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Governmental origin: why NTBFs grow in a transitional economy

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ABSTRACT

The NTBFs have attracted growing interest from most of the transitional economies as they are seen as an important source of greater value added creation while being characterised with higher rate of return on capital. Shedding light on the growth determinants of new technology-based firms not only helps managers to accomplish organisational goals but also assists policy-makers in devising effective strategies. The role of individual, organisational as well as environmental factors in the development of the new technology-based firms has been separately addressed by many researchers. The simultaneity of these factors leads to diverse configurations, each of which envisaging different growth paths for the firm. The aim of this paper is to identify the growth paths for the new technology-based firms. To this end, Some interviews were conducted with the managers of the developed new technology-based firms in Iran (as a transitional economy) and the key themes governing the growth pattern of this group of firms have been identified using the thematic analysis, while possible growth paths for these firms were established by means of qualitative comparative analysis. The designed questionnaires were distributed among 22 developed firms and 8 underdeveloped firms for the period 2013–2015 and the obtained data were analysed using the FSQCA software, which led us to the development of dominant growth path for new technology-based firms. Based on the findings of this paper and factors affecting the growth of firms, two growth paths are suggested for the new technology-based firms, of which the one with greater role for government is more likely to take place. Communication with government officials and lobbying groups in the field of science and technology as the key customer in transitional economies is critical to the corporate growth, which has been identified as a sufficient condition for this research.

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1. Introduction

Most of the developing countries try to change from a centrally planned economy to a market economy. In fact, since 1980, the International Monetary Fund, the World Bank and the United States Department of the Treasury proposed a series of economic policies to improve the situation and pave the way for the government's withdrawal of the economic affairs. Reducing the size of the government, paving the way for individual initiatives and businesses, providing enhanced security for private ownership, privatisation of state-owned manufacturing units, etc. are among its most important policies. In this regard, they undergo a set of structural transformations intended to develop market-based institutions. This process is characterised by the development of the private sector and changes in the role of the state, i.e., shifting from market intervention to better policymaking and regulation, though still carries out interventionist policies and maintains its supportive role in a less active way. Only the countries that pave the way for economic liberalisation, where prices are set by market forces are considered the countries with transitional economies where central planning decreases gradually over time (Fischer, Sahay, & Végh, 1996). Similar to other developing countries, there is a push to promote private sector in Iran and, at the same time, to curtail government involvement in the economy and encourage better governance. The transition process is characterised by the changing institutions, particularly private enterprises, the creation of fundamentally different governmental institutions and the promotion of private-owned enterprises, independent financial institutions (Feige, 1997). Based on the implementation of privatisation policies and free market mindset,

Since 1962, Iran has been implementing policies within the framework of 5-year development plans in an effort to foster the role of the private sector in its economy (Daftary, 1973). This is best exemplified by the development of the 'third construction plan' with the adoption of imports substitution and industrialisation approach. As a result of these policy measures, the private sector gross investment grew by 8.12% during 1960–1977 (ShahAbadi, 2009). After the Iranian revolution in 1979, the government opted for more centralised ownership model and decided that a great number of industries and economic activities be run centrally. Article 44 of the new Iranian constitution, drafted in 1980, declares that some of the major and basic industries, e.g., banking and recruitment, are to be run and owned by the state (Azkia & Hooglund, 2011). The ownership of the aforementioned industries was completely held by the government, particularly during the Iran-Iraq war in 1980–1988. After of Washington Consensus and the aftermath of the war was the development of some major economic and social reconstruction plans to improve the performance of state-run firms and provide greater opportunities for a more proactive contribution from the private sector. In line with these decisions, the government further continued the privatisation plan of state-run firms known as 'organizing state-run firms and stock sale' (Ministry of Economic Affairs & Finance, 2015). The average growth rate of private sector investment (at 1990 constant prices) was −2% during 1978–2001 (ShahAbadi, 2009). This was attributed to the economic conditions of the time, outflow of capital, and the outbreak of war. As a result, government expenditures grew exponentially, which in

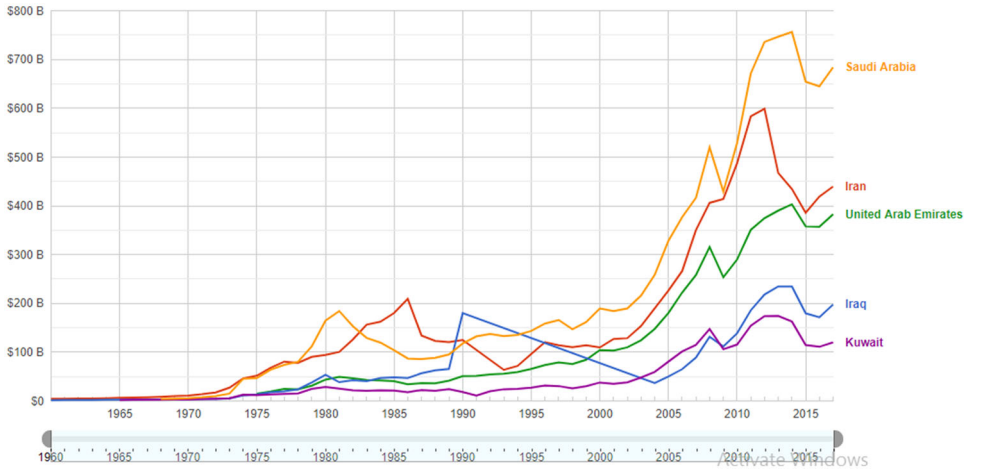

Figure 1. Iranian economic growth after Washington Consensus in comparison with other similar oil-producing countries (The World Development Indicator, 2018).

turn made running state-owned firms extremely costly. The government began to exercise direct authority and turned into a gigantic but ineffective monopolist in the Iranian economy. Article 44 of the constitution banned the activities of the private sector in major areas of the economy. No considerable reduction in government involvement in the economy could be witnessed. This prompted a new interpretation of Article 44 which was put forward and announced in 2005. It intended to bring about an appropriate economic environment for the development of Iran (Ministry of Economic Affairs & Finance, 2015). Accordingly, to help establish market-based institutions, the government opted to reduce its authoritarian role in all economic activities, and to promote private sector activities. The importance of establishing and fostering technology-based firms is frequently highlighted in the current political and economic environment of Iran. This is mainly due to the significance of knowledge and technology-based products in boosting Iranian competitiveness. In light of the privatisation trend and efforts made to shortcut the path of development, Iran is endeavouring to enhance the role of private enterprises that are actively working in new technologies based areas. Thus, the growth and development of these firms has attracted interest from the government encouraging officials to formulate various policies in this respect. In 2010, as the Protection of New Technology Based Firms and Institutions' Rights and Commercialisation of Innovations and Creations Act (financialtribune, 2015) was passed, measures were taken to support this group of firms. Attempts have been made to promote their economic role and to bring about suitable conditions for their growth and development through the establishment of funds and introduction of tax exemptions. The support provided was adopted from other countries in an effort to mitigate the role of government and promote privatisation. As shown in the Figure 1, among the oil-dependent economies, due to the implementation of privatisation policies between 2005 and 2010, Iran has also enjoyed good economic growth (The World Development Indicator, 2018).

Given the importance of technology-based firms in today's global economy and the attention that Iran pays to this issue, this paper seeks to identify the factors affecting the growth of this group of firms so that the probable supports from the government can be planned effectively. The findings of previous studies on the growth process of firms reveal that, during the stages of growth, these firms tend to select strategies, structures, and managerial activities that are aligned to the firm's life cycle and growth models, presupposing that free economy and perfect competition markets are in place. However, there are different factors behind firms' growth in developing countries, particularly those that strive to transition from a state-run/governmental economy to one based on private firms. The differences are more noticeable for Iran's case due to its dependence on oil. In such economies, there are different factors behind business growth, particularly those in the technology-based sector who are struggling with different issues such as oil revenues, sanction etc. Hence, the second section of this paper briefly reviews the studies conducted on the growth of technology-based firms. The research methodology is explained in the section. The results are analysed and discussed in detail in the fourth section. Finally, the conclusion resulting from the proposed pattern is put forward along with a discussion and comparisons with the literature.

2. A review of why and how firms grow

There are some different intellectual paradigms resulting from the orthodox and heterodox economies concerning the subject and investigation of organisations, though it is possible to provide some different classifications of the paradigms. The main perspective based on the heterodox economy is the classic theories that determine the development of firms indirectly with a view to find the optimum size of the firms. According to this perspective, it is believed that there is a direct relationship between the size and development of the firm. The firms seek the effective and optimum size; therefore, the greater the size of the firm, larger the profit in the point where the size of the firm results in the economies of scale, and as a result the firm will develop by reaching that point. This perspective emphasises the fact that the competition is a factor that minimises expenses incurred by firms (Carrizosa, 2006). In fact, the organisational development is explained according to the optimal profit i.e., the organisation continues to develop to the point where it reaches the maximum profitability that is known as the 'optimal size'. In fact, the organisation is considered to reach this degree of development when it achieves its greatest possible amount of production, and at the same time reaches the lowest point in expenses (Dennis & Perloff, 2004). In this perspective, if the organisation reaches its optimal size, it will not have any further motivation to reach a higher point. The economists of this school believe that the small firms develop more rapidly than larger firms do until both firms reach the optimal size (Carlsson & Taymaz, 1994).

However, Aldrich has proposed four views concerning the organisational studies within the perspectives based on heterodox economy and especially in the evolutionary school of thought; the four views are as follows: Ecological view: the relationships between the organisation and environment attracted greater theoreticians and sociologists' attention in the 1970s than before. They sought to analyse the effect of the

environment on the organisation structure. Hence, a theory was developed known as the theory of organisational ecology (Reed, 2006). In other words, all organisational changes from the standpoint of this intellectual paradigm varies from one organisation to another based on the external conditions and environment (Baum & Oliver, 1996). Resource dependence view: This theory believes the role of managers in the organisation to be greater than the role of the environment in the organisation. In other words, it states that the organisations are controlled by the environment, but managers can also learn how to control their environments. The management of the dependencies entails creating a power to counter the environmental elements organisations depend on (Hillman, Withers, & Collins, 2009). Transaction cost view: according to this theory, the expenses of an organisation are divided into two groups namely production and exchange costs. The costs of production are directly related to the production activities of the organisation. While these costs are associated with production, logistics and product development, the costs of exchanges are related to the planning and organizing the organisational activities and thereby change according to the structure of the firms (Douma & Schreuder, 2012). Organisational learning view: The basis of organisational learning is the inquiry and research in the organisation. In fact, the development of this theory is based on the contrast made between a working process and its actual results. The general origin of the organisational changes in this view is the learning processes and their results (Ghazinoory, Dastranj, Saghafi, Kulshreshtha, & Hasanzadeh, 2017).

Understanding the process of growth and major determinant factors of the growth in firms is of paramount importance to statesmen and private sector managers, as well as for the development of a healthy economy (Bannier & Zahn, 2012). From the macro-economic perspective, the growth of firms plays a decisive role in issues such as employment, the economic growth of the country, and establishment of competitive markets. In this way, the growth of firms becomes the major cause of higher employment rate in society, as well as increased demands in other sectors of the economy. As new firms emerge and grow in the market, monopolistic and oligopolistic markets transform into competitive markets contributing to the development of countries. On this basis, the stability of an economy significantly depends on the growth of firms (Carrizosa, 2006). According to Penrose 1959, the development of firms can be assessed according to their outputs such as the amount of exports, sales etc. over time or according to the results of the developmental processes such as the size or the improvement in the quality (Geroski, 1999). In a more comprehensive definition, Robins points out the concept of relativity of the development. He believes that the development manifests itself through the growth in some variables such as work force, capacity of the factory, assets, amount of sales, profit and market share as well as the number of patented inventions and it indicates the current conditions of the organisation in relation to its past conditions (Robbins, 1998).

After World War II, certain countries exhibited positive growth which stemmed from the establishment and growth of new technology-based firms. In recent years, these firms have attracted the attention of a great number of policy makers owing to their contribution to job creation, especially by creating high-quality jobs for educated people, and also due to their considerable capability in sales and exports (Almus &

Nerlinger, 1999). From a micro-economic perspective, the survival of these firms hinges on their growth. A firm experiencing continuous growth is more likely to survive. To fulfil persistent growth, firms can guarantee their survival though innovation in products and processes (Carrizosa, 2006). Various definitions have been put forward for the growth of firms. Some define growth from the viewpoint of financial resources (Carrizosa, 2006; Dennis & Perloff, 2004; Penrose, 1959). Others have a different outlook on system and deem growth to be caused by enabling human resources (Weinzimmer, Nystrom, & Freeman, 1998). On the other hand, the term 'firm growth' is regularly associated with revenue. From this perspective, any firm whose revenue or cash flow is progressing at a rate faster than that of the industry's average can be considered as a growing firm (Carrizosa, 2006; Dennis & Perloff, 2004). It may generally be stated that growth is demonstrated through an increase in variables such as work force, production/service capacity, assets, sales, profit, market share, and patented inventions (Robbins, 1998). The research conducted on firm growth may be divided into two major groups:

- The first group of studies focuses on how the growth process takes place. For instance, Lippit and Schmidt (1967) presented a three-level growth pattern, whereas Quinn and Cameron (1983) assumed a four-level pattern for the firm growth process. Churchill and Lewis (1983) considered a five-level development plan for firm growth. In line with this, Lee (2010) described the growth of knowledge-based firms in three stages, namely latency, growth, and maturity, indicating special conditions for each stage. In short, prior studies reveal that firms experience different stages of growth depending on strategies, structures, and various types of managerial activities they adopt for each stage of growth.
- The second group of studies addresses the factors affecting firm growth and tries to investigate why firms grow. In so doing, several scholars have endeavoured to identify the factors that affect the relative increase in the parameters that lead to growth – regardless of the growth stage the firm is going through. Recent studies (Khan, 2011) analysed the role of other variables such as human capital, local work force market, product and process innovation, legal status, and capital structure on firms' growth. Becchetti and Trovato (2002) considered initial debt/liability, ownership structure and decisions regarding selling to foreign markets as effective factors in firm growth. Moreover, to analyse growth, Bannier and Metz (2010) differentiate the factors exclusive to the firm and growth process, i.e., internal factors that a firm actively selects to affect the growth process, and external factors that cannot be changed or avoided. In terms of internal growth factors, the most important internal growth drivers are the firm's decisions as to the responsibilities, ownership structure, and payment policy, i.e., use of own revenue. With respect to external factors, there are two specific factors that firm's management does not directly control: macro-economy environment, and the firm's access to foreign capital.

In order to determine when a firm is considered to be a developed firm, it is necessary to determine a certain indicator to determine the state of development.

There are three perspectives concerning how to assess the level of development in the literature. Generally, the indices provided by the pundits in this field can be divided into three general groups. The first group introduces the size of the organisation as a component that symbolises the development of the firm and is measured by the rate of employment of personnel. Since the relevant data are collected, determined and categorised easily, many pundits have introduced this index as the indicator. In addition, the figures of employment are not affected by the fluctuation adjustments and they can be employed in different studies. However, some problems may arise in determining how an individual assesses the part-time or seasonal personnel (Carrizosa, 2006). Although this index is simple and extensive, it has some problems. In fact, it is possible that a firm increases the level of its employment, but this does not necessarily result in market development or financial success (Bannier & Metz, 2010), or conversely, when the rate of the employment does not increase while the sales of the organisation increases due to the proper productivity of the work force and efficiency of the processes. The second group provides the component of accounting or financial evaluations as a tool to assess the development of the firms and it believes that the indices such as the rate of changes in the assets, return on investments, profit, income, and cash can be all employed to assess the development of the firms. However, it should be borne in mind that the indices depend heavily on the accounting policies and procedures of the firms which decreases the possibility of comparison. The last group examines the development of the firms through their performance in any particular position in the market and employs indices such as sales, market share, market value as well as number of customers (Churchill and Lewis, 1983). However, the problem of applying the market share as the scale results from the difference of the firms in defining the market and dependency of market share on the definition of base. Thus, it may be the case that the sales volume increases while the market share decreases (Coad & Reid, 2012). As it was mentioned, it is possible that a firm can develop in terms of market share and the amount of sales due to the productivity of its work force, while the size of work force remains unchanged. For this reason, the index of the number of personnel is rejected as an indicator by this research and the indices such as cash, amount of assets etc. are not used by this research because of the lack of integrity of accounting procedures among the firms. Since it is necessary to employ an indicator as the recognition index of the development of firms without a judgment base that is provided for all firms in the same way regardless of the intra-organisational procedures, amount of sales indicator within a two-year period that is announced as the official figures in the tax statement of the firms has been selected as the indicator to separate the developed from undeveloped firms. Since the process of identifying the technology-based firms has been initiated by Iran's government in 2012, data for only two years was available at the time of conducting the present research.

As can be seen in Table 1, given a liberal economy approach and ever-decreasing government intervention in market mechanisms, the majority of studies on firm growth have neglected the role of government as an effective factor. The studies addressing why firms grow tend to focus on identifying the factors affecting the NTB firm growth process. To the best of our knowledge, no research has been conducted

Table 1. The studies on the factors affecting the development of new technology-based firms (self-compilation).

Row	Aspect	component	Resources	Row	Aspect	component	Resources
1	Features of the entrepreneur	Family history Social marginal issues Practical skills Education Age Former failure in business	(Fadahunsi, 2012)	5	Technological capability	Tacit knowledge On the job training Variety	(Wilbon, 1999)
2	Features of firm/organisation	Age Field of working Legal structure Size	(Fadahunsi, 2012; Sutton, 1996) (Sutton, 1996)	6	Market structure	Market orientations Price adaptation	(Chorev & Anderson, 2006; Licht & Nerlinger, 1998)
3	Marketing capability	Planning Providing new products Employing capable individuals Training the work force The amount of competition Using consultation Marketing strategy Technical resources	(Chorev & Anderson, 2006; Licht & Nerlinger, 1998; Becchetti & Trovato, 2002)	7	Providing resources	Having access to the educated man force Having access to financial resources	(Fadahunsi, 2012; McGee, 1994)
				8	Generating and updating knowledge	Type of generated knowledge Number of R&D projects Management of knowledge	
4	Organisational capability and production	Innovation Providing new product	(McGee,1994; Fadahunsi, 2012)	9	Laws	Laws of intellectual property	(Becchetti & Trovato, 2002)

on technology-based firms in developing country. Hence, this paper will seek to put forward a pattern based on the factors affecting the growth of Iranian technology-based firms in light of Iran's special situation in terms of its transitional, oil-based economy, disregarding ecological processes. To do so, the unofficial role of government in the growth process of those firms has been particularly taken into account while considering Iran's political, social, and economic circumstances.

3. Research methodology

We sought to review the literature before beginning the field studies. Accordingly, we articulated the research questions. The Iranian Vice-Presidency for Science and Technology identifies technology-based firms on an annual basis so that they can benefit from government support (Sattari, 2015). Since this paper mainly aims at identifying the factors affecting the growth of technology-based firms in Iran, the entire active technology-based firms that have grown in Iran (listed by the Iranian Vice-Presidency for Science and Technology), constitute the target population of this paper. Of the total number of technology-based firms in Iran (2111), the sample size covers only the actively operating technology-based firms located in Tehran (989).[1]

The vice-presidency for science and technology of Iran identifies the technology-based firms and grants them licences. In the first phase of the present research 22 managing directors of the technology-based firms, that were deemed developed based on the indicator selected by the present paper, were interviewed thoroughly by a semi-structured interview and they were asked to explain the reasons for the advancement of their firms. This enabled us to determine the routes leading to the development of the knowledge-based firms in the second phase of this research following the extraction of the main themes affecting the development of Iranian technology-based firms. The target population in the first phase of the present research consisted of 989 firms accepted in the years 2012 and 2013 of which only 99 firms were considered to be developed based on our select indicator. Of the 99 firms,42 firms were selected to be interviewed.

Grounded theory approach is adopted in the first part of this paper. According to this strategy, a bottom-up theory is constructed on the basis of available data. The goal is to bring about motion from surface to depth, identify categories and determine relationships, connections, and dependencies existing in the phenomenon under study, so that they can turn into explicit theories at the end of the process (Creswell, Plano Clark, Gutmann, & Hanson, 2003). Grounded theory has two approaches, namely, classical (Glaser & Strauss, 2017) and systematic (Corbin & Strauss, 2008). The classical approach, adopted by Strauss and Corbin (1998) is employed in this paper. With respect to the definition of grounded theory, they believe that this is a type of qualitative strategy that makes use of a systematic set of procedures to inductively develop a theory about a phenomenon. It mainly aims to explain a phenomenon by identifying the key elements (concepts, issues and theorems) of that phenomenon, and then, classifies the relationships between the elements within the context and process of that phenomenon (Strauss & Corbin, 1998).

The goal was to identify the factors affecting firm growth through in-depth analysis of the interviews and coding via Maxqda software. To identify technology-based firms that had grown, the increased sales index during 2012–2013 was used. Furthermore, theoretical sampling (Glaser & Strauss, 2017) and data saturation were adopted in this paper.

After conducting the interviews 11 key concepts were identified, which emphasised the environmental factors especially different roles of the government and specified the organisational capabilities. The key themes were theoretically saturated in the analysis of themes after conducting 42 interviews. The end of theoretical sampling is determined according to the saturation of data. The criterion for reaching the maximum information about the given phenomenon is the endpoint of data replication. This criterion is called saturation in qualitative research. It is necessary to reach the replication of former data to discover this such that the researcher faces frequently the data that replicate (Ranjbar, 2012). In the second phase of the present research, a questionnaire was designed to use the comparative qualitative analysis method, and the questionnaires were distributed among the developed firms that were interviewed and eight knowledge-based undeveloped firms. Later, the questionnaires were gathered and analysed using FSQCA software. In fact, the undeveloped cases were examined to increase the validity and reliability of the comparative qualitative analysis method. The comparative qualitative analysis method is one of the techniques to conduct causal analysis of the phenomena especially in studies where the common qualitative (like parametric quantitative methods) and quantitative (case study) methods are not deemed appropriate to carry out the analysis and the size of sample is 10–35.

This method makes use of the comparison of the items with each other (Rihoux & Grimm, 2006). The comparative qualitative analysis is an analytical method that is based on Boolean algebra and implementation of the comparison principles employed to study the social phenomena (Ragin, 2000). it is also capable of answering the questions concerning the theoretical set and is employed to analyse the causal complexity. FsQCA employs the sum theory (fuzzy) and Boolean algebra to analyse the combination of factors and the fact that how the existence or non-existence of these factors leads to a particular result (Ragin, 2009). In the present research, the possible routes for the knowledge-based firms to achieve the development are identified. In fact, the possibility to identify different combinations of the factors affecting the development of the firms is determined the realisation of each of which may lead to the development. Therefore, after analysing the data obtained from the questionnaire, two possible routes were extracted from the combination of the reasons for development. The theoretical sampling and opportunistic sampling have been employed in this research. In fact the individuals were selected based on the objectives of the research in two completely purposeful phases. Also, the research has attempted to record the procedure of collection and analysis of the data for later reference when necessary. This helps to enhance the external validity of the research, improve concentration on the opposite points and events that are against the axial process of the research as well as verification of the data by the external individuals (Christensen, 2012). Since the statistical generalisation is not the only form of generalisation and this type of

generalisation is not appropriate to all situations, the results have been relied on in technology-based firm population confirmed by the vice-presidency for science and technology of Iran through the balanced generalisation.

In this sense, to extract the factors affecting the growth of this group of firms, a total of 21 interviews were conducted with the CEOs and executives of these firms. In addition, eight interviews were also conducted with the managers of firms which had failed to achieve growth within the intended period of time. The goal was to identify the factors affecting firm growth. To identify technology-based firms that had grown the increased sales index during 2012–2013 was applied. Furthermore, theoretical sampling and data saturation were adopted in this paper,

Fsqca method, introduced by Charles Ragin (1989), is adopted to present a growth pattern of the participating firms. The purpose of this method is to compare cases with each other. It seeks to put forward different configurations to reach at a specific consequence (Ragin, 1989). By employing this method in this study, the possible configuration for the growth of technology-based firms in Iran was extracted. Since the type of variables is determined in terms of sufficiency and necessity in each of the configurations identified, by using this method the type of variables that result in growth of Iranian technology-based firms can be ascertained. Accordingly, a questionnaire was developed based on the identified variables from the interview of the first stage and distributed among the aforementioned 30 firms. The gathered data was analysed using FSQCA software.

4. Research findings

In the first stage of this research, a series of in-depth, semi-open interviews were conducted with the CEOs of two groups of firms that were identified as technology-based. They were asked to explain how their firms had grown. We then identified 11 main factors for NTBFs growth in Iran: Individual capability and entrepreneurial activities, Technical capability, Capability of marketing, Structuring and forming the market, Providing and allocation of resources, R&D, Generating knowledge, Legitimisation, Orienting the system, Legal ground, Spread of knowledge. To increase the internal validity of this part of the study, efforts were made to use multi-dimensional data (i.e., available documents, the Internet, interviews, documents provided by the interviewees) in the research process (Johnson & Christensen, 2012). In addition, fully purposive sampling was adopted, and people were selected according to research objectives. Also, to increase the external validity of the study, data gathering procedure and analysis was recorded for future reference, with a focus on opposing points and phenomena that were against the major course of the study, and the data audit was conducted externally (Christensen, 2012).

Our findings show that one of the most important reasons that the studied firms had grown, was the competency of the founders and the active human force working therein. This competency generally stems from their professional background, past experiences, education, and work culture. However, what differentiates Iranian growth firms operating in technology-based fields is their network of interactions with the government and the possibility of establishing unofficial ties with statesmen. This

plays a significant role in market creation, introduction of firm's products and facilitating legal formalities.

The major difference in the factors affecting the growth process of firms in general and technology-based firms in particular is knowledge creation and moving on the cutting edge of science in these firms. This may be investigated according to participation experience in research projects, on-the-job learning, offering products and continuously improving them, learning from offering unsuccessful products to the market, primary knowledge of development power and market-based product manufacture. In fact, the firms that managed to produce products as per market needs on the basis of the technical know-how of the firm and continuously learning from the failures and experiences of other firms, especially foreign ones, are more capable in knowledge creation and achieving growth.

There are more aspects to knowledge creation and growth than just the inter-firm aspect. The government's support to establish industry-university relationships for the commercialisation of technical know-how is crucial in this regard. This can be examined in light of the Iranian government's plans for the commercialisation of doctoral theses and the support the educational programmes offered to industry.

The use of modern marketing methods, an active sales unit, establishing an enduring and effective relationship between production and sales, having systematic plans to develop the brand, and, market research and analysis, to offer new, innovative products and export them, are other issues that can be categorised as necessities for growth within the framework of marketing capability in firms. The role of these factors was clearly visible in the firms under study that failed to grow. In fact, they failed to sell their products in domestic and global markets, and faced major problems in their growth process because of their lack of marketing capability. The majority of NTBFs employ an academic workforce that possesses knowledge and experience in their fields of expertise, but do not demonstrate sufficient marketing and management skills. Thus, this represents a huge setback for the market creation and sales of technology-based products.

Production capability is another issue identified in this study regarding the growth of technology-based firms in Iran. Product improvement according to customers' demands, technical familiarity with production hardware, and research and development power to alleviate defects, relate to this issue. In fact, the role of the government in the growth process of firms is shown within the legitimisation factor. The majority of technology-based firms where legitimisation held a particular place experienced a relative growth in a more stable manner. The ability to activate the major governmental actors in the specialist field of the firm, the power of active lobbying groups in the national innovation system, increased public knowledge, and creating an information wave via media constitute the legitimisation issue.

Since the government is frequently the market for this group of firms in Iran, it is very difficult to properly obtain the agreement of state-run organisations for the purchase of domestic technology-based products without establishing ties with the government. During the period of sanctions, owing to global limitations, the circumstances were favourable for domestic firms that had close ties with the government and those had risen from a governmental background. However, the presence of international firms will introduce specific challenges in this situation.

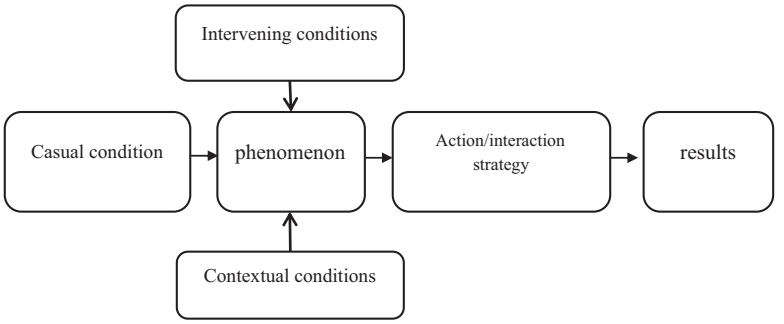

Figure 2. Paradigm model of Strauss and Corbin (Corbin & Strauss, 2008).

Given the fact that this group of firms is technology-based, the laws pertaining to intellectual property rights are also an issue, with a key role in the process of achieving growth in firms. This issue is identified as an effective variable in achieving growth within a legal infrastructure. Considering that government is still the major actor in transitional economies, and it is deemed an important market for firms, being informed about governmental purchases, governmental tenders, as well as science and technology priorities and macro strategies can indeed be one of the effective factors in firm growth within the framework of system orientation and market formation. As can be seen, issues such as legitimisation and system orientation were assessed after analysing and coding the interviews. These issues were not identified as factors affecting NTBF in previous research, as will be explained in more detail in the discussion. This suggests the importance and indirect role of the government in the growth of technology-based firms in the Iranian transitional economy at the first stage. Based on grounded theory, Strauss and Corbin recommend the use of diagrams to enter a new level and display results and findings. Nevertheless, they failed to present a systematic path for the incorporation and depiction of the levels. They recommend that the researcher depict the results of research findings using one's own technique (Corbin & Strauss, 2008). In the main coding stage, the analysis process took place on the basis of a paradigm model, which plays the role a tool for modelling the interactions between different actors and phenomena.

The paradigm model comprises context conditions, intervening conditions, causal conditions, interactive strategies, main categories, consequences and effects. The paradigm model is a set of successive efforts and the interactions between them over the course of time and place that find a function in response to a situation or context (Corbin & Strauss, 2008). Figure 2 illustrates this model.

Legitimisation was identified as a major factor for achieving growth in the main level of the pattern. In addition, individual competencies and entrepreneurial activities were deemed as effective in legitimisation within the framework of causal conditions. A group of interactive strategies including technical competency, marketing, production, knowledge creation and resource allocation also exist in this figure, where performance is influenced by the existing elements. Specific foundation-laying conditions, such as knowledge dissemination, market structure and forming influence interactive strategies, led to the growth of technology-based firms. Additionally, legal infrastructure and system orientation were brought up as facilitators or restrictors for

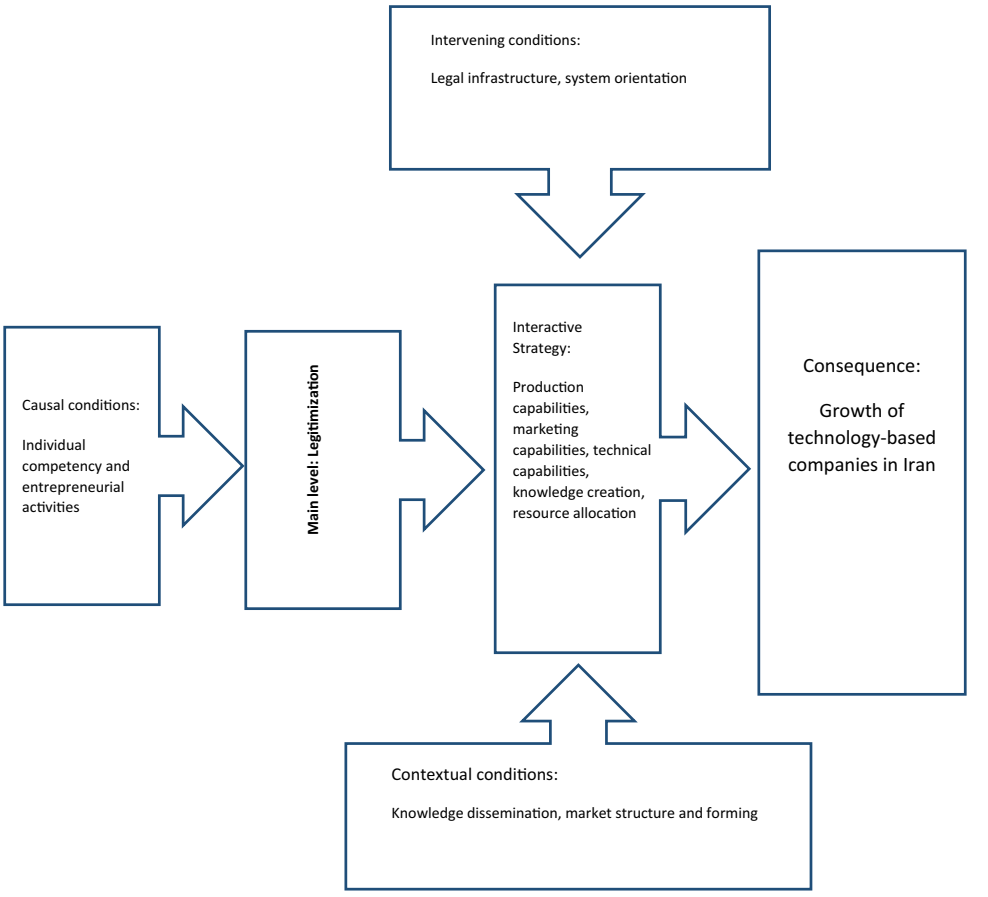

Figure 3. Extracted paradigm model according to grounded theory for the growth of technology-based firms in Iran (self compilation).

adopting the appropriate strategy to increase the possibility of this group of firms achieving growth. Finally, the consequence of these factors is the growth of technology-based firms in Iran. Figure 3 illustrates Extracted paradigm model according to grounded theory for the growth of technology-based firms in Iran.

The important point is the position of identified factors in attaining growth as an achievement in firms or, in other words, verifying the obtained result (the major effect of legitimisation in the growth of technology-based firms). Accordingly, FSQCA technique is adopted in the second stage of this research to identify causality (multiple configurations leading to similar achievements, i.e., growth in this group of firms). Thereby, it becomes clear under what combination the identified factors lead to the growth of technology-based firms and the result obtained, i.e., From the data gathered from 30 firms through questionnaires and data analysis, by using software developed by Ragin (2009) for employing FSQCA technique, two configurations were identified for achieving growth in this group of firms. Furthermore, as can be seen in Figure 4, the causality type of the factors in terms of the condition of being necessary or sufficient was determined in achieving growth.

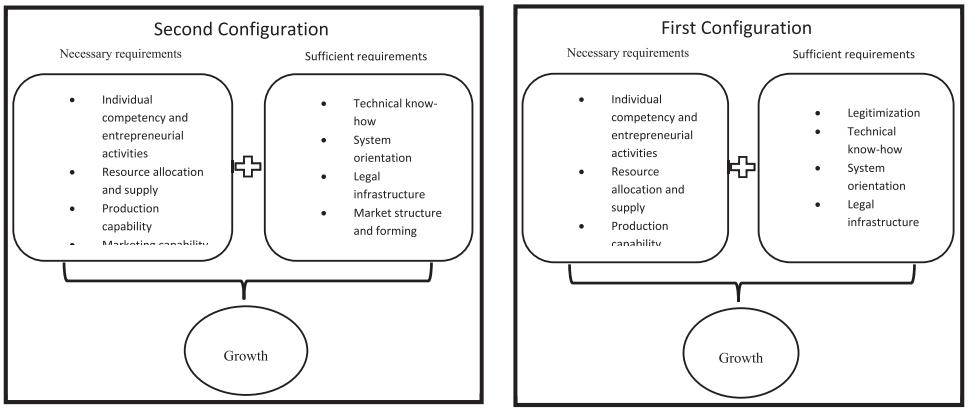

Figure 4. Identified configuration in achieving growth (self compilation).

According to the analysis performed based on FSQCA technique, possible combinations of causal conditions that lead to growth as an achievement are presented as two possible configurations. The necessary conditions in the firms achieving growth were identical in both configurations. However, they differ in sufficient conditions. In fact, two types of patterns are identified for two groups of technology-based firms in Iran. The first group is called 'firms with a governmental origin' in this paper owing to the importance of the firms' unofficial ties with the government. This group has a growth pattern as per the first configuration. The second group has no visible relationships with the government. These firms are called fully private firms, and they achieve growth within the framework of the second configuration. These two patterns are indeed identical in the entire necessary and sufficient conditions, and the only difference lies in the legitimisation variable. The patterns may be distinguished according to this difference. The pattern in which legitimisation is identified as a sufficient condition considers dependence on and ties with the government to be significant, and it is called GONTBF.[2] In the second pattern, this variable plays no role in the growth of firms, and it is called N-GONTBF.[3]

A many firms that achieve growth within the framework of the first configuration, which account for a considerable percentage, are typically established and at times run by the indirect investment of the government. This is the distinguishing feature of growth in Iranian technology-based firms against those in other countries.

Going through legal formalities and alleviating legal obstacles is easier for the group of firms with unofficial ties with the government. In fact, in light of their governmental origin, this group of firms can survive in Iran's market and grow. The factors identified in the first section of the paper of knowledge dissemination via international and national interactions, and information exchange in conferences, etc. were identified as an effective factor in the growth of this group of firms. After analysing the questionnaire data using FSQCA technique, this factor was not identified as a necessary or sufficient condition to achieve growth in any of the configurations. It was finally eliminated from the pattern.

Two criteria, namely consistency and coverage, should be taken into consideration when interpreting the above configurations. The consistency of a configuration

Table 2. Values of consistency and coverage, for the results obtained from comparative, qualitative analysis.

	Raw coverage	Consistency
Firms with governmental origins	0.67514	1.00000
Private firms	0.483748	1.00000

indicates the support of the dataset through the claim of a relationship between the conditions (or a combination thereof) and the achievement. Moreover, the coverage of a configuration shows its importance. Table 2 demonstrates the consistency and coverage of each of the identified configuration required to achieve growth in firms.

Both configurations have a consistency level equal to 1. Given that the consistency level should meet a minimum of 0.75 (Ragin, 2009) (Ragin, C.C, 2009), both of these identified configuration have a maximum rate, indicating their support from the claim of a relationship between the factors and growth as an achievement. Furthermore, the coverage of the first configuration is substantially greater than that of the second configuration, suggesting the importance of the role of government in fulfilling growth as an achievement in Iranian technology-based firms.

5. Discussion

This is due to the domestic circumstances of countries for the growth and development of NTBFs, the legal atmosphere, and the economic, social, and cultural infrastructures being unprepared (Ghazinoory, Soofi, & Farnoodi, 2013). That is why developing a domestic growth pattern for NTBFs allows politicians to be adequately aware of the factors affecting the growth and development of private firms in technology-based fields in order to develop more effective policies. The results of this research indicate that the growth of technology-based firms in Iran is considerably dependent on ties with the state and statesmen, despite the fact that the government has been making efforts to change its role and the dependence of the private sector. Some former researchers have, to some extent, acknowledged the role of government in the growth and development of technology-based firms. However, they have merely addressed this issue with regard to providing business infrastructures, and not as the key factor in the growth and development of this group of firms. The majority of the studies on the growth of technology-based firms were conducted with the presumption of a liberal economy, minimum intervention of government in internal processes of firms, and perfect competition markets, whereas the Iranian transitional economy and high dependency on oil brings about different circumstances. The indirect position and role taken on by the government in the growth pattern of firms is what distinguishes the findings of this study from those of other studies. In fact, analyses demonstrate that in order to achieve growth, firms need to optimally manage internal, managerial factors such as individual competency, entrepreneurial activities, resource allocation and supply, production capability, marketing capability and knowledge creation. These factors may be observed in both of the identified patterns as necessary variables. However, since a developing country, such as that of Iran, is going through a path from being monopolist and state-run toward competitive markets, establishing and running a firm on the basis of managerial principles alone has

not led to firm growth. As well as the relationships with statesmen and lobbying groups as key customers, the science and technology level of the country is still of great importance and is identified as a sufficient condition in analyses. Even for the group of firms that do not take advantage of such relationships, market structure and forming that is done by the governments as well as legal infrastructures are significant in the growth pattern.

Technology-based firms in Iran do not possess the production capability to export their products. That is why the domestic market is crucial for their growth and survival. In spite of this, the market for this group of products and services in Iran is predominantly in the hands of the government. This highlights the importance of the legitimisation variable in the growth of firms. Investigating the growth trend of firms in Iran has shown that a firm is more likely to succeed if the board of directors is comprised of people with backgrounds in the government in the sections pertaining to the activities of the firm, while also possessing expertise. Thanks to their relationships with the government, they are supplied with a market and provided with financial resources during the early years of the firm's operation. In parallel, since the firm is private and it enjoys managerial power, they enhance the technological capability of the firm in order to go beyond domestic markets, thus creating relatively stable growth conditions for the firm.

6. Conclusion

In this study, we attempted to identify the major factors affecting the achievement of growth with the aid of in-depth interviews and by examining the documentation pertaining to the technology-based firms achieving growth in Iran. The status quo in Iran, in terms of developing country and attempts for increased activity of the private sector, were also taken into consideration. Iran is striving to prepare the prerequisites for structural developments in order to develop entities/institutes/enterprises on the basis of the market. This would result in that the role of the government in economic processes decreasing, and other market activists coming into being to perform their tasks. The result of this research indicates that decreased government intervention in certain areas leads to reverse results, i.e., not only did it not lead to enhanced performance, but it also makes it impossible the survival of the firms operating in that area. Technology-based firms in Iran are in such circumstances. The government should play a major role in this group of firms.

Even though the government endeavours to privatise different aspects of economy, successful technology-based firms in Iran are only apparently considered to be private. They depend in some way on the government, or the government establishes the firm via reliable people but is not the official shareholder of the firm; rather, the shareholders are the individuals who work for the government or who worked for it in the past. The key person/persons in the technology-based firms that managed to grow in the present-day of the Iranian economy somehow depend on the government to provide a market for their products or financial resources; they may not grow without these unofficial ties. This is why a governmental origin is mentioned as the reason that technology-based firms grow in today's Iranian economy. The growth

and development trend of these firms shows that the variable of dependence on the government is merely one of the sufficient conditions for growth. If a technology-based firm is poor in terms of domestic capabilities such as technical capability, production capability, marketing capability, knowledge creation, etc., which were extracted as necessary conditions in the final pattern, it may not achieve growth and success.

In fact, technology-based growth firms in Iran have brought about a more reliable, less risky atmosphere for themselves thanks to their relationships with the government, so that they can create an empowerment possibility in other factors. At this stage, this group of firms will be able to survive and grow without government assistance. If Iranian statesmen are determined to transform monopolistic governmental markets to perfect competition markets, they should be able to decrease their role in economy as the major leaders. In this respect, the when and how are important. The government should limit this type of relationship when the technology-based firms are mature enough and have achieved an appropriate level of competency. Developing incentive policies for the entry of firms into international markets could be one of the solutions utilised to decrease the dependence of firms on the Iranian domestic market, which is highly governmental in technology-based fields.

Identifying and analysing why and how technology-based firms grow and develop in developing countries, such as that of Iran, requires more extensive studies and investigations of newer aspects of the existential identity of these firms. A combination of ecological studies on growth, which address how the growth process takes place, and studies such as the present research are a topic for future research. At the end, it is important to note that the short period of review of New Technology Based Firms in Iran is one of the research constraints and it is recommended that their growth rate of this firms be reviewed in the 5–10 year period.

Notes

1. *daneshbonyan24*. (2015). Retrieved from daneshbonyan24 http://www.daneshbonyan24.ir/
2. Governmental Origin New Technology base Firms.
3. Non- Governmental Origin New Technology base Firms.

Disclosure statement

No potential conflict of interest was reported by the authors.

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