

# Applying Knowledge Management Principles to Preserve Iranian Arts

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**Abstract:** Art is one of the most important heritages of past generations that which is transferred by artists from one generation to another. A lot of artists due to different reasons are not able to share their art with others. This paper aims to use existed principles in knowledge management in order to identify factors which are crucial for preserving the Iranian Arts. By the previous, the most important knowledge management practices consist of knowledge transferring, knowledge storing, knowledge generating, and knowledge applying. However, the outcomes of the interview adapt the knowledge management practices for preserving existing arts.

**Keywords:** Knowledge Management, Iran, Art, knowledge transferring, knowledge storing, knowledge generating, and knowledge applying

## 1. INTRODUCTION

Art is one of the critical topics for which we can use existed concepts in knowledge management in order to improve it. A lot of artists in history had no academic education and after their death many secrets of their art have not been transferred to next generation. Hence, employing such principles can remarkably contribute to preserve arts as well as experiences of artists.

Iran as the oldest country around the world due to its long history, is known as the cradle of many different arts and sciences. Different kingdoms and also attack of other countries led to initiation of various arts in this country which are not necessary to be presented in this paper. However, one of the main challenges during past 100 years is the improper management of heritage arts. Most of the old artists in fields of art crafts or music have passed away or are not willing to share their arts and experiences with others.

According to mentioned points above, this research firstly attempts to highlight existed principles in knowledge management. Later, the aim is to adapt these principles in knowledge management with arts.

## 2. LITERATURE REVIEW

Knowledge management (KM) emerged in 19<sup>th</sup> century and is a well-developed subject in both business and academic contexts. According to knowledge management principles, globally, the organizations generate and implement knowledge management principles in order to improve business process efficiency, increase quality and productivity of services and also identify new products and services for customers (Nguyen and Mohamed, 2011).

In addition, in field of technology, usually innovation is a direct consequence of knowledge management effectiveness (Darroch and McNaughton, 2002; Du Plessis, 2007; Manafi and Subramaniam, 2015) and also is due to being one of the key objectives to establish knowledge-creating organizations in order to improve their competitive advantages (Nonaka and Takeuchi, 1995).

### 2.1 Knowledge Management and Knowledge-Based Theories

Recent studies conducted in management and economic contexts are contributing to provide a knowledge-based theory of the organization that explores main reasons for existence of companies to create, integrate and utilize knowledge (Grant, 1996; Kogut and Zander, 1992). The knowledge based view (KBV) is initiated according to resource based view of the company that concentrates on strategic properties as the key source of having competitive advantage (Amit and Shoemaker, 1993). On the other side, based on KBV, knowledge is the key strategic resource that if managed appropriately, allows the organization to generate value from its production exploitation (DeCarolis and Deeds, 1999; Zack, McKeen and Singh, 2009; Donati and de Pablo, 2015). In addition, the company in fact is the manifestation of knowledge bearing entity which can manage its existed knowledge resources via its combinative dynamic abilities (Kogut and Zander, 1992). Moreover, as noted by Argote and Ingram (2000), "the challenge for those who are willing to create competitive advantage for their firm would be, however, in business strategy context, a lot of effort goes for understanding knowledge as the fundamental base of competitive advantage compared to explaining how firms can generate, retain and also transfer knowledge."

Thus, organizations should establish and perform a set of different initiatives or activities to contribute enhance their organizational abilities and exploit values; it means that they should employ knowledge management practices (Grant, 2002). The key goal of organizations utilizing knowledge management is to obtain knowledge awareness both collectively and individually and then form itself in such a way to efficiently and effectively employ organization's knowledge which is gained. According to Alavi and Leidner (2001), using the knowledge management practices, generally based on information and communication technologies (ICTs), results in positive organizational consequences for example improved communications and higher participation levels among employees, efficient problem solving and also effective time-to-market, better financial performance, improved marketing practices as well as better team performance in projects, so the widespread contribution of knowledge management leads to overall success of an organization. In addition, for technology intensive industries

in which competitive advantage significantly depends on the organizational ability to develop new processes and products continually, innovation appears to be the most critical issue for knowledge management (Nonaka and Takeuchi, 1995; Raisch and Birkinshaw, 2008; Subramaniam and Youndt, 2005).

## 2.2 Knowledge Management Practices

Knowledge management is a series of initiatives, activities and also strategies which organizations utilize to create, keep, transfer and use knowledge for organizational performance improvement (Alavi and Leidner, 2001; Zack et al., 2009). Mainly, explorative initiatives attempt to generate new knowledge while exploitative practices seek to utilize existing knowledge through transferring, sharing and applying those resources (Grant, 2002; March, 1991).

Knowledge creation includes generating new knowledge content or to replace existing content in tacit or explicit knowledge pool of the organization (Alavi and Leidner, 2001). Knowledge management initiation activities usually are relevant to internal knowledge development via R&D (Darroch and McNaughton, 2002). In addition, while organizations are generating knowledge and learn, they might lose track or forget the obtained knowledge (Alavi and Leidner, 2001). Therefore, storage activities of knowledge management that involve organization, structure and organizational knowledge retrieval, allow companies to keep an organizational memory that includes knowledge which can reside in different forms for instance stored information in electronic databases, written documentation, codified stored human knowledge in expert systems, tacit knowledge or processes achieved by individuals or groups and also documented organizational processes (Donate and de Pablo, 2015; Alavi and Tiwana, 2003; Zack, 1999).

In addition, knowledge management activities for transfer allows the employees to share, replicate and disseminate information into those places that require and can have good impacts on existing knowledge of companies. Therefore, the organization has to set up communication channels that might be formal, informal or impersonal (Alavi and Leidner, 2001). Lastly, knowledge application contributes integrating the knowledge from various sources to improve organizational capability via mechanisms which are according to norms, routines or decision-making in particular occasions (Grant, 1996). Knowledge management application practices therefore should concentrate on application and also integration of existing knowledge to organizational activities and solving the problems effectively and easier for the organization (Grant, 1996; Zack et al. 2009; Donate and de Pablo, 2015).

Effective knowledge management in previous studies is explained as a technique to improve innovation capacity of the organization. For example, according to an extensive study of reviewing relationship between KM and innovation, Darroch and McNaughton (2002) noted that in general, KM generation practices have relationship with innovation performance. Therefore, many scholars identified that there is a positive relationship between R&D efforts to create new ideas and innovation (Capon, Lehman and Hulbert, 1992; Zahra and Bogner, 1999). Other studies also revealed that there is a positive relationship between innovation and market knowledge acquisition or employees' knowledge (Li and Calantone, 1998; Lynn, Reilly and Akgun, 2000).

Based on such conclusions, KM practices which promote the new knowledge generation and also organizational learning are necessary for reaching the advantages according to innovation (Zack et al., 2009). Generally, such practices deal with learning via concerted variation processes, play and planned experimentation (Baum, Li and Usher, 2000). KM according to internal R&D practices to create knowledge (hiring and training research personnel, investing in equipment and research project evaluation) is so critical for the company to promote its innovation performance.

## 3. RESEARCH METHOD AND RESULTS

This research applied qualitative approach to adapt the best knowledge management practices for the existing art. By literature review, there are four main practices for knowledge management namely, knowledge generating, knowledge transferring, knowledge storing, and knowledge applying. So, several open questions were designed. These questions referred to the six experts (3 academicians and 3 artists). However, the questions are presented in following:

1. Who can contribute to preserve and improve the existing arts?
2. What are your suggestions for generating new arts or improving them?
3. What ways do you suggest to share the arts and artworks?
4. What methods do you suggest to storage of arts and artworks?
5. How we can exploit the existing arts and also artistic potentials in society?
6. Please mention any kind of suggestions or ideas that you have about arts and artworks.

The achieved results from the interview are mentioned in Table 1 as follows:

Table 1:

Questions	Interview Outcomes
Responsibility and Support	Government, ministry of culture, universities and schools, art institutes
Generating	Identifying the experts, gathering them together, motivating them to consult and share their experiences.
Transferring	Financial support of experts, appreciation and respecting them, identifying young talents, motivating the young talents to learn.
Storage	Employing new technologies such as camerawork, recording on CD, identifying different genres, categorizing different arts, accessibility for various arts across different parts of Iran.
Applying	Transferring the experiences of past generation to new generation, branding the existing arts, tourist attraction, presenting the artworks abroad, presenting as courses in universities globally.
Others	Advertisement to attract new generation; financial support to recognize masters; advertisement to attract traditional masters for collaboration; free workshops to promote existing arts

#### 4. CONCLUSION

Based on review of previous researches on knowledge management, it was concluded that important KM practices include transferring, storing, generating and also applying. After conducting the interview, due to finding the necessary solutions to use these practices in arts, different outcomes have been achieved (Table 1). At first, interviewees considered government support as the most important kind of support. Moreover, support by ministry of culture, schools and universities as well as art institute's play key roles in supporting and responsibility.

For the achieved results above, motivation in old and new generations is very critical. New generation and new talents should be identified in order to receive the experiences of old experts. In addition, old experts should be supported financially so that they will be willing to collaborate with other artists and also will share their experiences with students.

Future researches can study the achieved factors from interview with more details. For example, the effective factors on knowledge/art sharing in a quantitative research should be analyzed. Besides, a similar research can be performed for a specific art such as music.

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# Relationship between Organizational Factors and Corporate Entrepreneurship: A Study of Iranian Small and Medium Enterprises

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**Abstract:** The main purpose of this study is to examine the relationship between organizational factors and corporate entrepreneurship in Iranian SMEs. Organizational factors consist of management support, organizational values, organizational culture, formal control, work independency and empowerment, environmental monitoring, and organizational communication. 251 data gathered from 50 Iranian SMEs. The result of multiple regression analysis showed that all factors have significant and positive effects on corporate entrepreneurship. The highest impact referred to work independency and empowerment while the lowest impact referred to organizational culture.

**Keywords:** Corporate Entrepreneurship, Organizational Factors, SMEs, Iran

## 1. INTRODUCTION

Those companies which are participating in entrepreneurial activities can achieve more profit compared to other ones that are limited in such activities (Antoncic & Hisrich, 2001) (Mojica, et al., 2010) According to (Pearce II, et al., 2010), the corporate entrepreneurship results in a more profitable first-mover benefit. The modern business contexts include two main features which are uncertainty and complexity (Morgan, et al., 2006).

These two aspects impact and generate stress for small and young businesses. In addition, staying in such competitive context needs some entrepreneurial abilities (Lee & Pennings, 2005). Moreover, features of corporate entrepreneurial behavior also are remarkably impacted by nature of their relations with context (Minguzzi & Passaro , 2001). In addition, a lot of companies currently are trying to compete within international market and to participate in some corporate entrepreneurship (Ireland & Webb, 2007). Thus, it is important to understand and study the contextual components within the individual

organization and entrepreneurship (Wang & Zhang, 2009).

Obtaining the reliable outcomes in entrepreneurship investigations needs a comprehensive method to forming factors of entrepreneurial procedures such as individual, environmental as well as organizational procedures (Adams & Sykes, 2003); (Audretsch & Keilbach, 2003). The research of entrepreneurship in organizational level or the corporate entrepreneurship (CE) has become significantly important in managerial researches (Dess, et al., 2003). The CE could be described as an entrepreneurial behavior demonstrated by existing firms. Such process might lead to generating some new ventures for example "corporate venturing" or in case of organizational revitalization as well as "strategic renewal". Both of these procedures include innovation that is the presentation of new concepts to marketplace (Yilmaz , et al., 2005).

CE is assumed as a helpful method for improvement and revitalization of performance. In case of emerging economies which are adapting their markets to standards in developed markets, CE might be

considered as a critical property for profitability and also growth of existing organizations (Antoncic & Hisrich, 2000) (Antoncic & Hisrich, 2001); (Khanna & Palepu, 2011); (Banerjee , 2003). Also CE might improve their capability to understand and get the opportunities over their competitors (Shane & Venkataraman, 2000); (Ahlstrom, et al., 2007).

The emerging economies are currently a main economic force globally and entrepreneurship has a critical role in this procedure (Bruton, et al., 2008). In particular, organizations in Russia, Brazil, India, South Africa and China (BRICS) should re-test the traditional methods of conducting business and provide entrepreneurial mindset (You & Liu, 2008), due to they are growing although having competitive and hostile contexts (Weeks, 2008). The strategic corporate entrepreneurship (SCE) suggests a suitable strategy for organizations to reconfigure their sources in new ways and also exploit and understand opportunities (Irland & Webb, 2002); (Kyrgidou & Hughes, 2010). Hence, the corporate entrepreneurship is critical in competitive markets these days. A lot of attempts have been done to understand those variables which define the commitment of a corporation to the corporate entrepreneurship (Lumpkin & Dess, 1996); (Zahra, et al., 2000).

These days, entrepreneurship in small and medium enterprises (SMEs) is a good strategy to deal with transition period and is suggested for both developed and developing countries. Of almost 350 million industrial commercial units with more than 2 billion employees currently operating globally, beyond 90 percent of them are small and medium enterprises (Fakour & Ansari, 2009). Such small and medium businesses can become universal through their own products and services and by benefiting from presented patterns and strategies (Lee & Tsang, 2001).

The most important aspects of a competitive economy are generating private sectors, improving the entrepreneurship as well as expanding small and medium businesses. During recent years, a lot of changes within the business industries took place. The universal business context is moving toward the developing nations that can lead to high globalization as well as integration. Such modifications explain that small and medium businesses have a critical role in promoting and also altering the economies. The development and growth of economies in various societies across the world are related to new businesses so they are being developed and created according to them.

In this regard, the entrepreneurs in every single society have an important role to develop entrepreneurship and businesses and it can be a vital tool to understand opportunities and use them to confront with challenges for example unemployment, lack of dynamic and creative employees, low quality services and products, efficiency, competition and economy recession (Landstrom, 2005).

Therefore, rapid changes across the world in terms of technical and scientific areas and also existed socio-economic issues, reduction in underground resources and also unemployment and poverty made the researchers and also policy makers focus more on development of small and medium businesses. Due to crucial role of such businesses within social and economic growth and also development of nations and particular emphasize of policy makers on such issue, it would be critical to begin some fundamental proceeding in order to improve condition of such institutions. These are the places to grow, develop, innovate, entrepreneur and take the risks that are the bases for stable growth and moving toward organizational improvement.

A lot of small and medium businesses suggest new opportunities to develop

competitive advantages. Besides, such businesses are the main part of development in technology and provide advanced and complex requirements in each country (Hurmelinna-Laukkanen, et al., 2008).

In recent years, Iran attempted to support SMEs in order to contribute the economic development of this country (Kamyabi & Devi, 2010) (Arasti, et al., 2014). Due to CE can improve the performance of SMEs so it is important to identify the influential factors on CE. The conducted studies by (Hornsby, et al., 2009), (Turró, et al., 2014) and (Armesh , et al., 2014) revealed that in order to improve CE we should focus on organizational factors.

Organizational factors consist of management support, values, organizational culture, work independence, formal control, environment monitoring, and organizational communication. According to the critical role of SMEs in economic growth of Iran, it is necessary to investigate the role of organizational factors in improvement of CE. Role of each organizational factor to improve the CE creates some level of ambiguity. Hence, this study aims to find how organizational factors can affect corporate entrepreneurship in Iranian SMEs.

## 2. Literature Review

### 2.1. Entrepreneurship

The Corporate Entrepreneurship concept (known as Entrepreneurship Activity or Organizational Entrepreneurship) has been investigated for more than thirty years. Some scholars for example (Peterson, 1971), (Pinchot, 2002. III (1985)) and (Hanan, 1976) were some of these first movers that suggested many definitions for CE. In addition, (Sathe, 1985) explained Organizational Renewal Process. The corporate entrepreneurship in fact both motivates and stimulates innovation inside companies which are familiar with entrepreneurship concept. So it needs

improving their activities in entrepreneurship in an organization. The entrepreneurship is not just for generating new business however to do other innovation acts and methods for instance developing the services and products, administrative techniques, new technology as well as business strategies. The three highly identified entrepreneurship dimensions at organizational level are as 1) New Business Venture, 2) Innovation of services/products, and also 3) Innovation of Processes.

The first dimension includes both semi and fully independent enterprises or units which are identified as Formative Entrepreneurship (Schollhammer, 1981) (Schollhammer, 1982). Developing the new and independent enterprises (MacMillan, 1984) domestic risk activity (Hisrich, 1984), developing the independent businesses (Vesper, 1984), the entrepreneurship activity (Guth & Ginsberg, 1990), new spectrum (Kanter, 1991) as well as enterprise risk activity (Sharma, 1999). The other dimensions of CE emphasize on technology development. According to previous studies of various scholars, the CE includes abundant products within leading technologies (Covin & Slevin , 1991), offering new products and promoting their performance and also techniques of manufacturing (Schollhammer, 1982), development and advancement of product level and relevant services to technology and methods (Knight , 1997).

Other scholars asserted that the CE includes many entrepreneurship methods that need organizational approval and should be compatible with all of the resources in order to conduct such innovative acts (Schollhammer, 1982); (Burgelman, 1983); (Kanter, 1985) (Alterowitz, 1988); (Jennings & Seaman , 1990). According to (Damanpour, 1991), corporate entrepreneurship is a general concept including manufacturing, developing and establishing new behaviors and ideas. An

innovation might as some new services or products, a plan or an administrative system consisting organizational members. Moreover, CE includes improving and renewal of organization's capacity to achieve and advance innovative and skill capabilities. Generally, entrepreneurship is the procedure which attempts to act and innovate progressively. This would be the nature of entrepreneurship (Bygrave, 1991). A lot of advancements in entrepreneurship researches are initiated from entrepreneurship analysis as a procedure and so an organizational basis which is dependent. Hence, the question is that how entrepreneurship acts are impacted by the organizational decisions. Time limitations, reasoning or entrepreneurship activity type can impact personality as well as preferences of entrepreneurs (Stevenson & Jarillo, 1990). So, one should pay more specific attention to compatibility among research methodology and entrepreneurship studies results.

Previous studies on CE classified two corporate entrepreneurship groups antecedents as: one group points out organization (Hornsby, et al., 2009); (Turró, et al., 2014); (Armesh , et al., 2014)and also the other group refers external context (Armesh , et al., 2014); (Edelman & Yli-Renko , 2010); (Zahra, 1993) of firms. However, this study specifically focuses on organizational factors.

## 2.2. CE's dimensions

The corporate entrepreneurship studies usually emphasize on two aspects: the external context of an organization and internal factors at organizational-level. Also entrepreneurship could be grouped as four aspects including (1) Innovation, (2) New Business Venturing, (3) Proactivity and (4) Self-Renewal.

### 2.1 New business ventures

One of the most important key features of entrepreneurship is new business ventures due to the lead to new business development in an organization. This could be achieved via redefinition of products and services of a company or through creating new markets. In big corporations, it also covers developing more formal semi-autonomous or autonomous units, corporate start-ups, internal ventures, developing the autonomous business unit and also new streams. In all of the organizations in any size, such new dimension of business venture means generating new businesses in an organization without considering its autonomy level (Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004).

### 2.2 Innovation

Innovation in fact means the development of services or products with a focus on innovation technological improvement both. The entrepreneurship includes product enhancement, new product development as well as new methods and processes of production. (Covin & Slevin , 1991) studies the entrepreneurship posture which demonstrated regularity and also extensiveness of products innovation and also technological leadership inclination. Also in 1997, Knight asserted that product development, services, technologies and methods in production process are aspects of organizational innovation (Knight , 1997). Zahra described technological entrepreneurship and product innovation as innovative dimensions of manufacturing ( Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004).

### *2.3 Self-Renewal*

Self-renewal aspect shows the transformation of companies through renewing the core ideas by which they will develop. It includes both organizational and strategic transformation and defines again the concept of a business, establishes organization and also introduces remarkable innovative changes in a system (Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004).

### *2.4 Pro-activeness*

The last part is proactivity which is the aggressive posturing into other rivals. A proactive organization takes risk through experiments; it will take the initiative, is aggressive and also bold to pursue the opportunities. The proactive concept means the degree to which companies try to lead instead of following their rivals. This can be applied to critical business areas such as offering new services and products, administrative techniques and operating technologies. The proactivity includes risk and initiative taking as well as competitive aggressiveness which are shown in activities and orientations of top managers (Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004).

## **2.5 2.3. Relationship between organizational factors and CE**

### ***2.3.1. Management Support and CE***

Studies reveal that internal factors of an organization motivate individuals to organize their organizational performance and entrepreneurial activity (Zahra, 2007). According to (Hornsby, et al., 1990), different internal context dimensions such as management support for CE, reinforcing programs and work discretion, time access and the other sources, improve the organizational scope overall (Hornsby, et al., 1990) (Kuratko, 1990). The five-dimension structure is a brief explanation of internal

factors of an organization that motivates middle managers to hasten entrepreneurship attempts in organizations (Hornsby, et al., 2002). The study conducted by (Gantsho, 2006) on SMEs in Europe in manufacturing provided another aspect to the existing five dimensions and evaluated the organizational innovation within entrepreneurial organizations.

In addition, (Chen & Cangahuala, 2010), suggested that organizational communication and commitment have a remarkable relationship with job performance and CE. Thus, it seems that corporate entrepreneurship can make balance between organization and commitment which leads to improved performance. Besides, both management and organizational support are two positive factors motivating commitment (Antoncic & Hisrich, 2001). Also (Hitt, et al., 2011) suggested empirical proof demonstrating the top management status in supporting as well as controlling the activities of team members in line with the production process (Hitt, et al., 2001) and also innovation (Soonhee, 2009). Moreover, (Cooper, et al., 2004) mentioned that ideas of top managers is significant in defining the time interval in presenting the new products and services (Cooper, et al., 2004). Applying the meta-analysis, Henard and Zimanski attempted to describe the factors which impact capability of organizations in order to present new products (Henard & Szymanski, 2001). In current research, the positive relationship among the support factors of top management and entrepreneurial activity of presenting new products was verified. In addition, the higher management role was explained to introduce a future landscape, promotion of a specific product concept, allowing for projects initiation which introduces new products and also bringing critical resources (Haynie, et al., 2010). Hence, management support has high potential to affect CE. So, the first hypothesis will be as follow:

H1: management support affects CE significantly and positively

### **2.3.2. Organizational Values and CE**

The organizational values are key values of organizational beliefs that lead to growth of people in teams. The main values in an organization are the guiding rules and do not require any justification and are important and valued intrinsically for employees (Terziovski, 2010). The key organizational values could be the foundations for policy making within the organizations relevant to organizational entrepreneurship. Organization uses such values in order to describe daily behavior of its employees and also decision makings in organization. It is more helpful that organizations consider their core values while developing plans for long term and when assessing organizational performance, make decision based on such values.

These values will encourage the staff in hardship and if not, so they are not core values. These core values are daily slogans that make god feelings to employees and the organizational values are known as ethical aspects of organization (Tabarsa, 2011).

Those organizations which nurture organizational values and structures motivating entrepreneurial activities are probably growing more compared to those companies that do not. Quality and open communication, using the formal monitoring, regular environment control, organizational support, managerial support and values generally, help the organization to improve entrepreneurial qualities. The entrepreneurial companies participate in new business ventures and are more innovative; they usually renew themselves and also are highly proactive regarding their endeavors. Within the transition economies that are improving their economic position toward developed standards economically and where growth might not be the key goal, even the entrepreneurship is more necessary for

profitability and growth of their existing companies (Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004).

The organizational values are considered as critical entrepreneurship drivers. Guth and Ginsberg asserted that the entrepreneurial behavior inside companies is significantly dependent on values, characteristics, visions and beliefs of strategic leaders in that organization (Guth & Ginsberg, 1990). (Zahra, 1991) mentioned that there is a positive relationship between organizational values and corporate entrepreneurship which are individual centered and those values which are competition centered. So, it is value-based and emotional commitment which increases innovation in organizations (Kanter, 1985).

Organizational Values are viewed as important drivers of entrepreneurship. (Guth & Ginsberg, 1990) Hence, the second hypothesis can be written as follow:

H2: Organizational values affect CE significantly and positively

### **2.3.3. Organizational Culture and CE**

The organizational culture reveals a group of norms, beliefs and values that is mutual between all of the employees in organizations. One of the features of entrepreneurial organizations is that they have a flexible entrepreneurship or culture. It shows that via flexibility and based strategic perspective; the external context would be focused and will attempt to meet the demands of customers. In such culture, beliefs and norms which are accepted can make it possible to understand environmental variables and so interpret them and take the necessary actions according to them or demonstrate a proper behavior. This kind of organizations needs to respond quickly to new designs and also to be able to develop and restructure a group of new actions regarding new tasks (Kuratko, 2004). Those

companies that do not have flexible culture and structure to generate alliance and collaboration will encounter with chaos while there are crises but those companies which can forecast the connections, in particular flexible and informal connections in their structures, will generate effective and positive variable for more creativity and innovation inside the organization in order to improve organizational performance. Reinforcing and also creating the entrepreneurial behaviors and values and viewpoints in general are known as business culture and is one of the core governmental strategies components to improve entrepreneurship. Often the goal is followed in forms of promotional, persuasive and educational plans and policies in all social levels.

Due to its delicate and complex nature, more than other aspects of entrepreneurship strategies development, requires contribution of all individuals and various social levels by means of collaboration; the probability of institutionalizing various cultures and positive hidden values within the subcultures could be done (García-Morales, 2012). The cultural environment as one of the infrastructure element or even the basis of other needed infrastructures regarding entrepreneurship, requires to have big evolutions in rights, beliefs, customs and ethics of people. Significantly, the organizational culture effects entrepreneurship. The traditional organization's culture support decision making which is conservative and in addition would be according to hierarchical method. In general, organizational entrepreneurial culture is flexible that can support innovation and change, entrepreneurship, organizational learning, risk taking, teamwork, providence, mutual trust and honesty, enlivening work with delight and excitement, customer orientation and competition.

The main role of this culture in forming and motivating the entrepreneurial activities is an

issue which attracted many scholars comparing to the other organizational aspects impacting the CE (Sadler, 2000), (Zahra, 2005); (Darroch, 2005). The behavioral features of entrepreneurial individuals are the entrepreneurial context functions conforming to place and time (Gantsho, 2006).

H3: Work independency & empowerment affect CE significantly and positively

#### ***2.3.4. Work independency & empowerment and CE***

The employee's empowerment and work independency is one of the critical methods for improving the employee's efficiency and maximum use of group and individual capabilities and skills in line with organizational goals and organizational performance. We can note that the empowerment is one the strategies for growth and development of an organization. The organizations encounter with many pressures due to a lot of factors including rising competition globally, quick changes, need for after sales services and quality and also limited sources.

Based on the experience in many years, it was concluded globally that if any organization is going to be a leader and entrepreneurial in both economy and work in order to survive such competition, it must have creative, professional and encouraged human resources. Human resources in fact form the basis of real organizational wealth. There is a significant relationship between organizational efficiency and human resources (Gresov & Drazin, 2007). Using the potential capabilities of the human resources is assumed as a key benefit for organizational entrepreneurship. In terms of individual efficiency, an organization employs all of its potential and skills for advancement and via such potential strengths and effective talents will generate individual advancement in organization.

Thus, in order to have organizational entrepreneurship, the proper management of such resources is necessary. Here, HRM scholars and professions have emphasized advancement, growth and development of capabilities in employees during past years known as empowerment and independency. Since the organization will stand against challenges and assume the stable improvement as its primary objective so there is a necessity for more support and commitment of employees and making them to participate in various tasks. Empowerment and work independency are effective and new methods for improving the organizational efficiency in line with entrepreneurship via using skills and abilities of employees (Katsikea, 2011).

Followed by above discussion, the third hypothesis can be developed as follow:

H4: Work independency & empowerment affect CE significantly and positively

### **2.3.5. Formal Control and CE**

Due to there is a significant formality in organizations, there is no authority for employees. Tasks are not also flexible and tolerable. Also employees are not able to demonstrate various behaviors. In this regard, since learning is not an important factor to develop plans and organizational performance so the employees are not encouraged to learn. But, in entrepreneurial organizations, flexibility, learning and taking the risks are the main principles.

On the other hand, organizations can be named as entrepreneurial if they are able to take the risks and assign authority for decision making and appropriate judgment to employees and allow them apply their individual creativity to perform tasks. It could be accomplished if the amount of operational standards, instruction and also circulars are reduced as much as possible thus staffs can show their abilities. Here, there exists a

negative relationship between formality and organization entrepreneurship (Chiva, 2009). In an entrepreneurial organization in which the power to make decisions is assigned to people and units to plan and develop appropriate actions at the right time, the concept of centralization could be neglected. Referred to creativity, operational and talent or the intellectual ability of experts in such contexts, decentralization can take place.

In addition, other aspects of organizations specifically the technology and size have significant impact on centralization. Larger organizations which have more experienced professionals and also appropriate communicative networks which are suitable for updated technology will result in high decentralization and lower authority. When the staffs have enough knowledge, there would be more authority and better situation for centralization as well (Lumpkin, et al., 2010).

For conclusion, to strengthen the entrepreneurship, an organization should generate an environment full of freedom, flexibility and interactive communication of potential entrepreneurs. This could be understood when satisfaction of employees is optimum and they benefit from having freedom to participate more in individual innovation and occupational viewpoints (Zahra, 2007). The findings revealed that formal control can have negative or positive influence on organizational performance and CE (Antoncic, 2001); (Zahra, 2007). Followed by above discussion, the fifth hypothesis can be developed as follow:

H5: formal control affects CE significantly and positively

### **2.3.6. Environmental monitoring and CE**

Network shows organization as being a complicated structure of relationships through which many organizations are existed. The main issue for understanding this network is

presenting a specific border among the environment and organization. Managers place their organizations at center of this network and so those organizations that interacting with their key competitors and interactively will solve such problem. Thus, managers might neglect the outside information of such border of defined network. A part of this information could be remarkably valued. Next, managers are interested to guide the information into central part of this model that is the top management and organization (Haynie, et al., 2010). Studying the relationships in a network inside the organization can contribute managers to realize the dependency/authority relationship among organization and other network players for the better organizational performance.

The organizational dependency is not according to a single way or dependency rather it is complex set of dependencies among environmental factors and an organization inside the inter-organizational network (Villiers-Scheepers, 2012). The solution for such competitive action practically is to rank resources according to their vitality and availability. The vitality refers to estimation of importance level for specific resources. The critical resources are those that organizations could not perform without them. The necessary and rare resources suggest the strongest role of the entrepreneurs inside a network. The environmental monitoring emphasizes on alteration of organizational context in a way that it omits harmful and improper elements from organizational environment and improves the helpful and effective variables on both organizational efficiency and process. According to method of environmental monitoring and its appropriate conduction, there can be an optimum entrepreneurship establishment.

By review the extant research, we can conclude that environmental monitoring has

potential to affect CE. So, next hypothesis will be as follow:

H6: Environment monitoring affects CE significantly and positively

### **2.3.7. Organizational Communication (OC) and CE**

Organizational communication is an inter-individual process that considers the relationships of employees inside the organization. The communication among two or more individuals will be developed via physical proximity and according to its novel characteristics, an indicator of investigations on communication will be focused (Morris & Kuratko, 2002). All of the companies maybe assumed as some goal-oriented communities in which individuals are communicating with others due to many reasons. But, the key motivator for cooperation is that goals of organization and employees could not be achieved through solo performance rather through cooperation and teamwork. Hence, communication in organizations is considered as one of the core variables to achieve organizational goals and via such process the exchange of information could be done and so organizations can use this information to get the objectives (Danneels, 2007).

This relationship among the organizational interaction, performance and commitment interested the scholars for a long time. A lot of attention was given to the relationship between organizational interaction and organizational performance and corporate entrepreneurship.

The employees' commitment could be known as one of the key factors to improve the organizational performance. In many companies, high level of stress results in less satisfaction and also less organizational commitment (Elangovan, 2001). It is mentioned that more organizational communication leads to more employee commitment. This can result in more performance too (Chen & Cangahuala, 2010).

In 2010, Chen and Cangahuala investigated the relationship between job performance, communication and organizational commitment (Chen & Cangahuala, 2010). The results revealed that there are positive relationships among job performance, communication and organizational commitment. These results suggested that organizations empower their communication processes and channels for empowering their job performance and organizational commitment of their accounting professionals.

As noted by Zahra, communication is necessary since novel ideas could be more conveniently presented to an organization and staffs could become familiar with such new trends within different fields (Zahra, 1991). In addition, fluid and clarified communication is important between different interdisciplinary sectors since usually idea creation needs participation of various organizational departments for example HRM, Finance and Operations. Moreover, according to (Zahra, et al., 2009) asserted that through looking for consensus and having meetings regularly, staffs will have a chance to contribute. This can be a useful mutual platform between organizational goals and intrinsic motivation of employees that should be developed for generating the CE inside the organization (Kenney & Mujtaba, 2007). If there is no employee involvement so there is low levels of intrinsic motivation, thus communication is remarkably relevant to corporate entrepreneurship. For instilling a supportive internal context of CE, the quantity and quality of communication are important (Zahra, 1991). The mentioned results above have been confirmed by (Antoncic, 2007) (Antoncic, 2001); ( Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2000). Even though the studies by Antoncic cover the entrepreneurship but his definition of this concept is as same as CE generally. So, the

seventh hypothesis of the study can be developed as follow:

H7: Organizational commitment affects CE significantly and positively

### 3. Methodology and Results

As mentioned above organizational factors have potential to affect CE. Figure 1 shows the proposed framework of this study achieved from previous research.

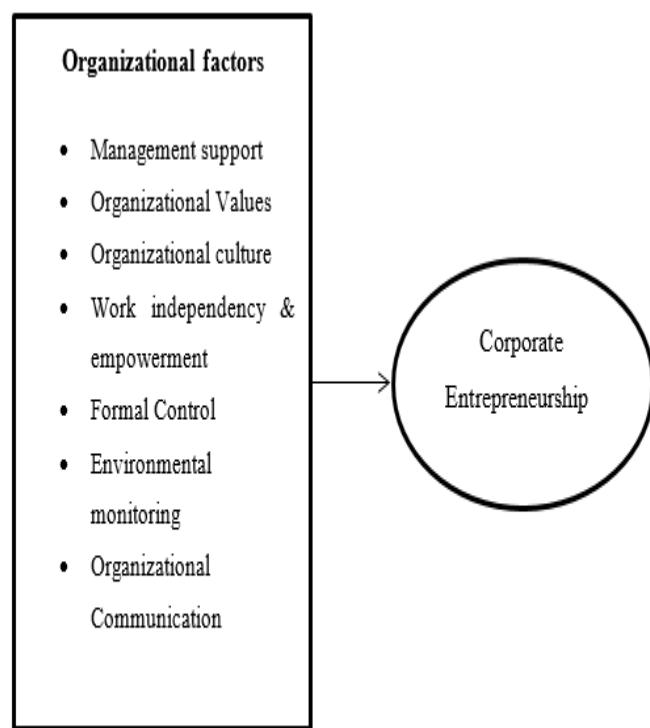


Figure 1: Proposed Framework

This research applied quantitative approach (hypothesis testing) to measure the impact of each environmental factor on CE. For this purpose, it was needed to gather primary data through survey questionnaire. The questionnaire items were adapted from different previous studies. Table 2 demonstrates the references and number of items for each variable.

To measure each item, 5-point Likert scale was applied. The population of this study was all top and middle managers who are working

in the 50 SMEs in 5 largest provinces of Iran. The population size was 2457, so the sample size was 265 according to the (Krejcie, 1970). So, 280 questionnaires were distributed, but 251 usable questionnaires were received. This number of data is enough to apply multiple regression analysis (Hair, 2010). The needed data was gathered since March 2016 until June 2016. The questionnaire had two parts. The first part was concentrated on demographic questions including gender, experience, number of employees, and qualification. The second part referred to the measurement of independent and dependent variables. Corporate entrepreneurship was measured by 8 items which are obtained from previous studies (they are presented in Table 2). For each independent variable 5 items were adopted from extant research (as shown in Table 2). Besides, the questionnaire is presented in Appendix.

After gathering data through Likert Scale, the mean of answers were calculated. The obtained results help to apply different statistical analysis such as Pearson correlation, and multiple regression analysis. Pearson correlation test shows the relationship between two variables regardless impact of one of them on another one. Multiple regression analysis usually is applied to measure the impact of one or more independent variables on dependent variables. In other words, this method shows that for every unit increase variation in independent variable how many unit increase dependent variable will have. There are two main indicators in multiple regression analysis including R-Square and VIF. R-square shows that how many percent of variation of dependent variable is dependent to highlighted independent variable. VIF is an indicator to measure multicollinearity of independent variables. When VIF is greater than 5, the researcher should revise the chosen independent variables.

Referring to the Table 2, the results of reliability test shows that all of the variables have acceptable internal consistencies since all estimate devalues are greater than .7 according to the (Nunnally, 1978)

Table 2: Research Items and Reliability Test

Variables	No of items	References	Cronbach's Alpha
CE	8	(Armesh , et al., 2014); (Zahra, 2007); (Antoncic & Hisrich, 2001) (Antoncic & Hisrich, 2004); (Luo M & Covin, 2005)	.801
Management support	5	(Armesh , et al., 2014); (Zahra, 2007) (Zahra, 2010); (Hornsby, et al., 2002)	.774
Organizational Values	5	(Armesh , et al., 2014); (Zahra, 2007) (Zahra, 2010) (Hornsby, et al., 2002)	.771
Organizational culture	5	(Armesh , et al., 2014); (Garcia-Morales, 2012); (Zahra, 2007); (Zahra, 2010)	.767
Work independency & empowerment	5	(Armesh , et al., 2014); (Jogaratnam, 2006)	.821
Formal Control	5	(Armesh , et al., 2014); (Jogaratnam, 2006), (Bulut & Yilmaz, 2008)	.832
Environmental monitoring	5	(Armesh , et al., 2014); (Haynie, et al., 2010)	.791
Organizational Communication	5	(Armesh , et al., 2014); (Morris & Kuratko, 2002); (Antoncic, 2007); ( Antoncic & Hisrich, 2001)(Antoncic & Hisrich, 2004)	.759

The first part of questionnaire referred to demographic questions. Table 3 shows the results of demographics.

	Frequency	Percentage
<b>Gender</b>		
Male	167	66.5%
Female	84	33.5%
<b>No. of employees</b>		
less than 15	1	.39%
15-30	86	34.3%
31-50	93	37%
51-70	68	27%
more than 71	3	1.31%
<b>Experience</b>		
Less than 5	22	8.8%
6-10	121	48.2%
11-20	74	29.4%
more than 21	34	13.6%
<b>Qualification</b>		
High school & below	5	2%
Diploma	28	11.1%
Bachelor	152	60.5%
Master	43	17.13
PhD	23	9.1%

Table 3: Demographics

	6	01			
Management support	3.27	.902	-.311	-1.23	0.00
Organizational Values	3.12	.821	.704	-.098	0.00
Organizational culture	3.02	1.11	-.652	-.651	0.00
Work independency & empowerment	2.99	.921	.045	-1.12	0.00
Formal Control	3.67	.899	-1.23	-.223	0.00
Environmental monitoring	3.71	1.04	.005	-.656	0.00
Organizational Communication	3.11	1.05	-.231	-.534	0.00

According to the table 3, 66.5 % of respondnets are male while 33.5% are female. Besides, the highest frequency of number of employees refers to the group 31-50. Most of the respondnets belong to the group experience 6-10. Out of 251 respondnets, 152 have bachelor degree (highest frequency) while the lowest frequency (5) referred to the first group which have high school or below degrees.

Next statistical analysis is mean analysis. Table 4 shows the results of mean analysis based on the four main central indicators mean, standard deviasion, skewness and kurtosis.

Table 4: descriptive Analysis

Vraiables	Me an	S D	Skew ness	Kurt osis	Normality test (P-value)
CE	3.4	1.	-.291	-.767	0.00

Reffering to the table4, all estimated values for mean vary between 2.99 (work independnecy and empowerment) and 3.71 (environemntal monitoring). The negative signs of skewness asserted that the peak of the frequency chart is centralized to the right direction while the positive signes shows left direction. All of the estimated values for kurtosis are negative, so all of them have flat distribution.

Besides, table 4 shows the results of normally test based on the Kolmogrov -Smirnov test. All of the p-values are less than .05, so none of the variables is normally distributed. Nonetheless, according to the central limit theorem we can assume them normally distributed because sample size is greater than 30. Table 5 shows the results of Pearson correlation test.

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

\*\*. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 5, all of the variables are correlated significantly and positively because all of the estimated p-values are less than .05. The highest relationship with CE refers to work independency and empowerment while the lowest relationship belongs to organizational values. However, there is no high relationship between each pairs of independent variables. The next statistical analysis refers to multiple regression analysis (See table 6).

Table 5: Pearson Correlations Test

	CE	Management Support	Values	Culture	Independency & empowerment	Formal Control	Environmental monitoring	Organizational communication
CE	Pearson Correlation Sig. (2-tailed) N	1 .467** 251						
Management Support	Pearson Correlation Sig. (2-tailed) N	.000 251	1 .273** 251					
Values	Pearson Correlation Sig. (2-tailed) N	.000 251	.000 251	1 .251				
Culture	Pearson Correlation Sig. (2-tailed) N	.000 251	.000 251	.000 251	1 .251			
Independency & empowerment	Pearson Correlation Sig. (2-tailed) N	.001 251	.000 251	.002 251	.000 251	.000 251	1 .251	
Formal Control	Pearson Correlation Sig. (2-tailed) N	.000 251	.000 251	.000 251	.000 251	.000 251	.000 251	1 .251
Environmental monitoring	Pearson Correlation Sig. (2-tailed) N	.000 251	.000 251	.000 251	.012 251	.000 251	.000 251	.000 251
Organizational communication	Pearson Correlation Sig. (2-tailed) N	.003 251	.001 251	.000 251	.000 251	.000 251	.000 251	.000 251

Table 6: Multiple Regression Analysis

Model Summary							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate			
1	.832*	.692	.683	.50378			
ANOVA <sup>b</sup>							
Model	Sum of Squares	df	Mean Square	F	Sig.		
Regression	138.651	7	19.807	78.043	.000*		
1 Residual	61.673	243	.254				
Total	200.324	250					
Coefficients <sup>a</sup>							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.280	.158		-1.773	.078		
Management Support	.117	.050	.158	2.350	.020	.279	3.587
Values	.086	.043	.110	1.974	.050	.409	2.445
Culture	.083	.037	.118	2.244	.026	.457	2.188
1 Formal control	.125	.053	.148	2.344	.020	.318	3.148
Communication	.179	.035	.196	5.195	.000	.890	1.124
Environmental monitoring	.166	.034	.192	4.876	.000	.814	1.229
Independency empowerment	.340	.030	.423	11.204	.000	.889	1.125

According to the results of table 6, R square is equal to .832 that implies 83.2 of variation of CE can be achieved by independent variables. P-value of ANOVA table equals zero, so at least of the independent variable of this study significantly affects CE. Since all of the values of VIF are less than 5, it can be concluded that there is no multi-collinearity among independent variables.

By the results of regression analysis, management support has significant impact on CE because the estimated p- value is less than .05 (.020). The estimated coefficient is equal to .117, so for every unit increase and growth in the management support, CE will go up .117 units. Therefore, the first hypothesis H1 is supported by this study.

As shown in table 6, organizational values have significant impact on CE because the estimated p- value is not greater than .05. The estimated coefficient is equal to .086, so for every unit increase and growth in the organizational values, CE will go up .086 units. Therefore, the second hypothesis H2 is supported by this study.

By the results of regression analysis, organizational culture has significant impact on CE because the estimated p- value is less than .05 (.026). The estimated coefficient is equal to .083, so for every unit increase and growth in the management support, CE will go up .083 units. Therefore, the third hypothesis H3 is supported by this study.

We are 95% confident that the impact of work independency and empowerment on CE is significant because the p- value is equal to zero. Besides, the estimated coefficient is

.340 to Therefore, for every unit increase in work independency and empowerment, CE will grow .340 units. Consequently, the fourth hypothesis H4 is supported by this study.

We are 95% confident that the impact of formal control on CE is significant because the p- value is equal to .020 (less than .05). Besides, the estimated coefficient is .125 to Therefore, for every unit increase in formal, CE will grow .125 units. Consequently, the fifth hypothesis H5 is supported by this study.

We are 95% confident that the impact of environmental monitoring on CE is significant because the p- value is equal to .000 (less than .05). Besides, the estimated coefficient is .166 to Therefore, for every unit increase in environmental monitoring, CE will grow .166 units. Consequently, the sixth hypothesis H6 is supported by this study.

We are 95% confident that the impact of organizational communication on CE is significant because the p- value is equal to .000 (less than .05). Besides, the estimated coefficient is .179 to Therefore, for every unit increase in organizational communication, CE will grow .179 units. Consequently, the seventh hypothesis H7 is supported by this study.

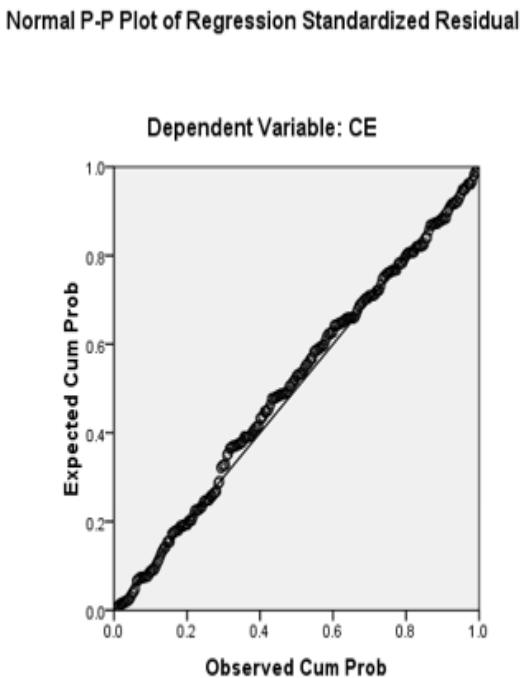


Figure 2: Normal p-plot of regression

Figure 2 shows an acceptable linearity for obtained residuals of the multiple regression analysis. As a result, we can write regression equation as follow:

$$CE = -.280 + .117 \text{ (management support)} + .086 \text{ (Values)} + .083 \text{ (Culture)} + .125 \text{ (Formal Control)} + .340 \text{ (independency and empowerment)} + .166 \text{ (environmental monitoring)} + .179 \text{ (Organizational Communication)}$$

## 5. Conclusion and Discussion

Iran like other countries has been trying to improve its economic growth through corporate entrepreneurship of SMEs. There are enough evidences to show that corporate entrepreneurship can be affected by organizational factors. From review of literature review we can conclude that organizational factors consist of management support, organizational values, organizational culture, formal control work independency and empowerment, environmental monitoring, and organizational

communication. Hence, this study aimed to find how organizational factors can affect corporate entrepreneurship in Iranian SMEs. The outcome of multiple regression analysis helped to measure the impact of each factor on CE. Besides, these results can be applied to answer the research questions of this study.

### *What is the relationship between management support and CE in Iranian SMEs?*

By the results of Pearson correlation test, the relationship between management support and CE is significant and positive. Besides, the results of regression analysis showed that management support has significant impact on CE because the estimated p- value is less than .05 (.020). The estimated coefficient is equal to .117, so for every unit increase and growth in the management support, CE will go up .117 units. Therefore, the first hypothesis H1 is supported by this study. The obtained results are consistent with extant research conducted by (Antoncic & Hisrich, 2001), (Cooper, et al., 2004), and (Hitt, et al., 2011).

### *What is the relationship between values and CE in Iranian SMEs?*

By the results of Pearson correlation test, the relationship between organizational values and CE is significant and positive. Organizational values have significant impact on CE because the estimated p- value is not greater than .05. The estimated coefficient is equal to .086, so for every unit increase and growth in the organizational values, CE will go up .086 units. Therefore, the second hypothesis H2 is supported by this study. The obtained results are consistent with previous research conducted by (Kanter, 1985), (Zahra, 1991), (Antoncic & Hisrich, 2001), (Tabarsa, 2011).

### *What is the relationship between organizational culture and CE in Iranian SMEs?*

By the results of Pearson correlation test, the relationship between organizational culture and CE is significant and positive. By the results of regression analysis, organizational culture has significant impact on CE because the estimated p- value is less than .05 (.026). The estimated coefficient is equal to .083, so for every unit increase and growth in the management support, CE will go up .083 units. Therefore, the third hypothesis H3 is supported by this study. The obtained results can be considered consistent with previous studies conducted by (García-Morales, 2012), (Gantsho, 2006), (Darroch, 2005), (Zahra, et al., 2009), and (Sadler, 2000).

***What is the relationship between work independence & empowerment and CE in Iranian SMEs?***

By the results of Pearson correlation test, the relationship between work independence & empowerment and CE is significant and positive. We are 95% confident that the impact of work independency and empowerment on CE is significant because the p- value is equal to zero. Besides, the estimated coefficient is .340 to Therefore, for every unit increase in work independency and empowerment, CE will grow .340 units. Consequently, the fourth hypothesis H4 is supported by this study. The obtained results are consistent with extant research conducted by (Gresov & Drazin, 2007) and (Katsikea, 2011).

***What is the relationship between formal control and CE in Iranian SMEs?***

By the results of Pearson correlation test, the relationship between work independence & empowerment and CE is significant and positive. We are 95% confident that the impact of formal control on CE is significant because the p- value is equal to .020 (less than .05). Besides, the estimated coefficient is .125 to Therefore, for every unit increase in formal, CE will grow .125 units. Consequently, the fifth hypothesis H5 is

supported by this study. The obtained results are consistent with previous research conducted by (Lumpkin, et al., 2010), (Chiva, 2009), (Zahra, et al., 2009), and (Antoncic & Hisrich, 2001).

***What is the relationship between environment monitoring and CE in Iranian SMEs?***

By the results of Pearson correlation test, the relationship between organizational values and CE is significant and positive. We are 95% confident that the impact of environmental monitoring on CE is significant because the p- value is equal to .000 (less than .05). Besides, the estimated coefficient is .166 to Therefore, for every unit increase in environmental monitoring, CE will grow .166 units. Consequently, the sixth hypothesis H6 is supported by this study. The obtained results are consistent with previous research conducted by (Haynie, et al., 2010) and (Villiers-Scheepers, 2012).

***What is the relationship between organizational communication and CE in Iranian SMEs?***

By the results of Pearson correlation test, the relationship between organizational values and CE is significant and positive. We are 95% confident that the impact of organizational communication on CE is significant because the p- value is equal to .000 (less than .05). Besides, the estimated coefficient is .179 to Therefore, for every unit increase in organizational communication, CE will grow .179 units. Consequently, the seventh hypothesis H7 is supported by this study. The obtained results are consistent with previous research conducted by (Zahra, 1991), (Kenney & Mujtaba, 2007), (Antoncic, 2007) (Antoncic, 2001), (Antoncic & Hisrich, 2000) ( Antoncic & Hisrich, 2001), and (Morris & Kuratko, 2002).

### **Managerial implications and Future Study**

Followed by above discussion, we can conclude that Iranian SMEs can use the main components of organizational factors to improve CE. According to the results of multiple regression analysis, the highest impact refers to the work independency and empowerment. Hence, Iranian SMEs can increase this factor inside their organizations through transformational leadership (Manafi & Subramaniam, 2015). It would be better if Iranian SMEs concentrates on their R&D departments.

Future study can test the proposed framework of this study in other countries and other industries.

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# Evaluation method for Engineering Program Assessment to implement OBE (Outcome Bases Education) System in Engineering Colleges

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**Abstract:** All Indian Engineering Institutions of higher education learning to adopt the outcome based education (OBE). The OBE is an educational process that emphasis achieving specified outcome in terms of individual study learning. All teaching staffs and students are directly involved with this. As for the students, they have been introduced with OBE from the day they registered, in all teaching and learning activities until they graduated. Teaching staffs are required to produce the Program Outcomes (PO) and Program Educational Objectives (PEO) in every teaching plan. This paper is mainly focus on first year to fourth year students of Bachelor of Information Technology assessment report for each student. The two methods direct and indirect has to be used and propped template created which gives better performance.

**Keywords:** Outcome Based, Program Outcomes, Program Educational Objectives

## 1. INTRODUCTION

As a solution, All India Council for Technical Education (AICTE) under the preview of Board of Engineers India has steering the OBE [1]. OBE is an educational process that emphasis achieving specified outcome in terms of individual study earning. The specified outcome relates knowledge, skills and attitudes. OBE is an essential requirement for Indian institution to become a full signatory member of multinational agreement for the mutual recognition of engineering bachelor degree.

In OBE, the educational outcomes are clearly and unambiguously specified. These determine the curriculum content and its organization, the teaching methods and strategies, the courses offered, the assessment process, the educational environment and the curriculum timetable. An engineer is a unique combination of different kinds of knowledge, skills and attitudes. In Spady's words: "Outcome Based Education means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences. This means starting with a clear picture of what is important for students to be able to do, then organizing the curriculum, instruction, and assessment to

make sure this learning ultimately happens. OBE is a wonderful system of education which makes the students industry-ready once they have graduated, though initially the faculty and students have to put more efforts and many hours of hard work in materials preparations and evidence collection. OBE System is not diluted into Tier-I and Tier-II Systems. OBE System is only one - and has to be implemented wholeheartedly, without any deviations, regardless of whether the institutes are autonomous or affiliated.

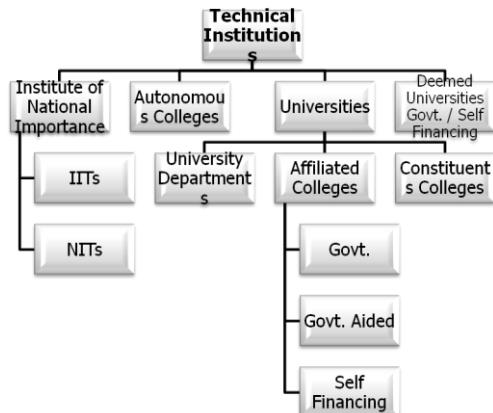
The eleven generic attributes refers to science mathematics and engineering knowledge (PO1), problems identification and problem solving (PO2), ability to design and development of solutions (PO3), conduct investigations of complex problems (PO4), create and apply Modern appropriate techniques (PO5), understand the engineer and society (PO6), understanding of the social, cultural, global and environmental responsibilities(PO7), understanding, responsible and commit with professional ethic (PO8), teamwork and leadership (PO9) ,communication skill (PO10), Project management and finance (PO11), and life-long learning (PO12). NBA (National Board of Accreditation) also acts as an accreditation awarding body for all engineering

program in India. Therefore, emphasis of OBE has been lined out in order to achieve national vision.

Nevertheless, every Program Educational Outcome (PEO) and Program Outcomes (PO) performs need to be analyzed and continuous quality improvement (CQI) should be done for future enhancement.

## 2. RESEARCH METHODOLOGY

This paper is mainly focus of engineering students from first year to fourth year. The research has divided in to two parts: direct assessment method and indirect assessment method. The evaluation marks of the assessment are total up and converted in to three scaling. Then the results are illustrated in bar charts so that the analysis of a engineering program can be thoroughly done.



### A. Direct Survey

Direct survey has categorized into two components which is student exam assessment survey and course end survey. Student assessment survey covers the whole semester coursework and the final examination. The coursework includes individual internal examinations, assignment, external examinations, mini project, Seminars, Main project presentation and laboratory report. End of semester survey evaluates the achievements of PO and PEO fixed by the lecturer at the beginning of the semester. It ranked from three (the highest) and one (the lowest). The percentage of direct survey is the average of students' assessment survey and end of semester survey.

#### Algorithm for Direct Assessment:

1. Identify and select class for a given department
2. For each class

- a. Select section and for each section repeat the following
- b. Initialize number of students for selected section = n
- i. for (int i=0;i<n;i++) // for each student perform the following //
- ii. for ( int j=1; j<k ; k++) // for each each subject and initialize number of subjects equal to k // Compute course outcome for each subject
- iii. Compute the average course outcome for a given section
3. Increment section and repeat step b
4. Compute average course outcome of a given class
5. Increment class index and repeat step 2 to 4
6. Compute Program Outcome for each department

Compute Program Educational Objective of the department

### B. Indirect Survey

Indirect survey is also divided into two: course end survey and alumni survey. Course end survey is evaluated based on Course outcomes rating from each course end survey form which is designed by the institution .In OBE approach each parameter is weighted 1 (lowest) to 3(highest). Alumni survey can only be conducted four years after the students graduate. As for this research, the fourth year students will be graduated by middle of 2013. Therefore, alumni survey will be conducted in 2014. Results for alumni survey will be analyzed once the survey has been conducted.

#### Algorithm for Indirect Assessment:

1. Identify and select class for a given department
2. For each class
  - a. Select section and for each section repeat the following
  - b. Initialize number of students for selected section = n
  - i. for (int i=0;i<n;i++) // for each student perform the following //
  - ii. for ( int j=1; j<k ; k++) // for each subject and initialize number of subjects equal to k // Compute CO for each exit survey, course-end survey
  - iii. Compute the average course outcome for a given section
3. Increment section and repeat step b
4. Compute average course outcome of a given class
5. Increment class index and repeat step 2 to 4
6. Compute Program Outcome for each department

Compute Program Educational Objective of the department

### 3. RESULTS ANALYSIS

The results are analyzed in detail based on Year of study and overall analysis for the whole for each subject of engineering program.

The results format is as follows.

#### Direct/ Indirect Assessment Sheet

Batch:

Academic Year/Sem:

Course Name:

Course Number:

Course Outcomes:

MID-I Exam Assessment:

Number of Students Appeared:

A:

Assessment	(1) Threshold value	(2) Actual Average	(3) Target % of students on or above threshold	(4) Target No. of students on or above Threshold	(5) Actual % of students on or above Threshold	(6) Actual No. of students on or above Threshold	(7) Level of Attainment
Part A + Assignment	60%		60%				

Attainment Level = ((Col.(6) / Col. (4 ))\*3) =

B:

COs	No. Of Students Appeared	(1) Threshold value	(2) Actual Average	(3) Target % of students on or above threshold	(4) Target No. of students on or above Threshold	(5) Actual % of students on or above Threshold	(6) Actual No. of students on or above Threshold	(7) Level of Attainment
CO1		60%		60%				
CO2		60%		60%				

CO Attainment = (CO1+CO2)/2=

MID-I Attainment Level = (A+B)/2 =

**MID- I I Exam Assessment:**

**Number of Students Appeared:**

A:

Assessment	(1) Threshold value	(2) Actual Average	(3) Target % of students on or above threshold	(4) Target No. of students on or above Threshold	(5) Actual % of students on or above Threshold	(6) Actual No. of students on or above Threshold	(7) Level of Attainment
Part A + Assignment	60%		60%				

$$\text{Attainment Level} = ((\text{Col.(6) / Col. (4)}) * 3)$$

B:

COs	No. Of Students Appeared	(1) Threshold value	(2) Actual Average	(3) Target % of students on or above threshold	(4) Target No. of students on or above Threshold	(5) Actual % of students on or above Threshold	(6) Actual No. of students on or above Threshold	(7) Level of Attainment
CO3		60%		60%				
CO4		60%		60%				

$$\text{CO Attainment} = (\text{CO3+CO4})/2=$$

$$\text{MID-II Attainment Level} = (\text{A+B})/2 =$$

$$\text{Internal Assessment} = \text{Mid-I} + \text{Mid-II}/2 =$$

**External Assessment:**

**Number of Students Appeared:**

(1) Threshold value	(2) Actual Average	(3) Target % of students on or above threshold	(4) Target No. of students on or above Threshold	(5) Actual % of students on or above Threshold	(6) Actual No. of students on or above Threshold
60%		60%			

$$\text{Attainment Level} = ((\text{Col.(6) / Col. (4)}) * 3) =$$

$$\text{Attainment of Course: } (25\% \text{ of Internal Attainment} + 75\% \text{ of External Attainment}) =$$

Course Attainment	Remarks
	Moderate

\* 1 - Slight

2 - Moderate

3 - Substantial

#### 4. CONCLUSION

In conclusion, more than 60% of every subject POs is successfully achieved. This is proved That if all direct survey exceeds 60% then we can say we have achieved Level 3.If Level 3 is Not reached then organization has to take initiation to conduct remedial classes, organizing Guest lectures to reach target level 3. If the indirect survey scores is not reached to target Level 3, Once students graduated from engineering college, they are all prepared to meet the Industry need. From this research, it is proven that the outlined PEO, PO, and generic skill for Every subject helps students to develop themselves. In other words, this evaluation method in OBE system helped to make students ready for industry and able to meet the future needs.

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# Sequential Extraction of Nickel in Soil and Fruits

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**Abstract:** The identification of chemical forms of Ni in agricultural samples is of interest for the evaluation of its mobility, bioavailability and ecotoxicity. In this study, the Ni concentration of the fruit and soil samples were determined using Flame Atomic Absorption Spectrometry (FAAS). The soil samples related to the fruits were digested and extracted using different digestion and extraction reagents. The result revealed that the soil samples obtained from various locations contain varying amount of Ni and was distributed between residual, oxide, carbonate and exchangeable fractions. The result also showed that the concentration of Ni in the soil samples recorded was within the allowable limits of 40mg/kg and the ANOVA ( $p=0.017 < 0.05$ ), showed that there is significant difference in the concentration of Ni in mango, orange, cashew and pawpaw fruits. Similarly, from the Duncan post hoc test, in the third homogenous subset, mango and orange have the highest Ni concentration followed by pawpaw in the second homogenous subset. In the first homogenous subset, cashew has the least Ni concentration.

**Keywords:** Chemical forms, flame atomic absorption spectrometry, fruits, nickel, soil

## 1. INTRODUCTION

Soils are receptacles for heavy metals released from industrial activities, municipal wastes, water sludge, urban composts, road traffic, atmospheric deposits and chemicals used in agriculture (Phosphate fertilizers, pesticides) and spread out into the environment [1]. Heavy metals are persistent in the environment; they are non-thermo degradable and thus readily accumulate to toxic levels [2]. Many soils especially those in hazardous wastes sites are contaminated by heavy metals such as Ni, Cu, Zn, Cd, etc. Heavy metal contamination in arable soils through industrial and anthropogenic activities is a serious problem in Nigeria. Metals uptake by plants may pose risks to human health when such plants are grown on or near contaminated areas. Metals accumulation in plant depends on plant species, growth stages, types of soil and metals, soil condition, weather and environment [3,4]. Nickel is an element that occurs in the environment only at very low levels and is essential in small doses, but it can be dangerous when the maximum tolerable amounts are exceeded. This can cause various kinds of cancer on different sites within the bodies of animals, mainly of those that live near refineries. The most common application of Ni is an ingredient of steel and other metal products. The major sources of nickel contamination in the soil are metal plating industries, combustion of fossil fuels, and nickel mining and electroplating [4]. It is released into the air by power plants and trash incinerators and settles to the ground after undergoing precipitation reactions. It usually takes a long time for nickel to be removed from air. Nickel can also end up in surface water when it is a part of wastewater streams. The larger part of all Ni compounds that are released to the environment will adsorb to sediment or soil particles and become immobile as a result. In acidic soils, however, Ni becomes more mobile and often leaches down to the adjacent groundwater. Microorganisms can also suffer from growth decline due to the presence of Ni, but they usually develop resistance to Ni after a while. Nickel is not known to accumulate in plants or animals and as a result Ni has not been found to biomagnify up the food chain. For animals Ni is an essential foodstuff in small amounts. Nickel is generally distributed uniformly through the soil profile but typically accumulates the surface from disposition by industrial and agricultural activities. Nickel may present a major problem in land near towns, in industrial areas or even in agricultural land receiving waste such as sewage sludge. Nickel can exist in soils

in several forms such as inorganic crystalline minerals or precipitates, complexes and absorbed on organic cations surface or on inorganic cations exchange surfaces, water-soluble, and free-ion or chelated metal complexes in soil solution [5]. The total heavy metal content in soils provide a convenient means of expressing a measure of pollution, numerous reports have highlighted that such measures are deficient in predicting toxicity of metal pollutants [5]. Heavy metals may be distributed among many components of the soil or sediment and may be associated with them in different ways [6,7,8, 9]. The nature of the association is referred to as speciation. The general approach for the soil speciation studies has been to separate the soil using different chemical reagents or solvents fractions and by analyzing each fraction to determine the amount of element combined or associated with each soil fraction or phase [10]. Therefore, the identification of the chemical form or phases of Nickel in soil is necessary for estimating its biological availability, physico-chemical reactivity and transport in the environment and into the food chain [11]. This research is aimed at investigating the levels of Ni and relation to its concentrations in fruits.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study area is located at Yelwa in Keffi town which is in the northern part of Nigeria. Yelwa is about 50km from Abuja, the Federal Capital Territory (FCT) and about 118km from Lafia, the Nasarawa State Capital, Nigeria. Yelwa is situated on latitude 10° 5' north of the equator and longitude 10° 35' west. This location is close to a major road, a mechanic workshop and some meters away surrounded by houses.

### 2.2 Instrumentation, Apparatus and Reagents

A flame atomic absorption spectrometer (model 8010: Young Lin) was used for Ni determination in the fruit and soil samples. An electro thermal oven (model: DHG) was used for drying the fruits samples, a 90 mics (0.09 mm) Standard Test Sieve was used for sieving the soil samples.

All of the reagents used to digest samples and for sequential extraction were of analytical reagent grade. 10 cm<sup>3</sup> of a mixture of nitric acid and hydrogen peroxide (2+1) was used for the digestion of fruit and soil samples. In the extraction procedures,

1.5 mol L<sup>-1</sup> nitric acid, 1.0 mol L<sup>-1</sup> oxalic acid, 0.05 mol L<sup>-1</sup> EDTA, and 1.0 mol L<sup>-1</sup> magnesium chloride were used.

### 2.3 Sample Collection

Random sampling was used in the collection of both the fruits and soil samples. The samples were collected in October, 2015. The soil samples were obtained at 10cm depth and 100cm away from the trees where the fruits were obtained [12] and were put into separate polythene bags and labeled accordingly.

### 2.4 Sample Preparation

The fruit samples collected were washed thoroughly, rinsed with tap water, and allowed to drain. The fruits were peeled and then sliced into smaller pieces and the seeds removed. The peels were dried at 85°C; using an electro thermal oven, model DHG. The oven dried fruits samples were stored in sample containers respectively and ready for ashing.

The soil samples were also oven dried at 85°C; size reduced by the use of mortar and pestle; sieved using a Standard Test Sieve of 90 mics (0.09 mm) and then stored in samples containers respectively and ready for digestion and extraction.

### 2.5 Samples Digestion

#### Wet Ashing

Five grams (5g) each of oven dried fruit samples were accurately weighed using analytical balance into an evaporating dish and heat at 480°C in an ashing furnace for 4 hours (4hrs). 10 cm<sup>3</sup> of a mixture of nitric acid-hydrogen peroxide (2+1) was added to each of the ashed samples and dried with occasional shaking on a hot plate and cooled, 4 cm<sup>3</sup> of 1.5 mol L<sup>-1</sup> nitric acid was then added, and centrifuged and 6 cm<sup>3</sup> distilled water was added to the clear digest ashed samples and were filtered [13]. These samples were analyzed for Ni, using FAAS model 8010 young Lin. Blank digests were also carried out in the same ways.

### 2.6 Digestion and Extraction of Soil samples

A modified sequential extraction method [11] developed by Yaman was used [13]. 10 cm<sup>3</sup> of a mixture of nitric acid-hydrogen peroxide (2+1) was added to 5 g of the soil samples and dried with occasional shaking on a hot plate and cooled. 4 cm<sup>3</sup> of 1.5 mol L<sup>-1</sup> nitric acid was added to the reminders, centrifuged and diluted to 60 cm<sup>3</sup> with water and were filtered. The clear digests were analyzed for Ni using FAAS model 8010 Young Lin. Blank digests were carried out in the same way. Soil extracts were obtained by shaking separately, 5 g of soil samples with 10 cm<sup>3</sup> of 0.05 mol L<sup>-1</sup> EDTA (for carbonate and organically bound phases), 1.0 mol L<sup>-1</sup> oxalic acid (for oxide phases) and 1.0 mol L<sup>-1</sup> MgCl<sub>2</sub> (for exchangeable phases). The mixtures were evaporated with occasional shaking on a hot plate. 4 cm<sup>3</sup> of 1.5 mol L<sup>-1</sup> nitric acid was added to the reminders, centrifuged and diluted to 60 cm<sup>3</sup> with water and were filtered. The clear digests were analyzed for Ni using FAAS model 8010 Young Lin. Blank digests were carried out in the same way.

## 3. RESULTS AND DISCUSSION

### 3.1 Content of Nickel (Ni) in Soils and Fruits

The results of Ni concentration in fruit and soil samples are shown in Table 1.

The results showed that mango, orange, pawpaw and cashew have lower concentrations of Ni as compared to their corresponding soils. This could be due to agricultural practices and other anthropogenic activities such as dumping of used alloy and batteries in these locations [14]. The concentration of Ni in the soils was recorded below the average concentration in the World soil of 40 mg/kg [9]. The concentration of Ni in fruits ranged from 0.040 mg/kg to 0.640 mg/kg. The concentration of Ni in mango, Orange and pawpaw was higher than in cashew.

Other values reported by [15] are 0.08 mg/kg, 0.26 mg/kg and 0.72 mg/kg for orange, pawpaw and mango respectively.

### 3.2 Nickel (Ni) Speciation

The distribution of Ni in the soil samples showed that Ni exists in the forms; residual, oxide, carbonate and exchangeable phases. The concentration of Ni bound to the residual fraction is higher in mango and pawpaw soils as compared to its concentrations in the other extraction media. Hence, Ni is bioavailable, mobile in the soil and available for plant uptake [13].

The concentration of Ni bound to the exchangeable fraction is higher in cashew soil than in other extraction media;  $\text{Ni}^{2+} + \text{Cl}^{-} \rightarrow \text{NiCl}_2$

Thus, Ni is said to be available in an exchangeable species. The concentration of Ni bound to carbonate fraction is higher in orange soil as compared to its concentration in the other extraction media;

$\text{Ni}^{2+} + \text{CO}_3^{2-} \rightarrow \text{NiCO}_3$  Hence, it is said to be a carbonate species [15]

The HNO<sub>3</sub>/H<sub>2</sub>O<sub>2</sub>, EDTA, H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>, and MgCl<sub>2</sub> extractables are considered available in the locations.

### 3.3 Comparing the Concentration of Nickel in Different Fruits

Here we need to compare the concentration of Nickel in mango, orange, cashew and pawpaw fruits. The one-way analysis of variance (ANOVA) is hereby applied for the test.

**Table 1: Shows Results of Ni Concentrations in Fruit and Soil Samples**

**Results of mean value (mg/kg) ± STD DEV (n=3)**

Sample	HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> (2+1)	HNO <sub>3</sub> / H <sub>2</sub> O <sub>2</sub> (2+1)	Oxalic Acid 1.0M	EDTA 0.05M	MgCl <sub>2</sub> 1.0M
Mango	0.630±0.101	13.413±2.300	4.813±0.800	5.120±0.100	1.770±0.064
Orange	0.640±0.314	4.330±0.200	0.530±0.050	6.400±2.500	3.100±0.200
Cashew	0.040±0.020	0.134±0.020	0.023±0.004	0.020±0.010	1.041±0.100
Pawpaw	0.460±0.203	13.413±2.300	4.800±0.800	5.120±0.110	1.810±0.012

**Table 2: Nickel Concentration in Fruits (mg/kg)**

Fruits	N	Mean	SD
Mango	3	0.63	0.10
Orange	3	0.64	0.31
Paw-paw	3	0.46	0.20
Cashew	3	0.04	0.02

**Table 3: ANOVA of Nickel Concentration in Fruits**

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.706	3	0.235	6.251	0.017
Within Groups	0.301	8	0.038		
Total	1.007	11			

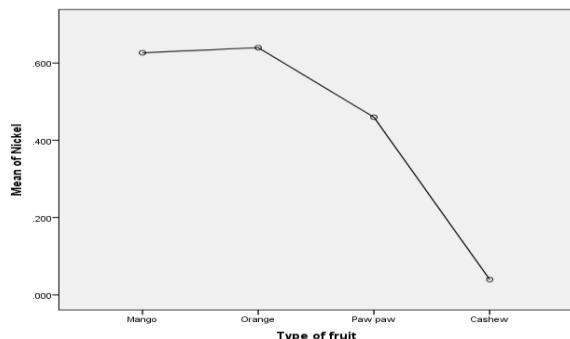
From Table 3 above, since  $p=0.017 < 0.05$ , we conclude there is significant difference in the concentration of Nickel in mango, orange, cashew and pawpaw fruits. The real difference is further investigated by the following Duncan multiple range post hoc test.

**Table 4: Duncan test for Nickel Concentration in Fruits**

Type of fruit	N	Subset		
		1	2	3
Cashew	3	0.04		
Pawpaw	3		0.46	
Mango	3			0.63
Orange	3			0.64

Means for groups in homogeneous subsets are displayed.

From the Table 4 above, Duncan post hoc test showed that, in the third homogenous subset, mango and orange have the highest Nickel concentration followed by pawpaw in the second homogenous subset. In the first homogenous subset, cashew has the least Nickel concentration. This is shown in Fig. 1 below.



**Figure 1:** The mean concentration of nickel against the type of fruit.

## 4. CONCLUSION

Total trace metal composition of soil is of little importance in determining its uptake by plants and consequently, in contaminating the food chain since the different forms have different mobilities, bioavailabilities and potential environment contamination potential. The results on heavy metal speciation in the study indicated that the soil samples collected from various areas contain varying amounts of the metal. The metal was distributed between residual, oxide, exchangeable and carbonate fractions. An increase of the metal concentration in some areas suggests that heavy use of agrochemicals for planting and other agricultural practice could cause increase in the content of heavy metals in the soil.

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# IN PURSUIT OF COMPATIBILITY IN URBAN CONTEXT

## An Analytical Study with Special References to Contemporary Local Contexts in Cairo

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### Abstract

In the past decades, an increased dissatisfaction with the built environment had been grown, despite the fact that several countries have developed legislative requirements to control the aesthetics of the urban environment, yet there is a growing difference between the view of the public and the professionals. One can also argue that the lack of empirical visual urban studies contributes to this gap. This paper investigates the validity of the previous hypothesis. The aim is to verify local urban spaces and their compatibility levels to local cultural language. A survey is conducted in several districts exploring the architectural features from the perspective of the professionals on one hand and the laymen on the other. The compatibility ratings were analysed by factor analysis. The results outline factors affecting the contextual compatibility in Cairo, highlighting non-homogeneous urban fabrics, evaluating the different architectural features which replicate or contrast with the context. These outcomes may help overcome the problems we are facing nowadays where architects and urban designers dismiss public taste in the design of local urban environments.

**Keywords:**Contextual Compatibility; Site Organization; Visual Compatibility; Factor Component Analysis.

### 1. INTRODUCTION

Contextual compatibility has received intensive attention throughout the last few decades. In order to achieve this compatibility, several aspects should be considered to allow for a perfect fit. These could be numerated as physical, perceptual, cultural, environmental and also conceptual. As perceived, the most influential aspect is foremost the perceptual compatibility (Abu-Obeid, 2009;Groat, 1983). Although it would seem that any adequate analysis of building features relevant to contextual fit would be difficult to achieve, yet many theorists had tried to solve this problem by suggesting conceptual frameworks for specifying physical features that are relevant to contextual fit. As noted by Abu-Obeid in his article titled. "Cognitive-Mathematic Approaches for evaluating Architectural Contextual Fit, Harrison and Howard (1980) pointed out aspects such as shape, pattern, form, colour, size, material, and design as physical features that form strong images to users and observers (Abu-Obeid, 2009 ; Auburn, Barnes, 2006). Others such as Harvey and Henri Lefebvre concentrated more on phenomenological references bridging between semiotics and experiences of space with reference to cultural preferences (Lefebvre, 1996;Lefebvre, 2003; Lefebvre, 2009). Accordingly, the fit in the contextual representation has been interpreted traditionally either through physical design strategies or philosophical concepts, cues, signs and symbols.

Several studies and surveys have concluded that building facades are the main and primary indicator to judgement on buildings. Along the lines of Harrison and Howard, Bentley (1985) pointed out what he called "contextual cues" such as windows, doors and wall details as variables to the contextual fit. Stamps (1995),

on the other hand, underlined a method through a study he conducted to validate principles of contextual urban design as means of control to contextual fit. He identified scale and character as two variables that would match old buildings to new (Brolin, 2002;Groat, 1988).

As indicated, the several outlined approaches seem to lack generality by focusing on some physical aspects or phenomenological indicators. The approach outlined by Linda Groat appears to be more general, discussing and investigating a wide range of design factors, not only the façade components as stated by other theorists (Groat, 1983). Based on several analytical studies she pointed out aspects that would allow for site organization and defining façade features mainly massing, style and space occupation that would lead to a fit between the old and the new. Moreover, she also confirmed that the most influential elements in judging compatibility are façade components (Groat, 1988).

There are scholars who investigated the contextual compatibility through physical attributes only such as Bentley and Stamps. Yet others with Groat, such as Kevin Lynch, Christopher Alexander and Gordon Cullen had investigated the compatibility from a different perspective (Lynch 1960;Alexander 1977;Jencks 1999; Cullen 1991&Cullen 2012) dividing the contextual compatibility into three types (compatibility as a function of visual continuity, compatibility through deeper levels of meaning and association, compatibility as a reflection of history). It is this variety of ways that compatibility may actually be interpreted and is hypothesized to be the optimum for this investigation to be fulfilled (Groat 1988).

Accordingly in order to investigate contextual compatibility a survey will be conducted investigating

its types and focusing on different design features which are the components of any design strategy. This will be conducted exploring several case studies in different places, asking about different physical attributes, patterns, and urban features. Guided questionnaires with frequent users and laymen as well as experts are conducted to verify this investigation.

## 2. RESEARCH PROBLEM

"Architecture always influences the perception, memory, and clarity of the images that people form about their environments. Within the context, environmental mystery can be better understood by the perception of contextual fit." Auburn and Barnes (2006)

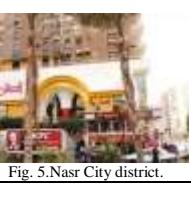
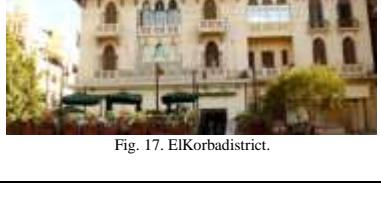
Certainly the designer has a great challenge to find out and create well suited Architecture or contextually compatible Architecture. Although architects usually visualize and familiarize themselves with the context, both physically and conceptually, yet their designs transcend the observed surroundings and create their own context. Sometimes this can be due to extreme abstraction or intentionally to stand out. This is considered a commonly observed problem in several sites today. By result, local contexts and urban spaces lack compatibility, character, and their own style; consequently they lack the feeling of place as well as the identity.

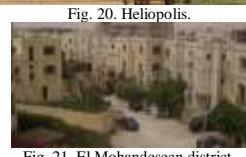
In different setting types such as residential, commercial and also public, it is more and more common to identify lack of social identity, cultural spirit of place and fittingness between old and new buildings and settings and within the newly built environments as well. Many regions have conflict in some characteristics, such as: colour, height, material, and volume between buildings. One can see different

façade colours and materials in the same street not matching with each other. Furthermore, conflict is obvious between the ground ribbon and the upper part of the building in commercial streets; shops under residential buildings have different colours, materials and proportions than the building above leading to non-homogeneous facades. It is important to note that even though the paper will investigate all types of compatibility whether environmental, physical, cultural, conceptual, and/or perceptual, yet it will concentrate on the perceptual as being the easiest to the laymen to identify and the most influential to the experts. From several observations as indicated below in table (1), it is obvious that architects lack considering compatibility in context. The research main problem notes that although Architects are aware of the need for contextual compatibility, there is a need to develop a framework for analysing, assessing and evaluating contextual compatibility in different Cairene settings.

Based on the literature review, the research applies an empirical study to verify the extent of perception of the attributes for contextual compatibility between professionals and laymen. The compatibility ratings were analysed by factor analysis, specifically the Principal Component Analysis "PCA" method. The results outline factors affecting the contextual compatibility in Cairo, highlighting non-homogeneous urban fabrics, testing and evaluating the different architectural features and physical attributes which replicate or contrast with the context. The paper's main objective is to prove that façade components/features have the strongest effect on compatibility judgment due to laymen and experts and not only experts as stated by theorists, also to investigate the contexts within the compatibility as a function of visual continuity, compatibility through deeper levels of meaning and association, and compatibility as a reflection of history.

Table 1: several observations indicate the research problem (source: Authors).

Inconvenient Context	Convenient Context
<p>Conflict in the same street between colors, heights, volumes, and materials.</p>    <p>Fig. 1. El Mohandeseen district Fig. 2. El Korba district.          Fig. 3. El Dokki district.</p>	<p>Complement in the same street between colors, heights, volumes, and materials.</p>   <p>Fig. 15. El Korba district          Fig. 16. El Korba district.</p>
<p>Conflict between the ground ribbon and the building above.</p>    <p>Fig. 4. El Korba district. Fig. 5. Nasr City district.          Fig. 17. El Korba district.</p>	<p>Complement between the ground ribbon and the building above.</p>

			 
Non-homogeneous urban fabric.	  	Homogeneous urban fabric.	 
No impression of unity. There is no beginning & end of place.	 	Impression of unity. There is beginning & end of place.	
Contrast in volume and height.	 	Matching in volume and height.	
Contexts lack Identity		Contexts with Identity	

### 3. TOWARDS CONTEXTUAL COMPATIBILITY IN URBAN SETTINGS

Recently, the term “contextual architecture” is interpreted and understood by contemporary western architects of the last two decades, not just as being the architecture that necessarily deals with finding the appropriate physical attributes to be borrowed or copied from the surroundings, but also as being the architecture that captures, in different ways and on several levels of interpretation, the spirit of the surroundings (Groat, 1995). This evokes a variation in the criteria of evaluating architectural work as being contextually compatible. Capturing the spirit of the surroundings is much more appreciated than simply copying from the existing vocabulary; innovative architects’ works are better evaluated when achieving compatibility through this strategy (Rice, 1980). Yet compatibility means consistency, appropriateness, suitability, convenience and fittingness as well, while

fittingness is the criterion that has been suggested always against which the applicability of qualitative and quantitative studies should be evaluated (Groat, 1988; Rice, 1980; Milligan, 1979). However in this research the term compatibility will be used in the practical investigation.

Moreover measuring the compatibility is completed by analysing activity patterns of users with respect to the designed physical environment, by identifying the functional properties of a specific setting (Lefebvre, 2009). So far the residential setting differs from the commercial and recreational setting, in their functional and physical properties. This paper is concentrating on the residential settings although shedding the light on other settings is also important in gaining contextual compatibility, but the study decided to leave the recreational and commercial settings to further studies.

## 4. FACTORS AFFECTING USER'S PERSPECTIVES

Several studies have confirmed that there is a considerable difference between designers and lay people / users as to how they perceive, recognize and 'like' built environments. This is namely due to the difference in schemata used by both. Nevertheless it is the meanings as observed by the users and lay people is the one that most matters as it represents everyday life and environments (Bonta, 1979; Jencks, 1980). This illustrates how many architectural practitioners and critics frequently record how they expect people to interpret or react to specific physical attributes of an environment and how they evaluate compatibility or consistency (Rapoport, 1982). A common assumption is that people perceive things mostly in common if they are put under the same circumstances and in the same viewing position. However there are many factors that together influence the user and differ from one person to the other and none can be examined or can be fully understood out of context. So any event in context needs users, during the following part; factors affecting the users will be discovered and discussed (Auburn, 2006).

Factors affecting the user's perspectives are many; Background, beliefs and experience of the user, his work, traditions, preferences, observations and his behaviour in the contexts (Kjellström, 2011). In the following arguments, some of these factors will be discussed.

### 4.1 User's Beliefs Impact on Compatibility

In his study, Jack L. Nasar examined the individual differences in perception. The examination indicates that the differences probably result from variations in the socio-physical context, also he referred to what Evans (1982) had found about the impact of the socio physical context on users, for example the impact of symbolic significance was reduced in a city lacking symbolic buildings, the impact of singular function was reduced in a city lacking singular function buildings, moreover the impact of signs was reduced for a less cultured population. These all related to User's beliefs. Furthermore, the emphasis on significance and building access - which are important concerns to the laymen - was higher in the examination for elder respondents than for others (Nasar, 1989).

From this examination, factors like cultural level and age of respondents had been occurred, if the respondent is less literate or less cultured, then his background and beliefs will be limited, his perspective will be influenced by these factors as well, they affect the user's beliefs. Hence, building 'recall' won't be enhanced by exposure and visual contrast only, but also his beliefs and backgrounds play an important role, and influence the personal reflection towards the context (Milligan, 1979).

### 4.2 User's Preferences Impact on Compatibility

In urban, the factor of preference at many times is related to way finding and orientation, or what do people rely on when first learning their way around an

unfamiliar place, so perception of some physical elements rather than others may help in liking and preferring those elements than others in the context, for example some studies find paths as more important, others find landmarks as more important. Aside from the effects of variations in the task and scale of environment, the differences probably result from differences in physical context. However, and as a general observation, it is landmarks in cities are more important to new comers than paths (Nasar, 1989; Lynch, 1960).

On another stance, preference is related to the familiarity of the object to the laymen, some facades for example contain details that are more familiar to laymen than others. Moreover, preference provides a general evaluation measure defining the relation between an object and a group of people or class and is concerned with aesthetic evaluations (Altman, 1980; Lessig, 1998)

### 4.3 User's Observation Impact on Compatibility

One of the major theories related to perceiving the built environment is what Kevin Lynch introduced defining place legibility. How people understand and recognize place was manifested in his analogy through isolating a set of features of the built environment that would allow for its vibrancy and attractiveness. Developing a mental map of the city for Lynch was key to understand what the city contains of such references that associate with people's cognition (Lynch, 1960). These mental representations that are developed by the individual and recognized by the laymen are defined by Lynch as a network of paths, edges, districts, nodes, and landmarks.

To verify his theory, Lynch conducted a series of questionnaire surveys, and interviews in the central area of Boston, Jersey City and Los Angeles (Lynch, 1960; Banerjee, 1990). Building on the outcome of how people mapped places in these central city areas, he concluded that in order for a place to have a high mental image, its elements should be strongly defined and recognized by its inhabitants not only from physical point of view but also from a meaningful measure.

The more there is ambiguity and confusion in these elements, the less the spatial recognition. Hence, edges, districts, nodes, and landmarks are favourable contributors to imaging and when placed in good form, increase human ability to observe, see and remember patterns, and hence increase the contextual compatibility (Banerjee, 1990; Plata, 2009).

### 4.4 User's Behaviour Impact on Compatibility

The patterns of interaction between people and the built environment are considered an important factor in environmental psychology studies. These ordinary behavioural patterns in ordinary settings are the focus of several studies to capture the notion of how the feel of a "place" emerges as an outcome of people relationships with the physical environment in which

they act(Vahabzadeh, 2001; Davis, 1999). As a main function of this concept, the idea of the orderliness of people's interaction with the physical environment. Stokols and Shumaker (1981) in their account of 'People in places' argue that settings are "a particular place in which specific individuals share recurring patterns of activity and experience"(Davis, 1999).

However Jack Nasar identified the user's behaviour as the spatial behaviour which, refers to how people use the environment, which places they visit, which places they avoid, how long they stay. This spatial behaviour can be observed directly, measured indirectly through its traces, or estimated from verbal report of behavioural intent or how individuals expect to use an environment(Nasar, 1989). The behaviour impact on compatibility is usually accounted for as the least although it is a significant factor in forming the meaningful image of a place.

## 5. ATTRIBUTES UNDER INVESTIGATION

As this study aims at exploring the relationships between attributes of contextual compatibility in different regions, and based on the above stated literature review these attributes are summarized as follows: three major attributes, divided into minor attributes; (Site Arrangement: size, composite fittingness, height, Mass: shape, volume, scale, Façade Features: colour, texture, materials, style, openings, overall details). Depending on the loadings of these variables in the survey, compatibility can be investigated highlighting the difference between liking/preference and appropriateness. Preference will be measured by Laymen's perspective, while Appropriateness will be measured by Experts' perspective. The questionnaire held in each context can say which type of compatibility is perceived and why, aiming to find the three types of compatibility (compatibility as a function of visual continuity, compatibility through deeper levels of meaning and association, and compatibility as a reflection of history) in all contexts.

## 6. EMPIRICAL ANALYSIS METHOD

### 6.1 Participants

As far as this paper is concerned with compatibility in contemporary contexts, compatibility then should be discussed and understood in a practical way, thus a questionnaire is designed for laymen and experts, aiming to shed the light on possible gap/overlap between meanings of compatibility in the minds of intellectuals/laymen and designers.

The sample consisted of 100 volunteers, 50 laymen and 50 architects, the sample fulfilled a number of criteria including: unfamiliarity with the selected sites, fitting in a range of age groups, and belonging to various groups representing different social classes such as students, governmental employees, architects, academic staff, and small business employees.

### 6.2 Study Areas(see Fig. 1-24 in Table 1)

A wide panoramic view of Cairo is taken in the questionnaire to investigate the contextual

compatibility in different sites, referring to different regions; Fatimid Cairo as an example of a historical context, ElKorba as an example of an old traditional and cultural context, New Cairo referring to a new residential compound, Nasr City as an example of a new developed context, and El Mohandeseen district as a crowded and high density context. It is worth to say that there are many contexts valid for these criteria but due to the study constraints, the research concentrates on these five contexts only.

### 6.3 Stimuli

The contexts in the questionnaire consisted of 5 printed coloured photographs "14 x 8 cm" of the 5 selected sites. Printed photographs were recommended by many researchers and were found valid representation techniques (Hennink, 2011).A strong relationship has been found between responses given to photographs and responses to places in situations, for that the photograph in this case is necessary to introduce the context to the volunteers as shown in the following figures (25, 26).

The 5 photographs were selected among 100 photographs taken from the 5 sites. The criteria for selections included:

- Variety between familiar contexts and unfamiliar contexts to the users and experts.
- Variety between styles (classic, baroque, neo baroque, modern).
- Variety between eras (old era and new era).
- Variety between residential contexts, either compounds or streets.



Fig.25. the photograph for New Cairo



Fig.26 the photograph for Fatimid Cairo (source: Authors)

### 6.4 Procedure

A photo-questionnaire was distributed among the volunteers. The questionnaire form had five pages, every page stands for one context of the selected sites with a picture refers to the context, the first page is for the Fatimid Cairo, the second page is for Nasr City district, the third page shows ElKorba district, the fourth stands for New Cairo district, and the last one stands for El Mohandeseen district. It indicated that the

volunteers whether architects or laymen would be evaluating 5 photographs.

The questionnaire is designed starting with a demographic data about the layman and the expert then a table containing the elements of the contextual design strategy including the three parts (site organization, mass, façade features) then the last part in the table asking about compatibility and its types, compatibility through visual continuity, compatibility through levels of meaning and compatibility as a reflection of history, whether any of them exists in the picture of the questionnaire from the volunteer point of view, asking the respondents to answer 15 questions representing the 15 variables about each photograph referring to each site. The variables included are required to be rated in a scale from 1 to 5 where 1 is referring to contrast and 5 is referring to replication. For example, "To what extent do you find the size compatible?" 5 points rating scale was used to answer each of the 15 questions. The scale ranged from 1 (not at all) to 5 (very much).

## 6.5 Results

As stated before in the research objective, the main aim of the study is exploring the relationships between the attributes of contextual compatibility (VISUAL COMPATABILITY: Site Arrangement: size, composite fittingness, height, Mass: shape, volume, scale, Façade Features: colour, texture, materials, style, openings, overall details. HISTORICAL COMPATABILITY & MEANING COMPATABILITY (socio-cultural)), also evaluating these attributes and then determining the most effective and which type of compatibility is more perceived.

A statistical method was applied to test the relationship between compatibility and ratings of elements of architecture. The method applied Multivariate Factor Analysis using Component Loading and Commonality and Principle Component Analysis (PCA), just as seen below (sample, this was conducted to all areas, details of information for different locations and radar charts are not included in the paper).

Table (2) Laymen Component Matrix shows component loading of variables and commonality of variables, the highest component loading is openings; Loadings above 0.50 are in bold Component Matrix. The most common variable in Fatimid Cairo is visual compatibility. (Source: Authors)

Variable		Factor 1 41.282 %	Factor 2 17.252 %	Factor 3 9.690 %	Factor 4 7.488 %	Commonality	Radar Chart for Commonality
Site arrangement	size	.543	.419	.504	-.245	0.783	
	composite fittingness	.695	-.395	-.066	.201	0.68	
	height	.604	-.500	-.052	-.019	0.61	
Mass	shape	.662	-.431	-.289	.392	0.859	
	volume	.566	-.505	.443	.114	0.783	
	scale	.479	.603	-.046	.221	0.639	
Façade Design	color	.268	.528	-.054	.650	0.774	
	texture	.544	.730	.129	.153	0.864	
	materials	.479	.603	-.046	.221	0.639	
	style	.786	.157	-.434	-.008	0.829	
	openings	.842	.034	-.126	-.126	0.739	
	overall details	.785	.012	.203	-.208	0.701	
Types of Compatibility	visual compatibility	.799	.160	.010	-.107	1.674	
	meaning compatibility	.536	.380	-.237	-.505	0.742	
	historical compatibility	.673	-.338	-.411	-.161	0.759	

The most common variable is "visual compatibility"

The Laymen Component Matrix in Fatimid Cairo district shows that the façade openings, is the highest component loading among all the architectural attributes. This is because the openings are the common factor among all buildings in the street; openings have the same size, proportion and materials. Hence they can be perceived as a tool for contextual compatibility as

shown in figure (27), and as indicated by the laymen in the survey.



Fig. (27), Fatimid Cairo district. (Source: Authors)

While Experts' Component Matrix showing the component loading of variables in Fatimid Cairo, indicated the façade materials as the highest component loading among all variables.

While in Nasr City district, the Laymen specified the façade texture as the highest component loading among all the architectural features, they gave the high rates to two types of compatibility; the compatibility due to meaning and compatibility due to visual continuity which means that people can perceive contextual compatibility in this site, then gave a high rate also to the façade texture, the radar chart done for the component matrix in Nasr city district identifies the texture of elevations as the highest component loading and the most perceived attribute due to the laymen.

For explanatory purposes, (compatibility through visual continuity) and (compatibility through levels of meaning) were found to be the highest component loading in the previous chart, they occurred strongly in Nasr City district. This was almost equal to the results of façade features, which means that this site is compatible to some volunteers. Furthermore, the highest component loading and most perceived attribute due to experts in the same site were both the (façade style) and façade colour. Details and texture took high loadings in the same radar chart following the façade style and colour. As volunteers perceive contextual compatibility in the district through the façade style, experts found similarity between the buildings' styles along the same street, as almost all the buildings are modern and similar in the geometrical presentations as indicated in the photo questionnaire distributed to them and as shown in figure (28).



Fig. (28), Nasr City district, buildings have the same style. (Source: Authors)

While in El Korba district, The Laymen component matrix shows that the façade style is the highest component loading among all variables. It is very surprising that the laymen had reached this result and not the experts, for the façade style is a scientific variable and most probably is perceived only by experts. However the experts' results are different, they perceive the façade colour as the most common factor in El Korba district as the range of colour is almost the same in the whole district (see Figure (29)). In contrast, the Laymen perceive the façade style as the most common feature.



Fig. (29), El Korba district, Heliopolis, buildings have the same style and colour (Source: Authors)

Moreover the Experts Component Matrix in New Cairo district shows that the highest component loading is the façade style. New Cairo is a new residential district dedicated for the high class and 'nouveau riche' category. It shows different architectural styles but only one style within the same compound as it contains many compounds as shown in figure (30), the photo questionnaire distributed to the experts includes a photo for one of those compounds in New Cairo. The result hence indicated that the façade style is the most common factor.



Fig. (30), one of the residential compounds in New Cairo (Source: Authors)

## 7. DISCUSSION

Discussion of contexts will be presented individually. Every context will be shown due to Laymen and due to Experts' results, showing the commonality through elements and component loading in attempt to know which type of compatibility is shown in each context. This method of comparative analysis is indicated in figure (31) below.

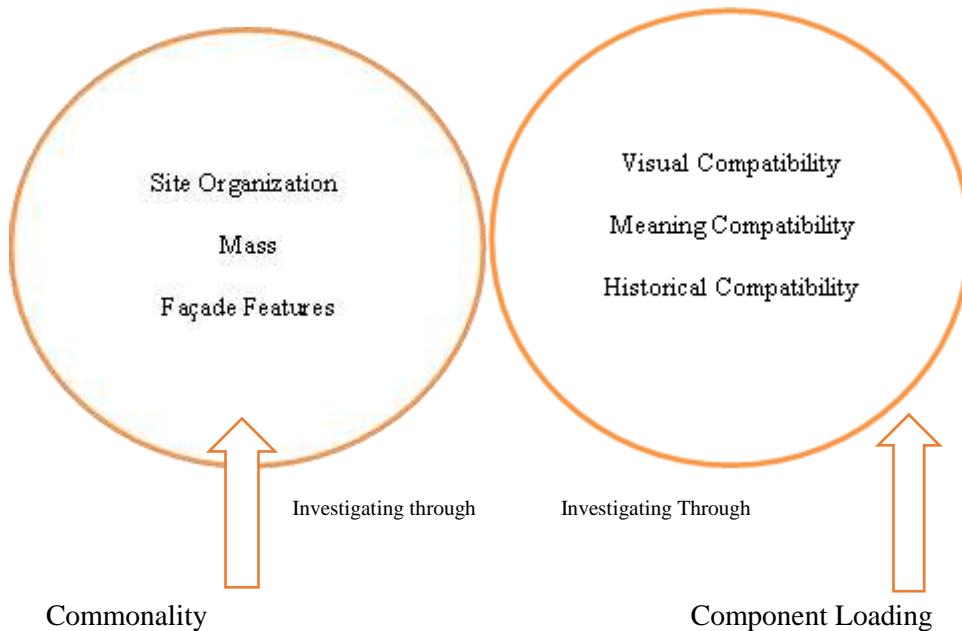


Fig. (31), a diagram explaining the strategy of discussing the results, commonality results show which of the design categories existed while component loading results show which types of compatibility existed. (Source: Authors)

## 7.1Fatimid Cairo

### Laymen

Commonality indicates visual compatibility is the highest element  
 Component loading indicates façade openings is the highest element

### Experts

Commonality indicates façade style is the highest element  
 Component loading indicates façade materials is the highest element

### **Commentary**

Component loading: component matrix due to laymen shows openings as the highest loading, while due to expert shows materials as the highest loading. Façade openings in Fatimid Cairo almost have the same size, proportions, and materials. Moreover the façade openings, materials, and overall details reserve a historical image, referring to the old Fatimid era, referring also to nostalgic meanings, leading to a well-known visual image. So Fatimid Cairo questionnaire due to Laymen and experts shows the three types of compatibility, (Visual, Meaning, Historical).

Commonality: Commonality due to laymen indicated visual compatibility is the highest element, while due to experts indicated façade style as the most common element which means (façade features) among all the three major categories.

## 7.2Nasr City

### Laymen

Commonality indicates scale is the highest element

Component loading indicates façade texture is the highest element  
Experts

Commonality indicates volume is the highest element  
 Component loading indicates façade style is the highest element

### **Commentary**

Component loading: component matrix due to laymen shows façade texture as the highest loading, while due to expert shows façade style as the highest loading. Moreover laymen indicate meaning compatibility and visual compatibility. This is most probably because the sample photo taken in the questionnaire is for a prototype street in Nasr City including residential buildings and a ground ribbon full of colourful shops' facades. The meaning perceived by them is a geometrical and architectural meaning related to ratio, scale, openings, volumes and blocks as well. Regarding the experts questionnaire, their results approved this result as the façade style is the most component loading for them. The result for this site, it owes (visual and meaning) compatibility.

Commonality: As the research depends on commonality to discover which of the three major categories exist more in the context (mass, site organization and façade features), then by monitoring commonality in both questionnaires, it was found that commonality due to laymen indicates scale and commonality due to experts indicates volume. Both fall under (Mass) which means that masses are matching with each other in this site.

### 7.3 El Korba

#### Laymen

Commonality indicates shape is the highest element  
Component loading indicates façade style is the highest element

#### Experts

Commonality indicates shape is the highest element  
Component loading indicates façade colour is the highest element

#### **Commentary**

Component loading: component matrix due to laymen shows façade style is the highest loading. Component matrix due to experts shows façade colour as the highest loading. Style and colour in El Korba facades refer to an older architectural era which holds a lot of meanings; visually and historically, thus it is shown that the three types of compatibility are visible in this context (Visual, Meaning, Historical) compatibility.  
Commonality: commonality results are the same for both laymen and experts, shape is the most common element determined by both laymen and experts. This means that the (Mass) is the most major element perceived by them and hence it can affect compatibility in this context.

### 7.4 New Cairo

#### Laymen

Commonality indicates height is the highest element  
Component loading indicates façade materials is the highest element

#### Experts

Commonality indicates height is the highest element  
Component loading indicates façade style is the highest element

#### **Commentary**

Component loading: component matrix due to laymen shows façade materials is the highest loading, while component matrix due to experts shows façade style as the highest loading. Hence, façade features are related mainly to visual compatibility. Since laymen perceived the materials, and experts perceived the style, they saw these two features as the most replicated and compatible items in the context. This also confirms and refers to (visual compatibility).

Commonality: commonality results are the same for both laymen and experts. Height is the most common element determined by both laymen and experts. This result is most probably because the sample photo chosen for this context was for a new residential compound in New Cairo, a prototype model with the same height, colour, materials, etc. Height falls under Site Organization. It is one of its minor elements, which means that the (Site Organization) or Site Arrangement affects the compatibility in the prototype contexts.

### 7.5 El Mohandeseen

#### Laymen

Commonality indicates shape is the highest element

Component loading indicates façade details is the highest element

#### Experts

Commonality indicates façade colour is the highest element

Component loading indicates façade colour is the highest element

#### **Commentary**

Component loading: component matrix due to laymen shows façade details is the highest loading, while the component matrix due to experts shows façade colour as the highest loading, façade features are related mainly to visual compatibility. Since laymen perceived the details, and experts perceived the colour, they saw these two features as the most replicated and compatible in the context, which refers to (visual compatibility). They can see the context compatible only visually.

Commonality: commonality results are not the same for both laymen and experts, laymen indicates shape as the most common element in the context, and this fall under (Mass), while experts indicates façade colour as the most common element in the context, and this fall under (Façade features).

## 8. CONCLUDING REMARKS

In general, the previous analysis show that many volunteers realized compatibility due to visual continuity in almost all the sites, especially in Mohandeseen, Nasr City and Fatimid Cairo. The other two types of compatibility (compatibility through levels of meaning, and compatibility as a reflection of history) gained fewer grades in the questionnaire just as shown in the previous discussion. Moreover the façade features had gained the highest component loading among all contextual variables. There reason that possibly lay behind these results is that the façade features are easily observed and appear adequately clear through the whole composition of the context.

## 9. FINDINGS

The findings of this research highlighted three conclusions: first the façade features: colour, texture, materials, style, openings, overall details have the big loading in all variables, which verified the research hypothesis that the façade components have the strongest effect on compatibility judgment. Second there is quite a difference between preferences done by laymen and appropriateness stated by experts. Architects are still aware of site organization and masses in the context, although the main issue for contextual compatibility due to them is the façade components and details. Third, is that compatibility due to visual continuity is the most perceived due to results from both laymen and experts which also verifies the stated hypothesis. Moreover the only two contexts that hold the three types of compatibility were (Fatimid Cairo and El Korba) which means applying compatibility interpretations depends on history,

traditions, meanings and different concepts not only physical components. Architects and Urban designers should take into consideration the layman's perspective which depends on deeper and rooted beliefs, behaviours, observations, etc., and which is by proof and evidence different than the expert's eye. A thorough investigation in this regard should be undertaken prior to developing designs especially in historic or valuable urban contexts.

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