

## A CLOUD BASED METASYSTEM MODEL FOR SMALL TO MEDIUM SCALE ENTERPRISES

(A Survey on the Small Scale Industries of Isfahan)

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**Abstract:** *Cloud computing as a service for small and medium-sized businesses is a game changer. Due to important role of SM businesses in Iran economy, the aim of this study is to design a cloud Spine for them. Information and data collected as views of experts, observing, preliminary and systematically interviews. The research method was a survey and a case study. A CATOWE analysis has been conducted. Results show that this business model provides win-win solutions for SM businesses provider and cloud service consumer. At the end, it is presented for the cloud Spine model.*

**Keywords:** *Cloud Computing, Metasystem, Cloud Spine model, Small Businesses Organization*

**JEL Classification Codes:** C88, M21

### 1. INTRODUCTION

The world surrounding us is becoming more intelligent at any given moment. With the progress of information technology, there is a need for calculation based tasks in every place and at all times. In addition, it is necessary for individuals to carry out demanding computing tasks through respective service providers and without need for access to expensive hardware and software. Cloud computing is the last solution technology which has been offered for such demands (Luckham, 2012). Small and medium-sized businesses have the utmost importance in economic growth of a country. These businesses typically have small portions of ICT, and they more likely don't have access to skilled personnel, information technology and its sophisticated infrastructure and management tools. Maintaining the costs within a reasonable range is one of the challenges faced by small to medium scale companies. On one hand, allocating significant amounts of money for information technology strategies is not possible for such enterprises, and on the other hand, the high expenses of information technology projects pose a high risk in case of failure. Regarding such challenges, this study aims to design a cloud based business model accessible for small to medium scale enterprises. The model structure is done via SSM (soft system modeling).

#### **The concept of cloud computing**

The Berkley university defines cloud based computing as a series of applications offered as online services alongside the hardware and software used for the provision of these services (Armbrost, 2010) (Etro, 2011). A recent report by Gartner predicts an explosive growth in the sector of cloud based markets in the coming year (Gartner, 2012). Cloud based computing can be defined as an innovative computing paradigm that allows the users to utilize a networked computing infrastructure on a temporary basis. Cloud based computing is offered by the provider in one or multiple abstract levels (Yusuf, 2008). Armbrost .et al (2009) claim that " cloud based

computing includes the applications provided as services on the web and also the hardware and software in the service provider's data centers (Armbrost, 2009). It's important to note that cloud based computing is not necessarily a new concept, but it is indeed a next step in evolution towards various plans executed in the recent years, including distributed computing (Garj, 2002), networked computing (Foster, 2001), public computation (Ross, 2004), virtualization (Bahram, 2003), and server clusters (Fox, 1997) as some of the plans specially focused on cloud based computing for improving networked computation through research and cooperation (Kim, 2009).

### Small to medium scale organizations

Large organizations quickly adapted to the progress of cloud computation (Klei, 2011). While many of the small and medium scale organizations are still reluctant to accept it. In the OECD (Organization for Economic Cooperation and Development) member countries, more than 95 percent of the organizations belong to the small to medium scale category. These small enterprises create between 60-70 percent of the employment opportunities. 2/3 of the European Union and 78% of the Japanese job opportunities are created by small to medium scale enterprises (Bernroider, 2002)

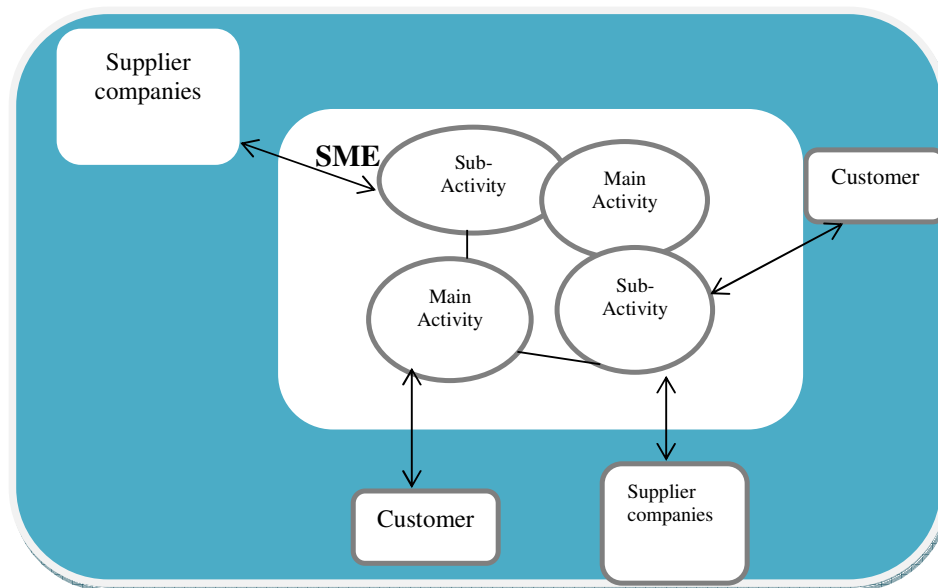


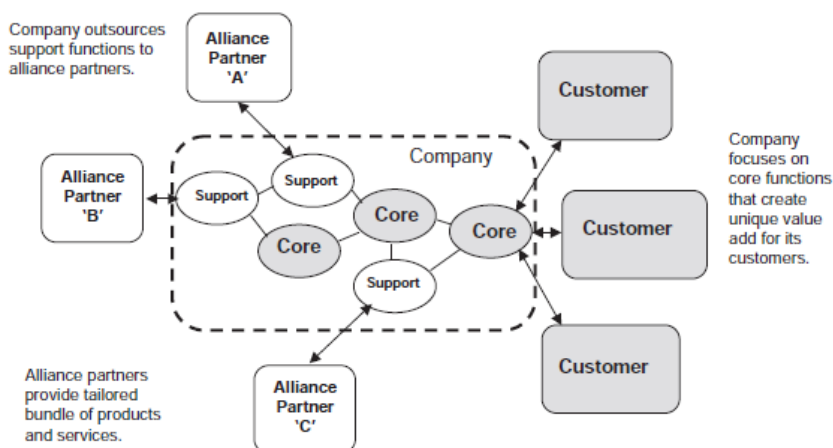
Figure 1: Small and medium-sized businesses and their relationships (Dababneh, 2007)

Small and medium scale enterprises usually contain small faculties for information technology and communications, resulting in a lack of proper access to skilled workforce in the sector of information technology and its complex substructures and managing its equipment. Small and medium scale enterprises, in both cases of working as a home based operation or cooperating with external providers, can use the market and cost pressure in the favor of increased efficiency of the organizations through the double axis movement of information and communication technologies (Mathew, 2012). Relationships of small and medium enterprises are shown in figure (1).

### The ecosystem of cloud computing Accountable Agility Organizations

The cloud based systems will be of increasing importance in the interactive and intelligent environments and altogether, creates significant values. This case is true for both small and medium sized enterprises. The business model in Figure (2) shows how companies are evolving away from self-contained organizations that perform all their core and support activities internally. Companies are now becoming enmeshed in networks of suppliers and customers. To

paraphrase a famous saying, no company is an island. No company can succeed all by itself. Companies need to be delivered in a reliable and predictable fashion, and it is the flow of information back and forth between companies through the cloud that makes this possible (Hugos, 2011) depend more than ever on effective collaboration with their supplier partners. Business services



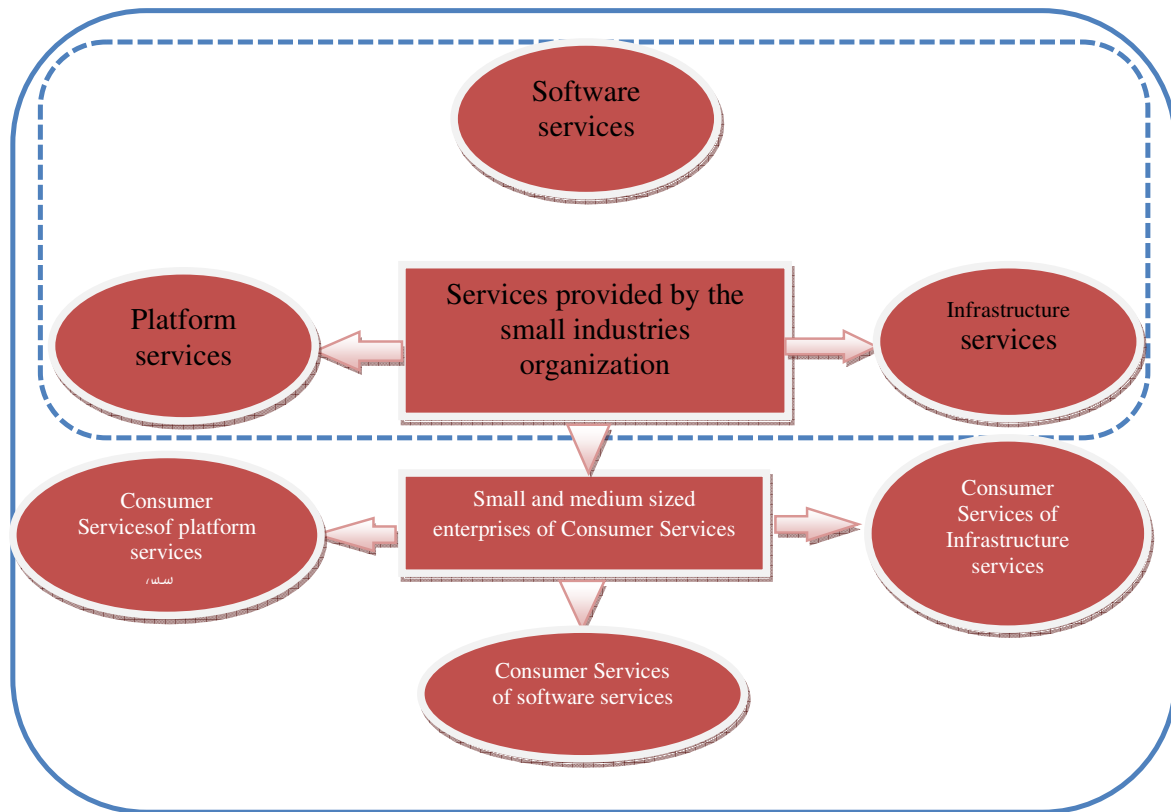
**Figure (2): Companies Are Dependent on an Ecosystem of Suppliers and Customers**

A small scale industrial enterprise, as a provider of cloud based services, should be able to offer services with the following 5 qualities that distinguish cloud computation systems from other forms of computing:

1. Self-serving services based on demand
2. Broad network access
3. Assembly of resources
4. Rapid elasticity
5. The measured services

Small to medium scale enterprises can be clients for the services of the small industries organization. Services provided by the small industries organization can include the following cases, depending on the type of services:

1. The ability to store information, access to documents, images and in short, all the Intel through any internet connection. In addition, it facilitates storing and sharing the information and capability to back up the Intel.
2. Service management
3. Backup and recovery of information
4. Web hosting platforms
  - The platform services that the small industries organization can provide for small to medium scale businesses include database and business intelligence.
  - The software services that the small industries organization can provide for small to medium scale enterprises include document management, client affairs management, sales management, bills, organizational resources management, human resource management, social networks, content management, financial affairs and email services.



**Figure (3): Conceptual Model**

## 2. METHODOLOGY & MODEL

Concerning the nature of the study, it is a descriptive-analytic or theoretical research and in regards to performance, is a contextual case study. The questions (hypothesizes) are created through a model based design and used to analyze the small industries organization of Isfahan, Iran. The research data is gathered by a qualitative questionnaire and the business model requirements analysis has been carried out using the CATWOE analytic method.

### Case study

With regards to the novel and sophisticated nature of this study, the statistical population included the managers and experts active in the information and communication technology sector of Isfahan's small industries organization. The study was conducted in the small industries organization and its industrial complexes.

### Instrument

With regards to the nature of the subject and for the purpose of achieving more accurate information, a number of 30 open questionnaires were used for the task of gathering the information (some of them including interviews), enabling the responding individuals to write what they thought and saw fit without any restrictions and provide necessary explanations. In the aspect of performance, the field interview method is used for the purpose of acquiring sufficient experience for the classification and conclusion of the information.

### The cloud based enterprise model for small and medium scale organizations

**The cloud spine, process management for small enterprises:** Process management of enterprises is a concept of an organization management process in which business processes are

considered as special organizational resources and they constantly adapt with the stream of changes. The fundamental principles of management include transparency and visibility of the business processes that are monitored through modeling with the help of official symbols, software and simulations which make them possible to be analyzed. The main reason for limited usage of business management principles by the managers of small and medium scale enterprises is their lack of confidence in commercial activists for the purpose of understanding the benefits of establishing managed business process, loyalty to the outdated managing practices, and incomplete information due to the limited resources and high risks in setup process of the business management supporting software, that lead to insufficient development of the enterprise (Chong, 2007).

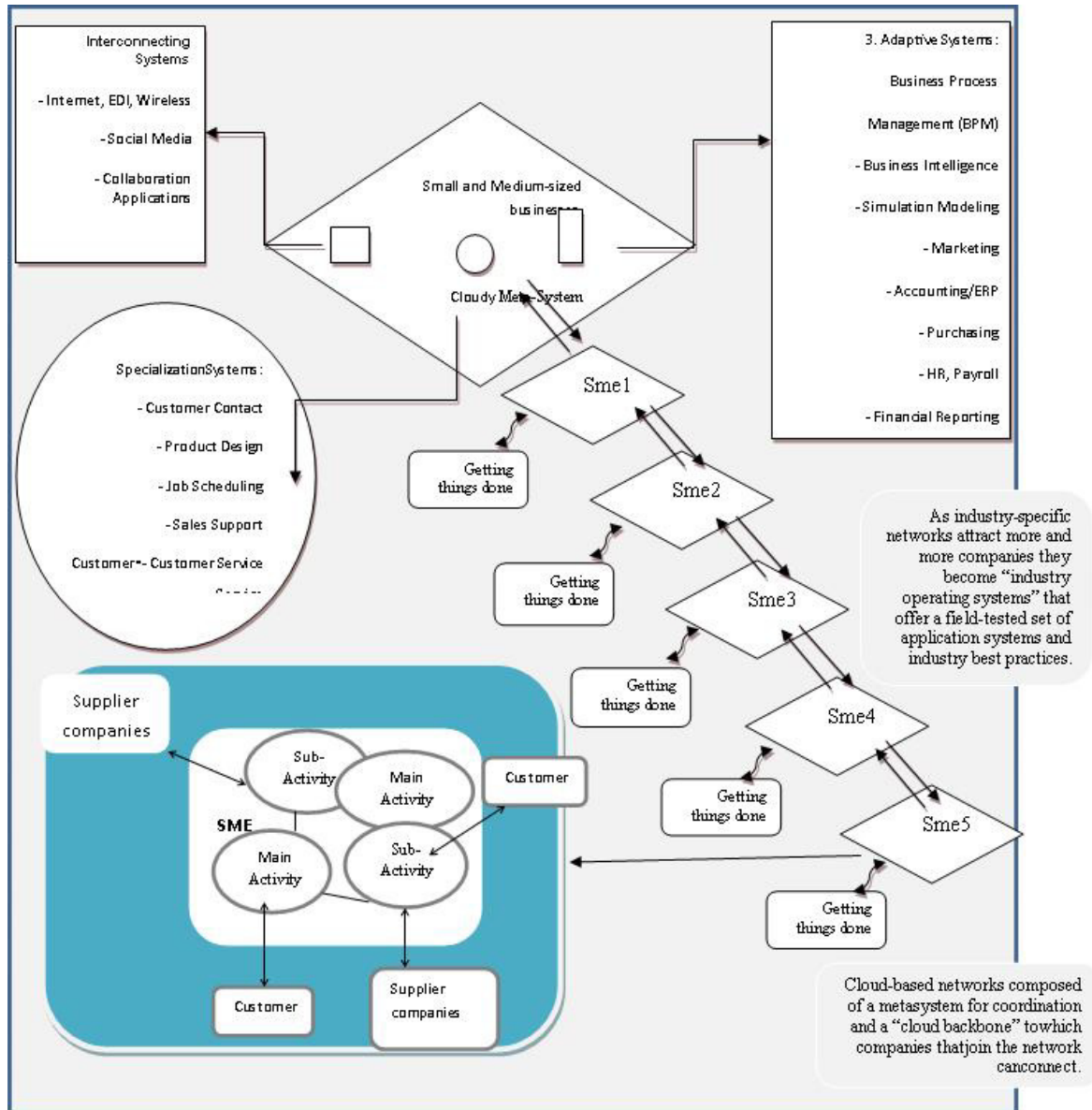
To acquire a better understanding of the business management process in the small to medium scale organizations, it is necessary to identify the unique properties of the small to medium scale enterprises, relevant to their organizational structure, the shared strategies and investigation of sociological backgrounds. For the application of correct solutions of business management process for each small or medium scale enterprise, it is essential to analyze the relations between the factors affecting the reception and application of information technology, creating the need for proper methodology for such analysis. In large scale organizations, process management of business plays the same role as in small to medium scale organizations, with the exception that in the flat hierarchical structures implemented in small and medium scale companies, it allows the management to show quicker response while applying the business process management. Lack of sufficient knowledge about business process management is the most important factor for its unacceptance by small to medium scale organizations. Some of the restricting factors for the implementation of business process management are as follows (Chong, 2007):

- inadequate funding
- lack of sufficient time
- lack of support for the senior management
- lack of information technology expertise
- insufficient knowledge about process oriented methods

However, purchasing a system for business process management is a costly option for small to medium scale enterprises, demanding not only a software package, but also proper hardware capable of running its processes in addition to the operating and maintenance personnel.

### **The cloud spine and cloud communications**

The roles of the Stanford Beyer's (1979) Meta system are so similar to those of the organizational coordinators in a responsive organization model. If we merge these two models, placing the Meta system and duties of the coordinator in a cloud environment, we can achieve a business network model based on a cloud system. We place the Meta system and coordination roles in a cloud, since they are participating activities and the cloud is a very efficient platform for cooperation between different small and medium scale enterprises. The business intelligence systems and cloud simulations are able to make all the businesses more transparent and visible in the network, in a way that makes it possible to observe the network's performance in real time. The cloud based business model for small scale organizations, alongside the systems required in this project for small and medium sized enterprises provides them with an agile and responsive structure and is constituted of two major parts: the cloud meta system that is the cloud system provided by the small industries organization of Isfahan and the cloud spine. The duties of a Meta system are to plan and coordinate the activities of the business network that enables the small and medium sized enterprises to use systems such as business intelligence and simulation.



**Figure 4: cloudy Spine model of small businesses process management**

This cloud based model allows the small and medium scale enterprises to use the computation potential for the management of their business processes and to pay for the services per usage. On the other hand, these enterprises are capable to collectively use the services of the expert workforce and communicate with them through the cloud spine. In the following part, the factors of this business model, including the clients, players, transformations<sup>19</sup>, worldview<sup>20</sup>, owners and environments of the small and medium scale enterprises active in Isfahan's industries are analyzed using the CATWOE method. CATWOE was designed by Peter Checkland (1976) as a part of the soft system's methodology and is a simple checklist for assistance to thinking process. It is one of the general techniques that help the analyst to identify the purpose of the business, the problematic issues and the process in which the solutions affect the business and people involved (Smith & Checkland, 1976). The methodology of soft systems is a strategy for addressing the complicated situations with no apparent structure based on

holistic analysis and systematic thinking. The soft system methodology is a participation that assists different parties to understand each other's view's (Checkland & Scholes, 1990).

**Clients:** the clients of this business model, are the clients of all the small and medium scale enterprises active in Isfahan's industries. In the state of Isfahan, most of the small and medium scale enterprises work as industrial clusters. Isfahan's gold enterprise, Isfahan's stone enterprise, Isfahan's machine carpet enterprise located in Kashan, Aran and Bidgol, the brick enterprise of Isfahan (the Dolatabad, hbibabdd, Mohammed Abad and ghahab zones), the plastic products Enterprise, the Textiles enterprise(Kordabaad), Mattress and accessories enterprise (Khomeini shahr, Dorcheh), and the following cases are the businesses included in this research:

- golab and elixir enterprise in Kashan
- shoe enterprise of Isfahan
- Clothing enterprise in Khorzogh
- textiles enterprise in Dahagh
- gas enterprise of Isfahan

There are certainly other enterprises in the Isfahan state that do not fall into the operational circle of these clusters. Most of the small and medium scale enterprises operate individually and without mutual cooperation and are usually run by the owners themselves. The owning managers usually possess a low level of knowledge in regards to cooperation with other units and also taking advantage of the benefits of information technology in their business, whether at the level of simple software for local accounting or establishing a website and online sales. The lack of sufficient agility for adapting to the environmental changes, in additions to the generally stagnant atmosphere of Iran's economy has caused these units to operate in minimal capacity level or cease their operations.

**The players:** the players of this business model consist of the suppliers and distributors, industrial complexes, small and medium scale businesses in the state and marginal parts, the small industries organization and the industrial complexes organization of Isfahan.

**The transformation levels:** at this level of the process, the inputs and outputs of the system are specified. In this business model, the inputs are the following:

- the information regarding the small and medium scale businesses including the type of the business, the operational field, products or services, present options for utilizing information technology, specialized systems, adaptable systems and connectible systems.

#### **Outputs**

- Establishment of a cooperation network between the provider, supplier and small and medium scale enterprises.
- Installation of operating systems and specialized software for different clusters.

**Worldview:** this business model is supposed to be implemented in the Industries of Isfahan state. Economically, Isfahan has one of the best conditions countrywide, ranking second after Tehran, with more than 10,000 industrial units. In addition, this state occupies the third place in regards to employment rate, value added and the value of industrial productions, and with the annual mineral extractions amounting to more than 17 million ton and decorative stones extraction amounting to 4.5 tn a year, it occupies the overall 2<sup>nd</sup> place in the country. In 2012, the gross domestic product (GDP) of the state amounted to the market value of 466.239 billion Rials, equivalent to 6.9 percent of the total national GDP. The highest share of value added for commercial activities contributing to the GDP were respectively the industrial sector (29.8%), wholesalers, retailers, maintenance of automobiles and products amounting to 70.402 billion

Rials (15.1%) and finally fishing sector with 187 billion Rials, and number of 578 corporate companies with a workforce of 5080 persons were active in the state.

**Table 1. The employment share of major commercial sectors of Isfahan**

<b>1.</b> Services	<b>2.</b> Industry	<b>3.</b> Agriculture
<b>4.</b> 46%	<b>5.</b> 42.6%	<b>6.</b> 11.4%

**Owner:** the system’s owner is the small industries organization of Isfahan, acting as the regulating body of the small and medium scale enterprises and responsible for the development of technology services and businesses and establishing a dynamic relationship between the industrial agencies and technological agencies (consulting engineers, laboratories, and research and development centers, scientific and academic agencies). In fact, the center of enterprise services is considered as one of the contributing social entities for the purpose of development of technology and business and consequently, development of knowledge based commerce and specialized employment.

The small industries organization of Isfahan is structured as follows:

- The management of business development and education: enhancing the knowledge and skill necessary for small enterprises in a way that leads to enhanced performance and behavior.
- management of market development and international affairs
- management of financial resources and investments

**The environmental restrictions:** the most limiting factor for the establishment of such business model, is proper foundation. On one hand, promotion of cooperation between small and medium scale enterprises can act as a supporting factor for the success of such model. Another restriction is the lack of confidence by the owning managers towards the information technology. Inadequate internet bandwidth and speed are also some of the restricting factors for the application of this model.

### 3. CONCLUSIONS

- Available tools and applications through the cloud of small industries provides a possibility to have a better services for the final customers for small and medium. Businesses. The lowest barrier to entry, flexibility, reliability, payment for the use that does not require heavy investment are facilities that make this model affordable for small and medium businesses.
- Small businesses organizations can attract the small and medium sized businesses with the delivery of cloud applications with improved features, attract new revenue.

For achieving success in the cloud, small industrial organization does not need clear strategy and framework for the management for new responsibilities. The organization must consider the control of costs throughout the life cycle of cloud solutions. They must also ensure that the virtualization capabilities, coordinate and continual automatic configuration, cause real prices and profit margins. An element that creates barriers for the implementation of this model will be funded. Somewhat below information show the importance of small and medium sized businesses in the economy:

- The rapid and extensive changes in production technology during recent decades and distancing from mass production in giant industry and trends toward flexible production in small and medium-sized businesses increases the capability of competing activities for



small businesses and leads to transfer economic activities from giant industry to the small businesses. However this issue does not mean elimination of giant industry and its replacement with small businesses, but the movement is toward the more interaction of these two with other and in the form of a chain production. In such a way that the division of labor among small businesses and great ones is formed in a way that instead of competing with each other, they are completing themselves.

- Creating and supporting small and medium-sized businesses are one of the main priorities in the economy development program in many developed and developing countries. SMEs businesses in creating jobs and providing a suitable platform for innovation and increasing exports are important. Small and medium-sized businesses have more flexibility and more entrepreneurship and more creativity can be done in them.
- These firms can comfort and match themselves better with the accelerated environmental changes and in comparing to the economic and political factors reacts faster. Also, the recruitment and employment factors are the large and main part of the population of the country and training of the skilled workforce. Supplying specialist human sources for large firms can be conducted by these agents and firms.

Therefore the financial support approaches in Iran economy from the small and medium-sized businesses should be studied and investigated by considering the great economic board and the place of small and medium-sized businesses in the whole economic.

The other barriers in order for implementing this business model are the lack of appropriate bandwidth and speed at the present time. According to most experts, in the near future, national network of information could hinder the promotion of the country. Although conceptual studies on the National Internet design conducted at the Iran Telecommunication Research Center and then launching a national Internet project is underway, however, there are many ambiguities in this context.

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