output of DMU_j
B_{fj}	f-th bad output of DMU_j
R_i^x	Range of input i
R_r^g	Rang of good output r
R_f^b	Rang of bad output f
	Decision Variables
u_r	Decision variable of good output r (multiplier form)
w_f	Decision variable of bad output f (multiplier form)
v_i	Decision variable of input i (multiplier form)
d_i^x	Surplus variable for input i
d_r^g	Slack variable for good output r

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Table1. Notations used in the proposed models. Continued

d_f^b	Slack variable for bad output *f*
λ	Decision Variable for envelopment form
θ	Efficiency score
SE	Scale Efficiency
SD	Scale of Damage
μ	RTS value under WND for Radial model
π	RTS value under WND for non-radial model
η	DTS value under WMD for radial model
δ	Index of DTS under WMD for non-radial model
ξ	Output oriented projection towards efficient frontier (multiplier form)
ε	A very small positive number between 0.0001 and 0.0000001

WND MODLES

Radial Model for Efficiency Evaluation under WND

In this scenario as shown in (5), efficiency would be investigated using a decrease in input level and an increase in desirable output level and keeping undesirable outputs fixed. To calculate Unified Efficiency (UE) under WND approach, the Model (7)-(14) is proposed.

$$Max\ UE = \xi + \varepsilon\left(\sum_{i=1}^{m} R_i^x\, d_i^x + \sum_{r=1}^{s} R_r^g\, d_r^g\right) \tag{7}$$

s.t.

$$\sum_{j=1}^{n} X_{ij}\lambda_j + d_i^x = X_{ik} \tag{8}$$

$$\sum_{j=1}^{n} G_{rj}\lambda_j - d_r^g = (1+\xi) * G_{rk} \tag{9}$$

$$\sum_{j=1}^{n} B_{fj}\lambda_j = B_{fk} \tag{10}$$

$$\sum_{j=1}^{n} \lambda_j = 1, \quad \lambda_j \geq 0 \quad (j = 1, \ldots, n) \tag{11}$$

Unified Efficiency (θ^*) under WND model would also be calculated as (15) using slack variables.

$$\theta^* = 1 - (\xi + \varepsilon(\sum_{i=1}^{m} R_i^x\, d_i^{x^*} + \sum_{r=1}^{s} R_r^g\, d_r^{g^*}) \tag{12}$$

The dual of WNDR[2] Model (7)-(14) can be written as multiplier form Model (16)-(22).

$$Min \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{f=1}^{h} w_f B_{fk} + \sigma \quad (13)$$

s.t.

$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (14)$$

$$\sum_{r=1}^{s} u_r G_{rk} = 1 \quad (15)$$

$$v_i \geq \varepsilon R_i^x (i = 1, \dots, m), \quad (16)$$

$$w_f > \varepsilon R_f^b \ (f = 1, \dots, h) \quad (17)$$

$$u_r \geq \varepsilon R_r^g (r = 1, \dots, s) \quad (18)$$

$$\sigma Free\ in\ Sign \quad (19)$$

It is notable that the optimum value of Model (7)-(14) is equal to optimum values of Models (16)-(22) due to the duality theorem in linear programming.

NON-RADIAL MODEL FOR EFFICIENCY EVALUATION UNDER WND

To calculate Unified Efficiency (UE) under the WNDNR[3] approach, Models (23)-(31) are proposed.

$$Max\ UE = \sum_{i=1}^{m} R_i^x d_i^x + \sum_{r=1}^{s} R_r^g d_r^g \quad (20)$$

s.t.

$$\sum_{j=1}^{n} X_{ij} \lambda_j + d_i^x = x_{ik} \quad (21)$$

$$\sum_{j=1}^{n} G_{rj} \lambda_j - d_r^g = G_{rk} \quad (22)$$

$$\sum_{j=1}^{n} B_{fj} \lambda_j = B_{fk} \quad (23)$$

$$\sum_{j=1}^{n} \lambda_j = 1, \quad (24)$$

Again, the unified Efficiency (θ^*) under WNDNR model can be calculated same as the WND Model.

2. WND Radial
3. WND Non-Radial (WNDNR)

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The duality of the WNDNR Model (23)-(31) can be written as multiplier form Model (33)-(38).

$$Min \ \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{f=1}^{h} w_f B_{fk} + \sigma \tag{25}$$

s.t.

$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \tag{26}$$

$$v_i \geq \varepsilon R_i^x (i = 1, \dots, m) \tag{27}$$

$$u_r \geq \varepsilon R_r^g (r = 1, \dots, s) \tag{28}$$

$$w_f \geq \varepsilon R_f^b \ (f = 1, \dots, h) \tag{29}$$

$$\sigma Free \ in \ Sign \tag{30}$$

It is notable that due to the duality theorem in linear programming, the optimum objective values of both Models (23)-(31) and (33)-(38) are equal.

The range adjusted measure (RAM) of efficiency model which was first proposed by Cooper, Park and Pastor (2000), is used here in order to adjust the range of inputs and outputs.

SCALE EFFICIENCY AND RTS CALCULATIONS UNDER WND

Scale Efficiency (SE) score in both radial and non-radial states are the same, but the RTS sign would be calculated separately based on the following algorithm.

Now, in order to define economic scale of inefficient units, first an image of inefficiency was extracted and the rate of inefficiency obtained using (43).

$$SE = \frac{\sum_{i=1}^{m} v_i^* (x_{ik} - d_i^{x^*})}{\sum_{r=1}^{s} u_r^* (G_{rk} + d_r^{G^*})} = \frac{1}{1 + (\sigma^* / \sum_{i=1}^{m} v_i^* (x_{ik} - d_i^{x^*})} \tag{30}$$

In order to calculate RTS for radial models, first the two maximization and minimization models (44)-(59) should be solved.

$$Min \ (Max) \ \mu = \sigma \tag{31}$$

s.t.

$$\xi + \varepsilon\left(\sum_{i=1}^{m} R_i^x\, d_i^x + \sum_{r=1}^{s} R_r^g\, d_r^g\right) = \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (33)$$

$$\sum_{j=1}^{n} X_{ij}\lambda_j + d_i^x = x_{ik} \quad (34)$$

$$\sum_{j=1}^{n} G_{rj}\lambda_j - d_r^g = (1+\xi)G_{ik} \quad (35)$$

$$\sum_{j=1}^{n} B_{fj}\lambda_j = B_{ik} \quad (36)$$

$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (37)$$

$$\sum_{r=1}^{s} u_r G_{rj} = 1 \quad (38)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (39)$$

$$\lambda_j \geq 0, (j = 1, \ldots, n) \quad (40)$$

$$v_i \geq \varepsilon R_i^x, (i = 1, \ldots, m) \quad (41)$$

$$u_r \geq \varepsilon R_r^g, (r = 1, \ldots, s) \quad (42)$$

$$w_f \geq \varepsilon R_f^b, (f = 1, \ldots, h) \quad (43)$$

Using the calculated upper and lower limit of μ^* per each DMU, the RTS of DMUk is determined as follows: if $0 > \overline{\mu^*} \geq \underline{\mu^*}$ there is increasing return to scale, if $\overline{\mu^*} > 0 \geq \underline{\mu^*}$ there is constant return to scale, and if $\overline{\mu^*} \geq \underline{\mu^*} > 0$ there is decreasing return to scale.

In order to calculate RTS for non-radial models, first the two maximization and minimization models (60)-(75) should be solved.

Min (Max) $\pi=\sigma$

s.t.

$$\sum_{i=1}^{m} R_i^x\, d_i^x + \sum_{r=1}^{s} R_r^g\, d_r^g = \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (45)$$

$$\sum_{j=1}^{n} X_{ij}\lambda_j + d_i^x = x_{ik} \quad (46)$$

$$\sum_{j=1}^{n} G_{rj}\lambda_j - d_r^g = G_{rk} \quad (47)$$

$$\sum_{j=1}^{n} B_{fj}\lambda_j = B_{fk} \quad (48)$$

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$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (49)$$

$$\sum_{r=1}^{s} u_r G_{rj} = 1 \quad (50)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (51)$$

$$\lambda_j \geq 0, (j = 1, \dots, n) \quad (52)$$

$$v_i \geq \varepsilon R_i^x, (i = 1, \dots, m) \quad (53)$$

$$u_r \geq \varepsilon R_r^g, (r = 1, \dots, s) \quad (54)$$

$$w_f \geq \varepsilon R_f^b, (f = 1, \dots, h) \quad (55)$$

Using the calculated upper and lower limit of π^* per each DMU, the RTS of DMUk is determined as follows: if $0 > \overline{\pi^*} \geq \underline{\pi^*}$ there is increasing return to scale, if $\overline{\pi} > 0 \geq \underline{\pi^*}$ there is constant return to scale, and if $\overline{\pi^*} \geq \underline{\pi^*} > 0$ there is decreasing return to scale.

WMD MODELS

Radial Model under WMD

To calculate Unified Efficiency (UE) under WMD using radial approach, Models (76)-(84) is proposed.

$$Max\ UE = \xi + \varepsilon \left(\sum_{i=1}^{m} R_i^x\, d_i^x + \sum_{r=1}^{s} R_r^g\, d_r^g \right) \quad (56)$$

s.t.

$$\sum_{j=1}^{n} X_{ij} \lambda_j + d_i^x = X_{ik} \quad (57)$$

$$\sum_{j=1}^{n} G_{rj} \lambda_j - d_r^g = (1 + \xi) * G_{rk} \quad (58)$$

$$\sum_{j=1}^{n} B_{fj} \lambda_j = B_{fk} \quad (59)$$

$$\sum_{i=1}^{n} \lambda_j = 1 \quad (60)$$

Then, Unified Efficiency (θ^*) under WMDR model would be calculated again same as WND Model

The dual of WMDR Model (76)-(84) can be written as multiplier form Models (86)-(93).

$$Min \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (61)$$

$$s.t. \quad (62)$$

$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (63)$$

$$\sum_{r=1}^{s} u_r G_{rk} = 1 \quad (64)$$

$$v_i \geq \varepsilon R_i^x (i = 1, \dots, m), \quad (65)$$

$$u_r \geq \varepsilon R_r^g (r = 1, \dots, s) \quad (66)$$

$$w_f \geq \varepsilon R_f^b, (f = 1, \dots, h) \quad (67)$$

$$\sigma \ free \ in \ sign \quad (68)$$

It is notable that due to duality theorem in linear programming the optimum objective values of both Models (76)-(84) and (86)-(93) are equal.

Non-radial Model under WMD

To calculate Unified Efficiency (UE) under Weak Managerial Disposability considering a non-radial situation, Models (94)-(101)are proposed.

$$Max \ UE = \sum_{i=1}^{m} R_i^x \, d_i^x + \sum_{r=1}^{s} R_r^g \, d_r^g \quad (69)$$

$$s.t.$$

$$\sum_{j=1}^{n} X_{ij} \lambda_j + d_i^x = x_{ik} \quad (70)$$

$$\sum_{j=1}^{n} G_{rj} \lambda_j - d_r^g = G_{rk} \quad (71)$$

$$\sum_{j=1}^{n} B_{fj} \lambda_j = B_{fk} \quad (72)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (73)$$

The dual of Model (94)-(101) can be written as Models (103)-(108).

$$Min \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (74)$$

$$s.t.$$

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$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (75)$$

$$v_i \geq \varepsilon R_i^x (i = 1, \dots, m) \quad (76)$$

$$u_r \geq \varepsilon R_r^g (r = 1, \dots, s) \quad (77)$$

$$w_f \geq \varepsilon R_f^b (f = 1, \dots, h) \quad (78)$$

$$\sigma \; free \; in \; sign \quad (79)$$

It is clear that due to the duality theorem in linear programming the optimum objective values of both Models (94)-(101) and (103)-(108) are equal.

SCALE EFFICIENCY AND RTS CALCULATIONS UNDER WEAK MANAGERIAL DISPOSABILITY

The Scale Efficiency (SE) score in both radial and non-radial states are the same, but RTS sign would be calculated separately based on the following algorithm. If DMUk is efficient under the WMD assumption, the efficiency score would be calculated using (42). Now, in order to define economic scale of inefficient units, first an image of inefficiency was extracted and the rate of inefficiency obtained using (43). In order to calculate RTS for radial models, first the two maximization and minimization models (109)-(124) should be solved.

$$Min\ (Max)\ \mu = \sigma \quad (80)$$

s.t.

$$\xi + \varepsilon \left(\sum_{i=1}^{m} R_i^x \, d_i^x + \sum_{r=1}^{s} R_r^g \, d_r^g \right) = \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (81)$$

$$\sum_{j=1}^{n} X_{ij} \lambda_j - d_i^x = x_{ik} \quad (82)$$

$$\sum_{j=1}^{n} G_{rj} \lambda_j - d_r^g = (1 + \xi) G_{ik} \quad (83)$$

$$\sum_{j=1}^{n} B_{fj} \lambda_j = B_{ik} \quad (84)$$

$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (85)$$

$$\sum_{r=1}^{s} u_r G_{rj} = 1 \quad (86)$$

$$\sum_{j=1}^{n} \lambda_j = 1 \quad (87)$$

$$\lambda_j \geq 0, (j = 1, \dots, n) \quad (88)$$

$$v_i \geq \varepsilon R_i^x, (i = 1, \dots, m) \quad (89)$$

$$u_r \geq \varepsilon R_r^g, (r = 1, \dots, s) \quad (90)$$
$$w_f \geq \varepsilon R_f^b, (f = 1, \dots, h) \quad (91)$$

Similar to the natural disposability conditions, using the calculated upper and lower limit of μ^* per each DMU, the RTS of DMUk is determined as follows: if $0 > \overline{\mu^*} \geq \underline{\mu^*}$ there is increasing return to scale, if $\overline{\mu^*} > 0 \geq \underline{\mu^*}$ there is constant return to scale, and if $\overline{\mu^*} \geq \underline{\mu^*} > 0$ there is decreasing return to scale.
In order to calculate RTS for non-radial models, first the two maximization and minimization models (125)-(140) should be solved.

$$Min\ (Max)\ \pi = \sigma \quad (92)$$
s.t.
$$\sum_{i=1}^{m} R_i^x d_i^x + \sum_{r=1}^{s} R_r^g d_r^g = \sum_{i=1}^{m} v_i X_{ik} - \sum_{r=1}^{s} u_r G_{rk} + \sum_{r=1}^{h} w_f B_{fk} + \sigma \quad (93)$$
$$\sum_{j=1}^{n} X_{ij}\lambda_j - d_i^x = x_{ik} \quad (94)$$
$$\sum_{j=1}^{n} G_{rj}\lambda_j - d_r^g = G_{rk} \quad (95)$$
$$\sum_{j=1}^{n} B_{fj}\lambda_j = B_{fk} \quad (96)$$
$$\sum_{i=1}^{m} v_i X_{ij} - \sum_{r=1}^{s} u_r G_{rj} + \sum_{r=1}^{h} w_f B_{fj} + \sigma \geq 0 \quad (97)$$
$$\sum_{r=1}^{s} u_r G_{rj} = 1 \quad (98)$$
$$\sum_{j=1}^{n} \lambda_j = 1 \quad (99)$$
$$\lambda_j \geq 0, (j = 1, \dots, n) \quad (100)$$
$$v_i \geq \varepsilon R_i^x, (i = 1, \dots, m) \quad (101)$$
$$u_r \geq \varepsilon R_r^g, (r = 1, \dots, s) \quad (102)$$
$$w_f \geq \varepsilon R_f^b, (f = 1, \dots, h) \quad (103)$$
$$\sigma\ free\ in\ sign \quad (104)$$
$$\xi \geq 0 \quad (105)$$
$$d_f^b \geq 0\ , (f = 1, \dots, h) \quad (106)$$
$$d_i^x \geq 0\ (i = 1, \dots, m)\ , d_r^g \geq 0\ (r = 1, \dots, s) \quad (107)$$

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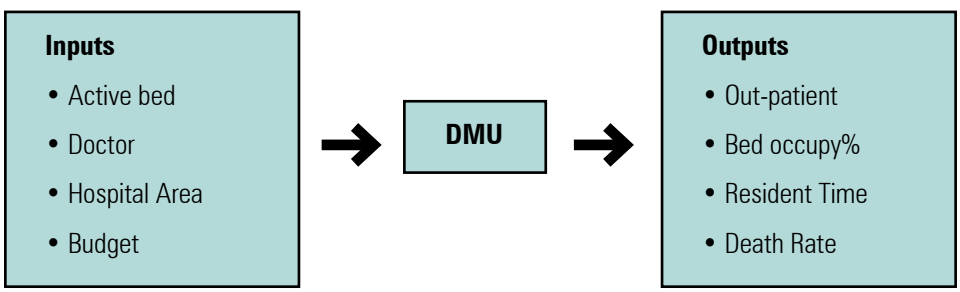
Again, using the calculated upper and lower limit of π^* per each DMU, the RTS of DMUk is determined as follows: if $0 > \overline{\pi^*} \geq \underline{\pi^*}$ there is increasing return to scale, if $0 > \overline{\pi^*} \geq \underline{\pi^*}$ there is constant return to scale, and if $\overline{\pi^*} \geq \underline{\pi^*} > 0$ there is decreasing return to scale.

CASE STUDY AND ANALYSIS OF THE RESULTS

The proposed models are applied in a real case study involving 33 public health organization in Tehran, Iran. A hospital is assumed as a DMU which uses inputs in order to produce outputs. Both WND and WMD situations are assumed for DMUs and all models are run and the results are discussed in this section. On the other hand, the efficiency score, scale efficiency, and RTS are calculated for both WND and WMD situations, using both radial and non-radial models. The schematic vies of a DMU is shown in Figure 1.

Figure 1. Schematic View of DMU (Hospital).



It is notable that due to anonymity of results of this research the name of public health organization are not reported.

RESULTS OF WND MODELS

In this part, the results of WND models in radial and non-radial cases are presented. Table 2 presents the result of Radial WND models in radial case. The results include efficiency scores, RTS of each DMU, slack variables of each input, and slack variable of each output.

Table 2. Results of Radial Models considering WND.

DMU	Efficiency	RTS	Slack of Inputs				Slack of Outputs			
			Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU1	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU2	0.72	CRS	1.94	71.30	7.28	0.15	0.98	-12.57	0.00	0.00
DMU3	0.83	CRS	8.99	2.54	0.00	0.17	1.51	-2.81	0.00	0.00
DMU4	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU5	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU6	0.65	DRS	14.74	75.28	0.00	0.25	0.87	6.38	0.00	0.00
DMU7	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU8	0.89	CRS	0.00	237.51	0.00	0.00	-0.17	-6.54	0.00	0.00
DMU9	0.97	DRS	5.38	289.65	0.00	0.00	1.05	3.73	0.00	0.00
DMU10	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU11	0.86	CRS	0.00	75.90	0.00	0.00	0.83	-11.11	0.00	0.00
DMU12	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU13	0.69	CRS	0.00	0.00	6.84	0.41	0.36	-8.20	0.00	0.00
DMU14	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU15	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU16	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU17	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU18	0.56	CRS	2.28	0.00	10.23	1.23	0.62	8.76	0.00	0.00
DMU19	0.68	CRS	0.00	32.51	0.00	0.00	-1.38	7.21	0.00	0.00
DMU20	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU21	0.88	CRS	5.09	0.00	17.45	0.00	-0.07	-5.64	0.01	0.00
DMU22	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU23	0.95	CRS	0.00	0.00	0.00	1.48	-0.40	-4.72	0.00	0.00
DMU24	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU25	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU26	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU27	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU28	0.87	CRS	13.02	225.08	0.00	0.00	-0.84	-18.12	0.00	0.00
DMU29	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU30	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU31	0.92	CRS	0.00	21.85	0.00	0.00	0.10	7.70	0.00	0.63
DMU32	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU33	0.86	DRS	0.00	132.46	0.00	3.45	2.03	-13.80	0.00	0.00

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Based on Table 2, 19 public health organization are efficient, and 14 public health organization are inefficient. Seventeen out of 19 efficient public health organization have constant RTS while 2 of efficient public health organization have decreasing RTS. The slack variables for all 19 efficient public health organization are equal to zero, and this means that these public health organization are strong efficient. It is notable that slack variables can help an inefficient hospital to find its projection towards an efficient frontier. On the other hand, the slack variables represent extra input used, and shortage of production of outputs. For instance, consider DMU_2 which is inefficient among all 33 DMUs. The efficiency score of DMU_2 is equal to 0.72. DMU_2 can improve its efficiency score using projection. If DMU2 reduces 1.94 of its doctors, 71.30 of its active beds, 7.28 of its hospital area, and 0.15 of its budget the inputs will be set. Moreover, DMU2 should improve the resident time 0.98, the death rate 12.57 in order to set its outputs. Under such changes DMU2 will be an efficient DMU among the other DMUs. The same analysis can be done based on Table 2 for all other inefficient DMUs.

In a similar way, Table 3 presents the result of WND models in non-radial case. Again, the results include efficiency scores, RTS of each DMU, slack variables of each input, and slack variable of each output.

Table 3. Results of Non-Radial Models considering WND.

			Slack of Inputs			Slack of Outputs				
DMU	Efficiency	RTS	Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU1	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU2	0.83	DRS	12.44	16.78	3111.11	1.67	0.00	0.00	0.13	1.02
DMU3	0.88	CRS	1.00	0.00	0.00	2.37	1.54	0.00	0.13	0.55
DMU4	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU5	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU6	0.71	IRS	14.54	82.23	0.00	4.38	0.43	12.85	0.18	1.24
DMU7	1.00	IRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU8	1.00	IRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU9	0.84	IRS	5.00	360.71	16942.86	0.43	0.26	5.86	0.00	0.02
DMU10	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU11	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU12	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 3. Results of Non-Radial Models considering WND. Continued

DMU	Efficiency	RTS	Slack of Inputs			Slack of Outputs				
			Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU14	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU15	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU16	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU17	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU18	0.77	DRS	19.19	19.10	2280.95	2.24	0.00	9.57	0.20	0.70
DMU19	1.00	IRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU20	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU21	0.79	DRS	13.59	48.75	22466.05	2.15	0.29	0.00	0.19	0.00
DMU22	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU23	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU24	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU25	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU26	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU27	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU28	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU29	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU30	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU31	0.93	DRS	0.00	36.13	9100.00	0.44	0.18	8.56	0.02	1.27
DMU32	1.00	DRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DMU33	1.00	CRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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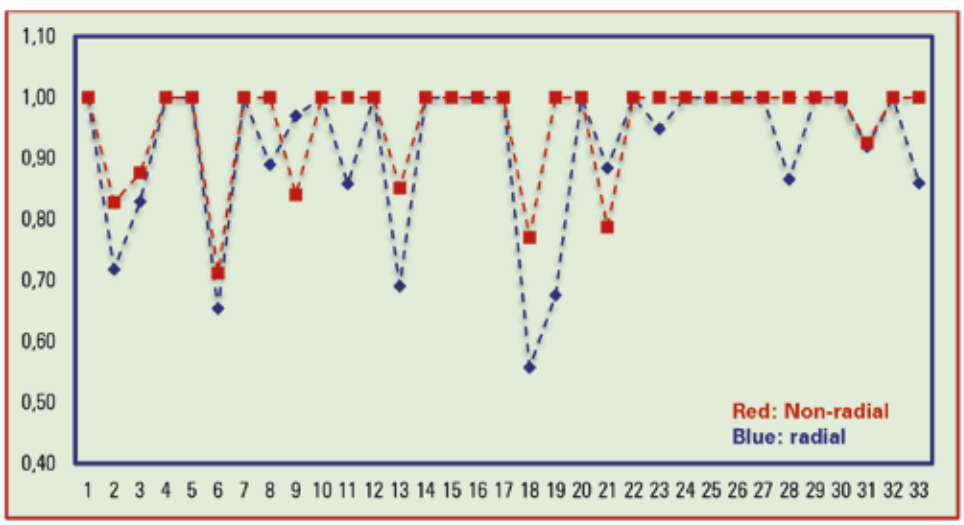
Similar analysis can be made on contents of Table 3. Twenty five public health organization are efficient, and 8 public health organization are inefficient. Eighteen out of 25 efficient public health organization have constant RTS, 2 of them have increasing RTS and 5 of efficient public health organization have decreasing RTS. Again the slack variables of all 25 efficient public health organization are equal to zero, and this means that public health organization are strong efficient. Slack variables can help an inefficient hospital to find its projection towards efficient frontier.

As it is clear from the contents of Table 2 and Table 3, the number of efficient DMUs in non-radial models are more than radial models. In order to make a better sense of the results under WND conditions, the efficiency scores of all DMUs for both radial and non-radial models are plotted in Figure 2.

Figure 2. WND Case: Comparison of Efficiency Scores of Radial and Non-Radial Models.



It could be concluded that radial models measure efficiency in a more precise way than non-radial models and the discrimination power of DEA approaches is decreased when using non-radial models as DMU can change its inputs and outputs independently, so it has more opportunity to close towards efficient frontier.

Results of WMD Models

In this part, the results of WMD models in radial and non-radial cases are presented. Table 4 presents the result of Radial WMD models in radial case. The results include efficiency scores, DTS of each DMU, slack variables of each input, and slack variable of each output.

Table 4. Results of Radial Models considering WMD.

DMU	Efficiency	DTS	Slack of Inputs				Slack of Outputs			
			Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU1	0.92	CDS	17.48	67.678	2400.499	0.12	-1.7	1.5199	0	0
DMU2	0.81	IDS	0	30.457	0	0	0.842	-6.025	0	0.38
DMU3	0.88	IDS	0	25.946	8731.289	0	0.359	-1.173	0	0
DMU4	0.98	CDS	0	9	18200	0	-2.1	1	0	0
DMU5	0.87	IDS	10	264	7400	1	-1.4	20	0	0.59
DMU6	1.00	IDS	0	0	0	0	0	0	0	0
DMU7	0.91	IDS	11.32	37.965	12631.64	1.51	-1.5	-2.035	0	0
DMU8	0.76	CDS	12.09	0	3279.67	1.04	-0.8	5.9637	0	0
DMU9	1.00	IDS	0	0	0	0	0	0	0	0
DMU10	1.00	CDS	0	0	0	0	0	0	0	0
DMU11	0.62	IDS	10.6	0	1815.189	2.51	-0	-7.31	0	0
DMU12	1.00	CDS	0	0	0	0	0	0	0	0
DMU13	0.69	IDS	0	81.158	0	0	1.08	-5.215	0	0.49
DMU14	1.00	CDS	0	0	0	0	0	0	0	0
DMU15	1.00	IDS	0	0	0	0	0	0	0	0
DMU16	0.87	IDS	0.092	0	3516.389	3.98	0.424	-12.07	0	0
DMU17	0.89	IDS	5.334	12.303	18761.61	2.65	-1.8	8.3969	0	0
DMU18	0.58	IDS	0	58.555	0	0	-0.3	11.538	0	1.34
DMU19	0.52	CDS	5.314	0	13831.42	0.64	-1.5	5.6106	0	0
DMU20	1.00	CDS	0	0	0	0	0	0	0	0
DMU21	1.00	IDS	0	0	0	0	0	0	0	0
DMU22	0.96	CDS	0.333	191.33	16333.33	0	1.8	2	0	1.14
DMU23	0.84	IDS	4.396	61.888	4334.419	0	-0.9	1.0615	0	0
DMU24	1.00	IDS	0	0	0	0	0	0	0	0
DMU25	1.00	IDS	0	224	10000	0	0.2	10	0	0.86
DMU26	0.97	IDS	32	57	5000	0	0.2	0	0.02	0
DMU27	1.00	IDS	0	0	0	0	0	0	0	0
DMU28	1.00	CDS	0	0	0	0	0	0	0	0
DMU29	1.00	IDS	0	0	0	0	0	0	0	0
DMU30	0.85	IDS	23.05	0	4400.292	4.09	-1.1	2.5414	0	0
DMU31	0.81	IDS	2.935	204.64	0	0.99	-0.3	21.707	0	0.26
DMU32	1.00	IDS	0	0	0	0	0	0	0	0
DMU33	1.00	IDS	0	0	0	0	0	0	0	0

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Based on Table 4, 14 public health organization were efficient and 19 public health organization were inefficient. Among 14 efficient public health organization, 5 public health organization had constant DTS and 9 public health organization had increasing DTS. The slack variables for all 14 efficient public health organization are equal to zero, and this means these public health organization are strong efficient.

In a similar way, Table 5 presents the result of Radial WMD models in non-radial case. Again, the results include efficiency scores, DTS of each DMU, slack variables of each input, and slack variable of each output.

Table 5. Results of Non-Radial Models considering WMD.

			Slack of Inputs			Slack of Outputs				
DMU	Efficiency	DTS	Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU1	0.82	IDS	8.3	156.8	16694.2	0.5	-1.7	8.4	0.2	0.0
DMU2	0.85	IDS	0.0	194.0	10000.0	1.0	0.0	5.0	0.0	1.7
DMU3	0.85	IDS	4.0	263.0	22000.0	0.0	0.4	18.0	0.0	0.7
DMU4	0.97	IDS	0.0	9.0	18200.0	0.0	-2.1	1.0	0.0	0.2
DMU5	0.68	IDS	25.0	409.0	12400.0	0.0	-1.7	6.0	0.0	3.1
DMU6	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU7	0.81	IDS	11.8	173.8	21270.1	1.4	-1.1	8.1	0.1	0.0
DMU8	0.76	IDS	24.0	42.0	12000.0	2.0	-1.4	13.0	0.0	2.4
DMU9	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU10	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU11	0.69	IDS	26.0	176.0	9000.0	2.0	0.1	6.0	0.1	2.1
DMU12	1.00	CDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU13	0.78	IDS	13.0	183.9	0.0	0.3	0.2	0.6	0.1	3.0
DMU14	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU15	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU16	0.79	IDS	9.4	319.8	13600.0	2.2	0.4	-3.0	0.0	0.1
DMU17	0.80	IDS	10.9	188.6	25513.8	2.2	-1.2	21.4	0.1	0.0
DMU18	0.74	CDS	3.0	280.0	9500.0	1.0	-1.1	27.0	0.1	3.3
DMU19	0.72	CDS	20.0	235.0	22000.0	0.0	-1.3	21.0	0.1	2.4

Table 5. Results of Non-Radial Models considering WMD. Continued

DMU	Efficiency	DTS	Slack of Inputs			Slack of Outputs				
			Doctor	Active Bed	Hospital Area	Budget	Resident Time	Death Rate	Bed occupy	Out-Patient
DMU21	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU22	0.83	IDS	4.1	200.0	12700.0	0.8	2.2	-3.3	0.0	2.3
DMU23	0.87	IDS	4.9	0.0	12655.5	0.0	-2.2	-6.7	0.1	2.2
DMU24	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU25	0.90	IDS	0.0	224.0	10000.0	0.0	0.2	10.0	0.0	0.9
DMU26	0.80	IDS	13.9	40.6	20341.8	0.8	-0.3	-0.8	0.3	0.0
DMU27	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU28	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU29	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU30	0.67	IDS	24.0	205.0	16300.0	4.0	-0.6	18.0	0.1	0.1
DMU31	0.71	IDS	18.4	311.8	3600.0	1.2	-0.6	14.0	0.0	3.1
DMU32	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DMU33	1.00	IDS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Similar analysis can be made on contents of Table 5. Fourteen public health organization are efficient, and 19 public health organization are inefficient. One out of 14 efficient public health organization have constant DTS, and 13 of efficient public health organization have increasing DTS. Again the slack variables of all 19 efficient public health organization are equal to zero, and this means that public health organization are strong efficient. Slack variables can help an inefficient hospital to find its projection towards efficient frontier.

As it is clear from contents of Table 4 and Table 5, the number of efficient DMUs in non-radial and radial models are equal, although the average efficiency scores in non-radial model is quite higher than the average efficiency scores in radial model. In order to make a better sense of the results under WMD conditions, the efficiency scores of all DMUs for both radial and non-radial models are plotted in Figure 3.

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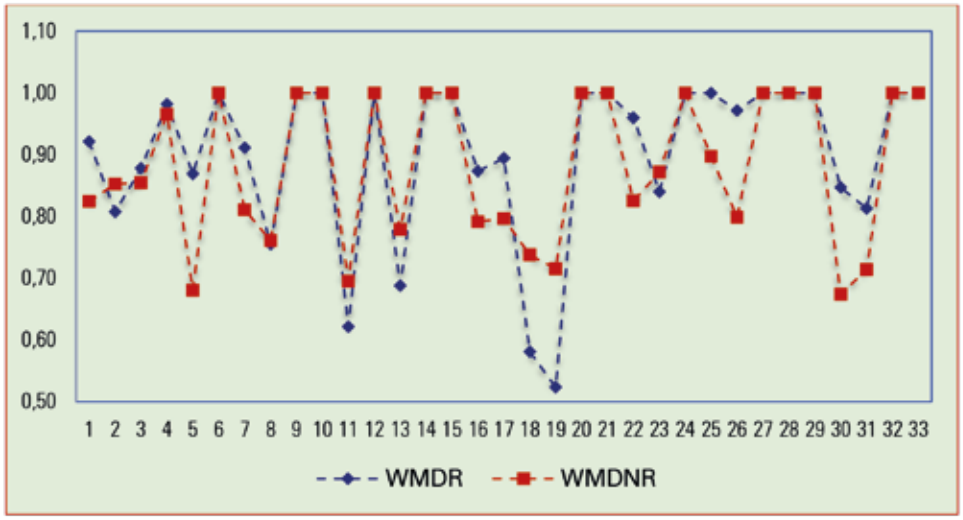
Figure 3. WMD Case: Comparison of Efficiency Scores of Radial and Non-Radial Models.



Discussion and Further investigation

Table 6 presents the summary results of WMD and WND cases for both radial and non-radial models.

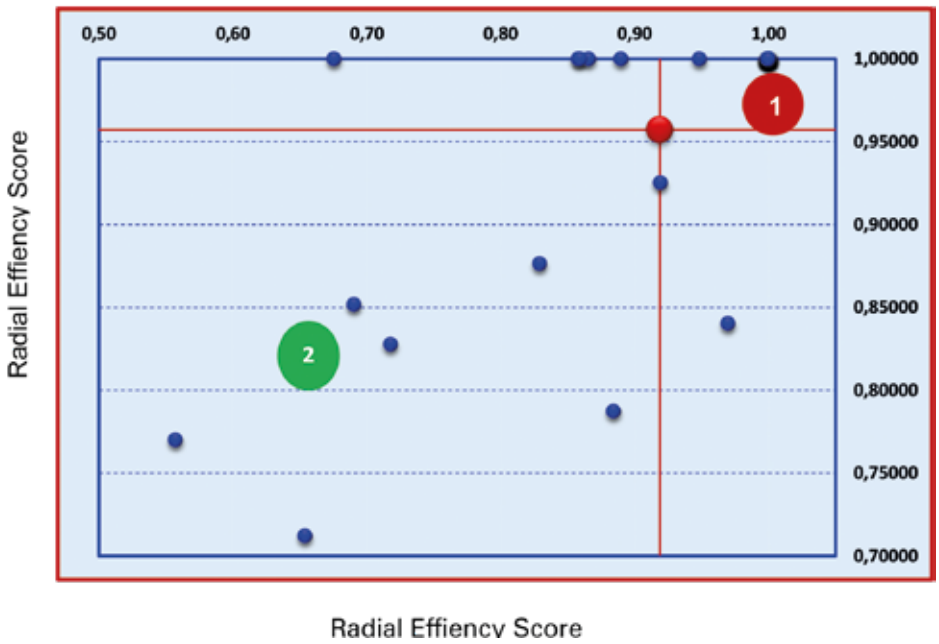
Table 6. Summary Results of WMD and WND cases for radial and non-radial models.

Radial/ Non-radial	Non-Radial models				Radial models			
PPS Assumption	WMD		WMD		WND		WND	
No. of Efficient DMUs	14		14		25		19	
No. of Increasing RTS	30	13	10	9	5	2	0	0
No. of Constant RTS	3	1	23	5	19	18	28	17
No. of Decreasing RTS	0	0	0	0	9	5	5	2

In order to determine the position of a DMU, the following analysis is conducted. In WND case, first the average efficiency score for each radial and non-radial models have been calculated. Then, a 2-dimentional plot, as in Figure 4, is prepared. In Figure 4, the efficiency score of a DMU under radial and non-radial model in presence of WND situation has been plotted.

In WND case, first the average efficiency score for each radial and non-radial models have been calculated. Then, a 2-dimentional plot, as in Figure 4, is prepared. In Figure 4, the efficiency score of a DMU under radial and non-radial model in presence of WND situation has been plotted.

Figure 4. Radial VS Non-Radial Efficiency Scores WND case.



The red horizontal and vertical lines in figure 4, shows the average efficiency score values for both radial and non-radial models, respectively. The Figure 4 is divided into 4 regions. The DMUs in region 1, are the DMUs which their efficiency scores are higher than average in both radial and non-radial models under WND case. These DMUs are the best public health organization and the efficiency is stable in them. The DMUs in region 2, are the DMUs where their efficiency scores are lower than average in both radial and non-radial models under WND case. These DMUs are the worst public health organizations and the efficiency is very low in these organizations. This can give public health organization' managers proper insights for improvement.

The red point shows the average efficiency scores. The red horizontal and vertical lines in figure 4, shows the average efficiency score values for both radial and non-radial models, respectively. The Figure 4 is divided into 4 regions. The DMUs in region 1, are the DMUs which their efficiency scores are higher than average in both radial and non-radial models under WND case. These DMUs are the best public health organization and the efficiency is stable in them. The DMUs in region 2, are the DMUs which their efficiency scores are lower than average in both radial and non-radial models under WND case. These DMUs are the worst public health organization and the efficiency is very low in them. This can give public health organization' managers proper insights for improvement.

The analysis is conducted for WMD case. In Figure 5, the efficiency score of a DMU under radial and non-radial model in presence of WMD situation has been plotted.

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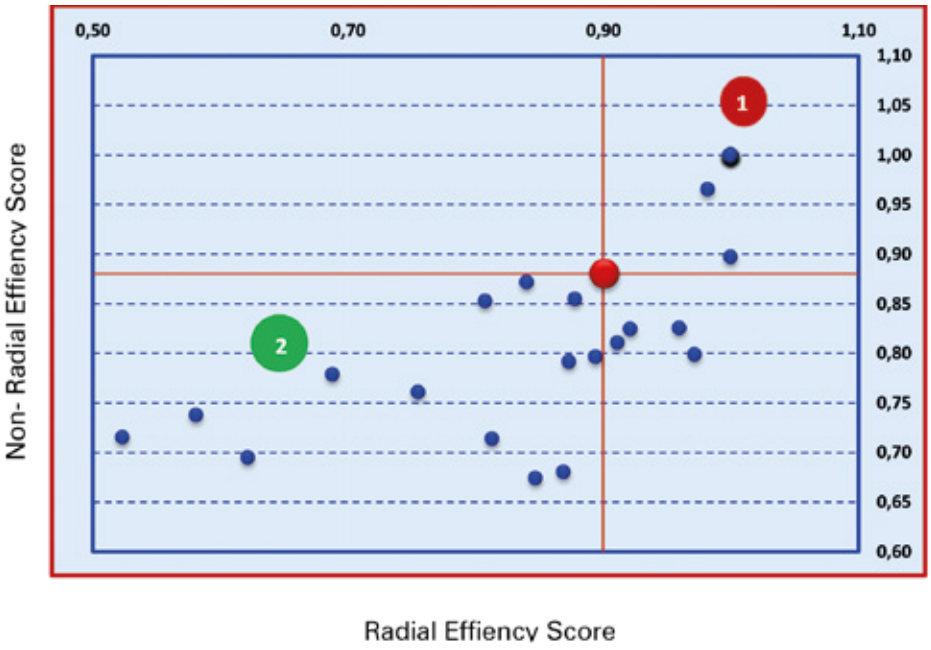
Figure 5. Radial VS Non-Radial Efficiency Scores WMD case.



Based on the information in Figure 4 and Figure 5, it is clear that the average efficiency score in both WND and WMD cases, when the non-radial mode is used to measure the efficiency, is low. Moreover, the efficiency scores of most of public health organization are less than the red horizontal line.

The situation is opposite when the radial model is used to measure the efficiency. Only few DMUs are settled down at the right side of vertical line of Figure 4 and Figure 5. This means that the average efficiency score in both WND and WMD cases, when the radial mode is used to measure the efficiency, is high.

The average efficiency scores for the WND situation are equal to 0.91 and 0.95 for radial and non-radial models, respectively. The average efficiency scores for WMD situation are equal to 0.90 and 0.88 for radial and non-radial models, respectively. Totally, it can be concluded from Figure 4, and Figure 5 that the average efficiency score is lower for WMD in comparison with WND situation

It is notable that the two PPS defined in this research (i.e., weak natural and weak managerial) have two completely different viewpoints towards efficiency. It means the natural viewpoint seeks to decrease inputs, to fix bad outputs, and to increase good inputs, while the managerial viewpoints tries to use more inputs, to produce more good outputs in a constant rate of bad outputs. So, as mentioned, in Table 2 and Table 3 the term RTS was used while in Table 4 and Table 5 the term DTS was used. It is clear that the strategies of these managers are different and opposite. Table 7 shows the associated strategy related to DTS and RTS.

Table 7. Associated Strategies related to DTS and RTS.

WND		WMD	
Associated Strategy	RTS	Associated Strategy	DTS
Increase in size is preferred	Increasing	Decrease in size is preferred	Increasing
No change in size is preferred	Constant	No change in size is preferred	Constant
Decrease in size is preferred	Decreasing	Increase in size is preferred	Decreasing

Practical Suggestion

Regarding the obtained results, it is suggested that policy makers and managers of public health organization apply the following suggestions in order to promote the performance of the public health organization. The proposed models of this study can be used to determine efficient DMUs, inefficient DMUs, and the associated return to scale/DTS of departments of public health organization. The scale efficiency results can be used to regulate hospital results such as the average hospitalization of a patient, or regulating the laboratory's schedule with routine examinations. The public health organization produce health cards in order to reduce patients' release time and settlement. The process of sending physicians' prescriptions to laboratory and receiving their reply should be reduced and summarized. The facilities and equipment's for surgery operations must be maintained using more accurate procedures. There is a need to establish a managerial system in order to operation room schedule efficiently. It is mandatory to handle the patients with a non-treatment medicinal disease as soon as possible in emergency unit. No hospitalizing if suggested for such patients.

CONCLUSION REMARKS AND FUTURE RESEARCH DIRECTIONS

In this paper, several models were proposed to measure the efficiency scores of systems in the presence of undesirable outputs. In this regards, two new assumptions on production possibility sets (PPS) were proposed. In the first assumption, the WND was proposed. Under the WND situation, a DMU's interest is to reduce its inputs in order to increase its good outputs while producing a constant value of bad outputs. In the second assumption, the WMD was proposed. Under the WMD situation, a DMU's interest is to increase its inputs in order to increase its good outputs while producing a constant value of bad outputs. On the other hand, the WND perspective seeks to meet the environmental issues while improving efficiency, and the WMD perspective seeks to develop the production rate in order to improve the efficiency. Based on these two PPSs and using radial and non-radial models, several models based on DEA were developed in order to measure the efficiency scores of DMUs, to determine the return to scale, and to determine the DTS. The proposed models and

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procedures were applied in 33 public health organization in Iran and the results were discussed for the case study. The main contribution of this study were as follows:

1) Introducing two new PPSs as WND and WMD;
2) Development of new models based on these PPSs to calculate the efficiency scores using both radial and non-radial approaches;
3) Proposing some procedure in order to determine the RTS of DMUs under WND situations;
4) Proposing some procedure in order to determine the DTS of DMUs under WMD situations;
5) Handling a real case study including 33 public health organization in Tehran, Iran.

The preceding points are proposed to researchers and scholars working in the field of performance measurement. The procedure of this paper can be conducted using strong natural disposability and strong managerial disposability. The results can be compared with the results of this study. The variable RTS was used in this study, other return to scales can be considered.

As there are several qualitative criteria in performance assessment, development of the procedure of this paper in presence of qualitative and uncertain criteria can be interesting. Other applications such as baking, energy sector, production and services can be handled using proposed models of this study.

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