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The Success Factors in Developing Countries' Transition to a Learning Economy: Evidence from Iran by a Grounded Theory Approach

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Abstract

An outstanding feature of the contemporary world is the rapid economic, technological, social, and political changes marked by a high level of uncertainty. For surviving in this complex and constantly changing economy, successful transition to a learning economy is a necessity for developing countries. This research was aimed to investigate the factors which played a role in the developing countries' successful transition to a learning economy. Furthermore, according to evolutionary economics, countries are path-dependent, i.e. the differences in structures and institutions of an economy give each economic system its specific nature that is illustrated in the particular challenges each country face in its transformation to a learning economy. Hence, based on the pieces of evidence from Iran, this inductive, exploratory, and qualitative research, using a grounded theory approach and a follow-up quantitative analysis based on survey data, led to the development of a model that can be used to analyze the success factors which contribute to this transition. The findings showed that in terms of the 'paradigm model', transitional thinking as casual condition, ICT, social capital and macro-economic conditions as intervening conditions, policy institution as central category, government, university and industry interactions, learning firms, collaborative learning, improved research and education system, and regional development as strategies were factors that could lead to a learning economy.

1. Introduction

In recent decades, knowledge has been considered as a strategic variable in economic competitiveness and development (OECD, 2000; Mu et al., 2010; Cavusoglu, 2016); as a result, the knowledge-based economy has been the dominant paradigm (Asongu & Andres, 2019; Zandiatashbar & Hamidi, 2018; Ogundeinde & Ejohwomu, 2016; Amavilaha et al., 2017). At the same time, only having knowledge does not imply the necessary paradigm shift to a knowledge-based economy (Chen & Zhang, 2010). In fact, among the different engines of economic development, innovation is the most important factor for making

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progress and creating wealth (Hudson & Minea, 2013; Pieroni et al., 2019). Thus, when reference is made to a knowledge-based economy, the innovation system is a crucial means of competition in such an economy (Andria & Savin, 2018). In spite of this fact, the innovation system in developing countries differs with that of the developed countries (Xao & Guan, 2009). As a result, competitive intelligence comes from a body of knowledge that is based upon learning structures. Accordingly, it is the learning capability of the society which matters in developing countries (Lundvall et al., 2006), hence the emergence of the concept of learning economy.

However, there are certain prerequisites that need to be met for each single national economic system if it is to make a transition to a learning economy (Soskice, 1999). In other words, and according to the evolutionary economics, countries are path-dependent, i.e. different national economies have their own specific profiles of science and technology (Lemola, 2002; Choung et al., 2014; Fu et al., 2011). What is not yet clear is how this process of transition takes place and what variables initiates this transition in developing countries'. Addressing such questions can help us figure out how such a transition to a learning economy can take place in a specific country, such as Iran. Another follow-up question would be this: What are the success factors expediting this transition to a learning economy in Iran?

In what follows, a brief summary of literature on learning economy and an overview of Iran's science and technology policy challenges and issues are provided in section 2. Then, the study methodology is discussed in section 3, followed by a discussion of the processes involved a grounded theory, (including various coding, processes and the emergence of a theory) six theoretical propositions are spelled out in section 4, and, finally, some conclusions and implications for policy and management are presented in section 5.

2. The Learning Economy and Iran's Science and Technology Policy Issues

The role of knowledge in economic development has strongly been recognized (Carayannis et al., 2018; Lundvall, 1992; French, 2004; Amavilaha et al., 2017). In various contexts, an interpretation of what has actually taken place in the economy over the last few decades under the heading 'learning economy' has gained currency (Lundvall & Johnson, 1994). Having access and using the international tacit knowledge and diffusing interdisciplinary problem-driven research and education system that lead to learning are needed for developing countries transition to a learning economy. That said, the important effects of learning at the firm level are crucial for economic growth (Okada, 2004). In spite of the fact that a learning economy has benefited developing countries; for instance, it has facilitated their integration into a global value chains, there are no studies about the role of a learning economy in Iran. To the best of our knowledge, there are only some limited studies about knowledge-based economies and the evident relations in this area. For example, a research which was based on the fundamental components, specified by the World Bank (1998), of a knowledge-

based economy_ showed that all of those components had a decisive impact on Iran's economic development. Therefore, exploring and investigating key factors which influence Iran's transition to a learning economy is imperative.

Iran's 1404 development vision predicts that in the course of the next two decades (up to 2025), Iran will change into a developed country and will be ranked first economically, scientifically and technologically in the region. According to this vision, several five-years plans have been formulated and will be implemented to attain the final goal, which is being ranked first in the Middle East. Although there has been some primary success in attaining the objectives delineated in the development plans, such as the increase in the number of students and teachers in higher education, and government expenditures in education, and some other science and technology indicators, there has not been sufficient and real progress toward the vision. The most important change taking place thus far is in the number of published academic articles, promoting Iran's ranking in this area in the world (27 in 2008, 22 in 2009, and 16 in 2012) (Regional Information Center for Science and Technology, 2012). Nevertheless, some other indicators, such as Iran's place among the knowledge-based economies (98 in 2009 and 96 in 2012) (World Bank, 2012) (Table 1) and its economic competitiveness (64 between 144 countries in the world), represent a great contradiction.

Table 1. Knowledge-based economy in Iran and some selected countries

Indicators	Sweden	Korea, Rep.	Turkey	Iran
Knowledge-Economy Index	9.43	7.97	5.16	3.91
Knowledge Index	9.38	8.65	4.81	4.97
Economic Incentives and Institutional Regime	9.58	5.93	6.19	0.73
Education	9.74	9.09	5.83	4.61
Innovation	8.92	8.8	4.11	5.02
ICT	9.49	8.05	4.5	5.28

***Source**: World Bank (2012)*

In spite of the fact that innovations are the result of knowledge management processes as a whole (Stankovic & Micic, 2018; Mejri et al., 2018), the dominant approach used to study them is based upon the linear innovation model. The governance style in the national innovation system is authoritative in Iran (Abbasi et al., 2011; Supreme Cultural Revolution Council, 2003). Indeed, it may well be argued that due to the rapid technological and institutional changes which characterize the learning economy, the linear model can only be used efficiently in basic research in university laboratories and special firms in R&D-intensive industries' branches, such as pharmacy. Iran has to enter into a transition process, but the necessary transition is difficult to manage. Hence, for a particular setting, it is essential to recognize the potential factors involved in the transition. However, with regard to the transition plan in developing countries, such as Iran,

a crucial consideration for economic progress is how techno-economic and socio-institutional changes will create a national learning system.

3. Methodology and Data Collection

The learning economy paradigm needs to develop customized research methodology and models (Lundvall, 2008). Hence, the common research methodology in quantitative and deductive approaches, such as survey-based researches, is not satisfactory (Lundvall et al., 2008; Fitjar & Rodríguez-Pose, 2013; Jensen et al., 2007). That explains why the present study took an inductive and qualitative method, using grounded theory approach and a follow-up survey-based quantitative analysis to develop a model that can be used to analyze the themes and related components of this transition. In fact, this study included two phases. First, it was the qualitative phase in which grounded theory was used; second, it was the survey-based quantitative phase in which a questionnaire was utilized.

3.1 Grounded Theory: Qualitative Phase

Because of using grounded theory and comprehensive data gathering in the first phase, findings are based on real problems in society and specific history, path dependency, the size and the level of economic development. The authors contend that qualitative methods based upon grounded theory approach can play a major role in investigating some issues such as learning economy. Grounded theory is represented in the form of a theory building based on data analysis (Glaser & Strauss, 1967). In grounded theory, first, the required data is gathered and the key concepts are highlighted with specified codes. In the next step, categories will be recognized based on the codes, and the related theory will appear in the final step (Strauss & Corbin, 1990).

To do a grounded theory research, there are three approaches or research designs: Systemic approach (Strauss & Corbin, 1998), emergent approach (Glaser, 1992), and construct approach (Charmaz, 2000). In order to formulate a theory about a phenomenon, the systemic approach uses a systematic group of producers in an inductive manner. As a result, the theory building in this method, as followed in this research, is accomplished according to the systemic approach (Strauss & Corbin, 1998). The reason to select this approach in the present study is that there was scarce research and information regarding the learning economy as a subject area and the descriptive phenomenology was a convenient method for investigating topics such as learning economy. In this first exploratory phase, the qualitative data collected from the interviews and other sources over the last two years in Iran were examined. The data were obtained as describe here: 1) After the preliminary open interviews, 29 supplemental semi-structured interviews were conducted with 16 key academics, chosen for their experience in working across a range of related fields, both in the industry and government sectors, to gain some insights from different perspectives; 2) Complementary qualitative

data were collected simultaneously through deep and comprehensive data gathering from different data sources as follows:

- Iran's 1404 development vision;
- Iran's Holistic Scientific Map;
- Iran's 5th and 6th Development Plan;
- Iran's Comprehensive IT Strategic plan;
- Reports and publications from international organizations, such as World Bank, IMF, OECD, United Nations about Iran;
- Academic resources, published books, and articles in Persian and other languages about development issues in Iran;
- Opinions of policy-makers, managers, and other important decision-makers published through different mediums.

3.2 Questionnaire: Quantitative Phase

The second quantitative phase of this research was done through a survey with 37 main respondents who had graduated in science and technology policy making and other related fields, worked on related research, and had their papers published in related journals. All of them had enough and related experience because of working across a range of related fields, both in the industry and government sectors. After doing the first phase and identifying 12 themes (categories) and 139 components (concepts) related to Iran's transition to a learning economy through three coding processes (the success factors), 60 pivotal components were selected by the ATLAS.ti based on the components' density and groundedness. These 60 important components constituted the questionnaire constructs. Thus, the survey had two sections. The first section contained respondents' biography, including the education field, experience in specific fields, and etc. The second part was about the 12 themes and the final 60 components related to Iran's transition to a learning economy and their relations drawn from the first phase. The respondents were asked to determine the importance of each of the 60 components related to Iran's transition to a learning economy through a five-point Likert scale in the first column. In the second column, they were asked to assess the relations between the themes based upon the paradigm model. In fact, each component had two columns. The theory of transition to a learning economy for Iran presented in the form of a model and shown in Figure 5 is the final outcome of this research extracted from the findings of the survey. The validity of the questionnaire constructs was guaranteed by extracting the factors through the processes involved in the grounded theory; also, six experts, in form of experts' panel, were asked to explore the theoretical constructs and incorporate them into a questionnaire. In this method, the validity is evaluated by reviewing all the items of the questionnaire items in terms of comprehensiveness, clarity, and readability. Finally, some level of agreement will be achieved as to which items should be included in the final questionnaire. Reliability is the extent to which a questionnaire or any other measurement tools

deliver similar results on repeated trials. In other words, it is the consistency or stability of scores across raters or over time. The questionnaire reliability was confirmed by Cronbach's Alpha, measured using SPSS as follows:

Table 2. Reliability statistics of the questionnaire

Themes	Cronbach's Alpha	No. of Items
Institution	0.897	60
Government, industry and university interactions	0.911	60
Learning firms	0.943	60
Macro-economic conditions	0.853	60
Information and communication technology	0.749	60
Regional development	0.823	60
Social capital	0.934	60
Improved research and education system	0.927	60
Collaborative learning	0.877	60
Policy institution	0.804	60
Transitional thinking	0.768	60
Learning economy	0.908	60

3.3 Presenting the Research Model and Theoretical Propositions

In the grounded theory, after three steps of coding (open, axial, and selective), the results are tested and confirmed by various methods, a questionnaire-based survey in the present research. In what follows, the research model, which is based on the paradigm model in the systemic approach, and a discursive set of theoretical propositions derived from that model are presented.

4. Results

In the first phase, and in line with the principles of grounded theory, there was a cyclic interaction between data collection and data analysis. Data analysis was done by ATLAS.ti. Version 5, as illustrated in Figure 1 in form of a workflow diagram.

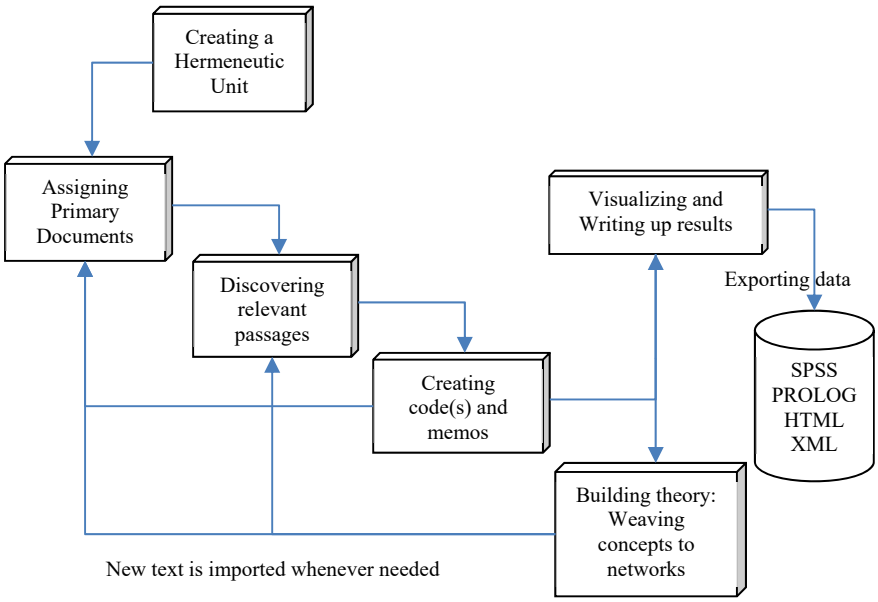

Figure 1. The ATLAS.ti workflow

For example, a part of the software output was as follows:

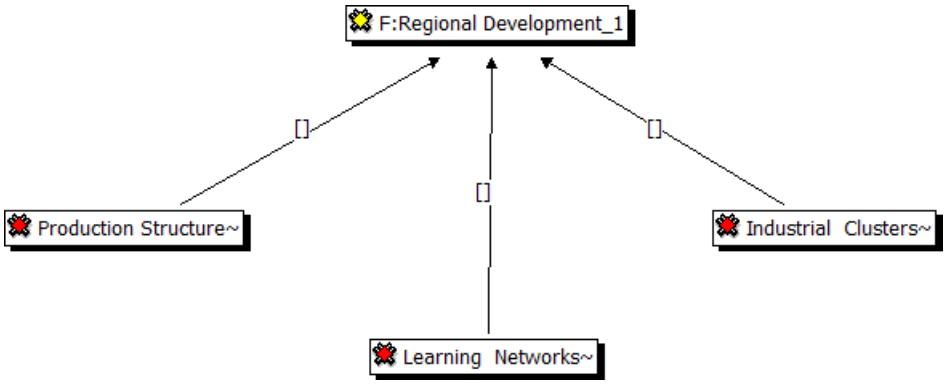

Figure 2. ATLAS.ti output

In this stage, 4051 codes and 600 memos were generated which resulted in 12 categories (themes), and 139 concepts (components). In the second phase, we used SPSS and one-sample T-Test for data analysis.

4.1 First Stage: Open Coding

The open coding in the grounded theory was done via some analytic processes that led to concepts (codes). This was done by repeating questions such as ‘what is this about?’ and ‘What is being referred to here?’

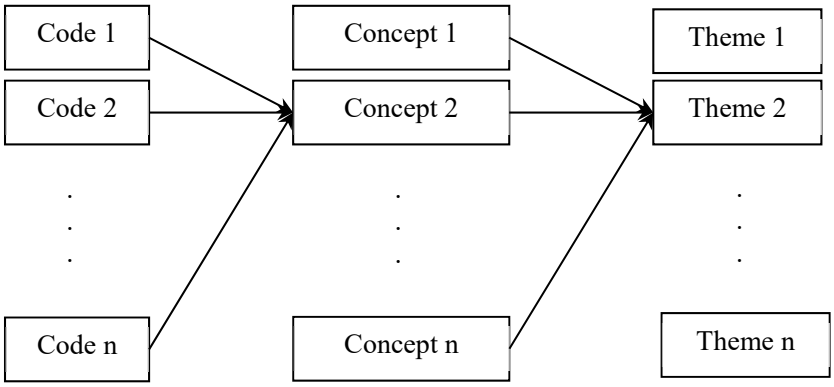

Figure 3. The process of open coding.

As can be seen in Figure 3, the analysis and coding, the discovery of categories, and categories explanation according to their characteristics are part of the open coding stage. The results are presented in the form of a table (Appendix A).

4.2 Second Stage: Axial Coding

After doing the first phase and identifying 12 themes (categories) and 139 components (concepts) germane to Iran's transition to a learning economy through three coding processes (the success factors), the 60 pivotal components selected by the ATLAS.ti, based on the density and groundedness of the components, were used in the axial coding and a set of relations established between the generated categories at the open coding stage (Figure 4).

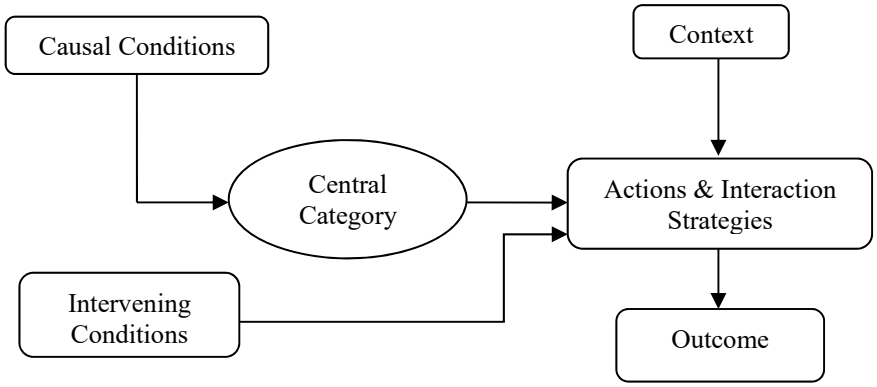

Figure 4. The paradigm model (Strauss & Corbin, 1998).

Axial coding based upon the paradigm model is shown in the form of a table (Appendix B).

4.3 Third Stage: Selective Coding

The essential step in the grounded theory is selective coding in which central category is chosen. In fact, the researcher is expected to create an image by aligning some categories together based on their relations (Creswell, 2004).

4.3.1 Shaping the Theory of Transition to a Learning Economy for Iran: A Narrative Description

The learning economy paradigm posits that knowledge creation and destruction has accelerated over the last years, and firms and nations need to update their capabilities and competencies to keep pace with this it. Consequently, today, success is a result of proactive learning and forgetting, and not having access to a stock of knowledge (Freeman & Perez, 1988).

However, changing the attitude and mindsets of some agents is difficult but necessary for the transition to a learning economy. Therefore, we need a transitional thinking (causal conditions) in all sectors of society so that everyone will be informed of the advantages and difficulties of the process of transition. When the mindsets change and the public and policy-makers' understanding of the transition is enhanced, it is important to take into account the policy institution (central category). Policy institution is a coherent set of individuals (policy-makers in different levels, science and technology strategists, and the general public), soft institutions (such as existing customs, norms, and collaboration), hard institutions (such as universities and research centers), and the interactions between the sections. This whole will finally lead to some desired policy inputs, outputs, and especially, outcomes. This needs an institutional set-up (context) that facilitates the interactions and increases the institutional convergence and learning, which together can contribute to cohesion and integration in the institutional structure of the society. On the other hand, ICT, social capital, and macroeconomic conditions (intervening conditions) are all at play. The considerable impact of ICT on the learning economy is indisputable; it facilitates the interactions within it and reduces its costs. Macroeconomic conditions such as opening the economy to improve competition and boost the legal security for investments may result in improvement of international competitiveness at an international level.

The action and interaction strategies will be affected and determined by policy institution (central category), institutions (context), and ICT, social capital and macroeconomic conditions (intervening conditions). Iran needs learning firms, improved research and education systems, regional development, enhanced government, an interconnected industry and university, and collaborative learning as practical strategies for a transition to a learning economy. As a learning economy, Iran will be characterized by systemic and aggressive learning, where science and technology policies are considered as national assets and developed and well-educated humans as capital. In such an economy, systems capability is measured in terms of their interactive links, and knowledge will be produced to

address the society problems and utilized in relevant contexts. Moreover, and as regards the universities, they will be deemed as economic-scientific institutions and university groups as knowledge firms. Furthermore, the interaction between universities and private corporation, as well as interdisciplinary learning, will be emphasized, activities will arise from real operational problems, and special institutions will be stablished to solve the contradictions that result from structural changes, development and growth processes, and sequential capability building. Finally, technological capabilities for key industries and policies regarding science and technology will be integrated with the development strategies and macroeconomic policies.

4.4 Quantitative Data Analysis

In the second phase, SPSS and one-sample T-test were used for data analysis. As mentioned in the methodology, each component had two columns. The first column was aimed to evaluate the importance of each of the 60 components, and the results are presented in Table 3.

Table 3. One-Sample T-Test Statistics (Determining the importance of each of 60 components)

Components/Statistics	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Unlearning phase	12.982	36	0.000	1.351	1.14	1.56
Shared understanding of problems	7.361	36	0.000	0.919	0.67	1.17
Coordinated view at a national level	5.265	36	0.000	0.703	0.43	0.97
Incentives based on transition plan	10.413	36	0.000	1.351	1.09	1.61
Policy makers' understanding of transition	6.812	36	0.000	1.054	0.74	1.37
Formal and informal integration of experts	-0.539	36	0.593	-0.108	-0.51	0.30

The Sig. (2-tailed) for the "formal and informal integration of experts" component in the learning economy category was more than 0.05; therefore, this component was not important and was eliminated. It seemed that the respondents considered "integration" as an unquestionable component in the learning and education system that may result in economic progress. However, it must be noted that 'formal and informal integration of experts' component is not an outcome, but a prerequisite for transition to a learning economy. The Sig. (2-tailed) for each of the other 59 components was less than 0.05; thus, it could be concluded that these components were important enough to be considered as success factors for

the final model. The second column was supposed to evaluate the relations between different parts of the paradigm model. A brief account of the results can be observed in the Table 4.

Table 4. One-Sample T-Test Statistics (the relations between different parts of the paradigm model)

Components/Statistics	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Unlearning phase	29.047	36	0.000	4.514	4.20	4.83
Shared understanding of problems	24.737	36	0.000	3.946	3.62	4.27
Coordinated view at a national level	22.785	36	0.000	3.865	3.52	4.21
Incentives based on transition plan	27.009	36	0.000	4.270	3.95	4.59
Policymakers' understanding of transition	28.066	36	0.000	4.189	3.89	4.49

The Sig. (2-tailed) for each of the 59 components and their relations based on the paradigm model was less than 0.05. This means that these components met the criterion in this step. As a result, the final model of transition to a learning economy for Iran could be presented as what is shown in Figure 5:

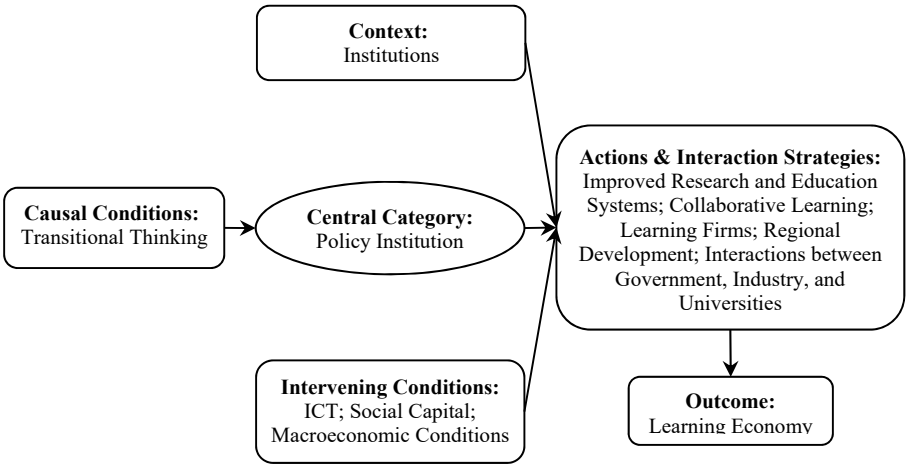

Figure 5. A model for Iran's transition to a learning economy

As mentioned earlier in section 3.2, a discursive set of theoretical propositions were produced at the final step. These propositions are briefly stated below.

4.5 Theoretical propositions

Theoretical propositions explain the generalized relations between the central category and other selected categories. Propositions entail conceptual relations formed (shaped) from structures. In this study, the theoretical propositions were tested by the quantitative survey, and six final propositions presented below are based on the research and the model of Iran's transition to a learning economy.

Proposition 1: Transitional thinking includes unlearning phase, shared understanding of problems, coordinated view at a national level, formulating and implementing incentives based on a transition plan, improving both the policy makers' and public's understanding of transition. These elements, described as the causal conditions will affect the central category.

Proposition 2: Creating and diffusing policy learning, improving policy transfer as a whole, developing of horizontal interactions and learning networks between different policy areas, improving learning-by-comparing through international comparison and improving absorptive capacity of policy institution are the main elements of policy institution. These elements, referred to as the central category, will affect actions and interactions.

Proposition 3: ICT (ICT's infrastructure development, E-Government development), social capital (the improvement of social trust, social cohesion improvement, social participation, public awareness, civil society, and networks as the core of social capital to improve social communications), and macroeconomic conditions (open economy, improved competition, formulation and implementation of integrated and comprehensive strategy, improved private sector participation, improved domestic economic management, creation and improvement of legal security for investments, improved international competitiveness at an international level), as intervening conditions, will affect actions and interactions.

Proposition 4: Institutional convergence, facilitation of foreign direct investment, enhancement of intellectual property rights (IPRs) & its enforcements, institutional learning diffusion and cohesion, and integration of the institutional structure of the society are the main constituents of the institution. These institutional constituents, subsumed under the context, will affect actions and interactions.

Proposition 5: Learning economy is the outcome and the result of the following elements: Regional development (industrial clusters development, learning networks development thorough horizontal interactions in region, production structure improvement), learning firms (building and diffusing organizational trust, developing ICT as the supporter of new forms of organization, improving firms' absorptive capacity), improved research and

education systems (developing vocational learning, improving the quality of educational content by focusing on the relation between theory and action based on real problems in the society and integrating external action courses and training plans, developing the interactions between university, industry, and government, building and diffusing interdisciplinary research and education, enhancing international communications, building on reforms in higher education, building creative education programs and developing social skills in students via training systems), GIU interactions (designing a framework for improving the policymaking and monitoring role of government), and collaborative learning (building intentional learning processes at the national level and improving social learning, and collaboration).

Proposition 6: A Learning economy is characterized especially by systemic and aggressive learning, where science and technology policies are considered as national assets and developed and well-educated humans as capital. In such an economy, system capability is evaluated in terms of interactive links, and knowledge is produced to address the problems which the society is facing and is employed in relevant contexts. Furthermore, and with regard to universities, they are considered as economic and scientific institutions and university groups as knowledge firms. In addition, the interaction between the universities and private corporations is emphasized, as is the interdisciplinary learning. It is vital that activities are based on real operational problems, and special institutions are established to solve the contradictions that result from structural changes, development and growth processes, and sequential capability building. Finally, technological capabilities for main industries, science and technology, and policy are improved and integrated with the development strategies and macroeconomic policies. To sum up, the findings of this research showed that for a successful transition to a learning economy in Iran, deep changes had to take place in the socio-institutional and techno-economic components. For such transition, those components have to be taken into account simultaneously, as suggested in the long wave theory approach.

5. Conclusion Remarks

In this research, the success factors which could play a role in the transition of developing countries to a learning economy were explored. The data were collected from different sources, including government policies, firm strategies, higher education system, etc., in Iran to shed light on various actors and institutions. As mentioned earlier, in a learning economy, the emphasis is on the significance of transitional thinking, policy institution, regional development, and collaborative learning, which all together point to the importance of non-economic and socio-institutional factors such as trust, collaboration, and social institutions. Moreover, Iran is characterized by cultural and subcultural diversity; consequently, various forms of policy interventions could be developed in different geographical and historical settings. In line with a policy approach, there is a need to develop more convergent policymaking by focusing on institutional

coordination. On the other hand, the rate of technological changes and, consequently, economic growth depends, to a large extent, on the well-educated and high-skilled labor force. Accordingly, the human capital is critical in turning developing economies, like Iran, into learning economies. Successful learning economies need to improve the knowledge and learning capabilities of policymakers whose knowledge with regard to policymaking may be outdated. However, redefining the role of government is vital. The regional dimension of economic development is a key component of government interventions. In spite of the major role of university research in economic progress, improving the cooperation between the government, university, and industry is the next most significant concern for Iran in its march toward development. That, however, does not underestimate the unique role of universities in fostering regional development. Due to the broad dominance of government in different sectors, we can state that the central question is how to promote the collaboration between the government, government, and government (GGG). It means that the problem in Iran is not the interaction between the government, university, and industry (GUI); rather, it is the cooperation between GGG.

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Appendices

Appendix A: Open Coding at a Glance

Number of generated codes	Concepts (components)	Themes (Categories)
20	Institutional capacity	Institutions
21	Foreign direct investment (FDI)	
22	Intellectual property rights (IPRs) & its enforcement	
41	Institutional convergence	
26	Institutional learning diffusion	
31	Cohesion and integration in the institutional structure of society	
21	Institutional fitting and refitting in response to new rules	
42	Designing a framework for improving policymaking and monitoring the role of government	Government, Industry and University Interactions
21	Financial and regulatory support of venture capital	
24	Building joint work teams	
21	Formulating and implementing regulations and laws to enhance interactions	
32	Planning and organizing capable human resources	
33	Government/University/Industry exchange of ideas	
38	Improving university-industry collaboration thorough special institutions	
2	Guiding actively the process of university and industry internationalization	
34	Comprehensive and coherent policymaking by government	

Number of generated codes	Concepts (components)	Themes (Categories)
34	Integrated competence building strategy at the firm level	Learning firms
25	Improving and diffusing the technological capability at the firm level	
30	Improved organizational structure and systems	
21	Developing and diffusing technological learning	
27	Developing and diffusing organizational learning	
32	Developing and diffusing organizational adaptation	
43	Developing and diffusing organizational trust	
31	Developing the intra-firm horizontal cooperation	
22	Finding a balanced development between the firms' internal and external R&D capacity to capture the benefits from external technology sources	
24	Increasing functional flexibility	
20	Focusing on core capabilities and outsourcing secondary tasks and functions	
23	Developing a learning culture among employees in the public sector	
41	Accelerating the development and application of ICTs	
39	Improving firms' absorptive capacity	
26	Making formal interactions with key stakeholders (suppliers and customers) increasingly to gain competitive advantage	
24	Making informal interactions with competitors as to improve knowledge spillover	
44	Open economy and improvement of competition	Macro-Economic Conditions
26	Improving the efficiency of financial markets	
24	Improving the flexibility in the labor force market	
42	Planning and implementing an integrated and comprehensive strategy	
54	Improving private sector participation	
37	Developing applicable competition regime and policies	
38	Improving market flexibility and security	
44	Improving economic management by taking an indigenous approach	
64	Creating and improving the legal security for investments	
45	Improving international competitiveness at an international level	
37	Eliminating the digital gap between the regions at a national level	Information and communication technology
50	Developing ICT's infrastructure	
54	Developing e-government	

Number of generated codes	Concepts (components)	Themes (Categories)
58	Developing industrial clusters	Regional development
42	Developing learning networks thorough horizontal interactions in the regions	
40	Building horizontal interactions between different regions	
32	Developing business incubators	
43	Improving the production structure	
31	Improving trust	
22	Finding a balance between centralization and decentralization in the regions	
34	Developing technology clusters	
39	Developing knowledge spillover in the region	
31	Making broader socio-economic progress in the area of learning	
46	Social trust improvement	Social Capital
34	Social cohesion improvement	
33	Social participation improvement	
49	Improving public awareness and creating a powerful civil society	
48	Networks development as the core of social capital to improve social communications	
25	Educational modification in research and education system	Improved Research and Education system
29	Deregulation and decentralization to enhance institutional autonomy	
23	System diversification	
49	Improving the quality of educational content by focusing on the relation between theory and action based on the real problems the society face and integrating external action courses and training plans	
58	Vocational learning development	
42	International communications enhancement	
21	Brain gain thorough international communities	
22	Building creative education programs	
44	Building and diffusing interdisciplinary research and education	
49	Developing the interactions between GUI	
32	Developing students' social skills in training systems	
34	Preparing students for interdisciplinary cooperation	
21	Improving the interactions between socio-economic system of a country and its research and education system	
22	Flexible education system	
20	Flexible management of public R&D institutes	
23	Improving learning by doing and informal and formal training	
21	Reallocating employees that have university training to SMEs for building networks with universities and knowledge institutions	
24	Creating and diffusing research culture	

Number of generated codes	Concepts (components)	Themes (Categories)
41	Improvement of collaboration	Collaborative learning
31	Interactive learning improvement	
32	Informal learning diffusion	
40	Building intentional learning processes at a national level and improving social learning	
51	Creation and diffusion of the policy of learning	Policy institution
22	Policy capacity improvement	
31	Policy transfer improvement as a whole	
33	Development of horizontal interactions and learning networks between different policy areas	
29	Transfer of successful institutional set-up among different sectors like nuclear and medical sector to other sectors	
42	Improvement of the absorptive capacity of the policy institution	
34	learning-by-comparing improvement through international comparison	
24	Domestic transfer of institutional forms from one sector to another	
25	Policymaking (for science and technology)	
23	Policymaking (through science and technology)	
31	Unlearning phase (creative destruction of knowledge, diffusion of rapid forgetting and learning)	Transitional thinking
45	Shared understanding of problems	
41	Coordinated view at a national level	
32	Formulation and implementation of incentives based on the transition plan	
24	Improvement of Policymakers' understanding of transition	
21	Improvement of public understanding of transition	
24	Systemic and aggressive learning	Learning economy
11	Lifelong learning	
13	Technology capacity (acquisition and development)	
22	Cultural capital	
31	Science and technology policies as national assets	
41	Developed and well-educated humans as capital	
12	Social capital in terms of trust as an important asset for social learning	
11	Using know what and know why as a source of support for know how	
23	System capability in terms of interactive links	
29	Knowledge production based on society problems and its utilization in relevant contexts	
32	University groups as knowledge firms	
24	University as an economic and scientific institution	
14	Organizational capability	

Number of generated codes	Concepts (components)	Themes (Categories)
15	Technological capability	Learning economy
13	Learning to learn	
11	Social learning with an emphasis on institutions capacity for creating sustainable growth and facilitating the learning processes	
15	Interaction between ideas (software) and skills (hardware) for a learning model	
21	Networking between university institutions and private corporation	
12	Combining science-based learning with experience-based learning	
14	Rapid adaptation to change	
11	Using crises as the main tools for developing opportunistic learning	
14	Mobility of professional manpower	
17	Adaptive learning	
14	A combination of autonomy and social integration among government officials	
18	Existence of a common future and accepted vision for the STP and different sectors	
15	Transfer capacity	
31	Interdisciplinary learning and activity based on real operational problems	
23	Integration of science and technology policy with development strategies and macroeconomic policies	
19	Dual technological development (civil and military)	
12	Problem-driven research and education in the economic firms	
33	Improvement of technological capability for the main industries	
21	Formal and informal integration of experts	
12	social absorption capability	
33	Existence of institutions for solving the contradictions that result from the structural changes in the process of development	
23	Creating sequential capability	
12	Convergent learning and divergent learning, simultaneously	
14	Direct and indirect learning, simultaneously	
11	Collaboration between competition policy and policies that aim to develop learning organizations and networks for producing competency	
12	Decentralized R&D resource allocation that hinders the creation of imbalanced regional capability	

Appendix B: Axial Coding Based on the Paradigm Model

Elements of the paradigm model	Themes (categories)	Components (concepts)
Causal conditions	Transitional thinking	1. Unlearning phase 2. Shared understanding of problems 3. Coordinated view at the national level 4. Formulation and implementation of incentives based on a transition plan 5. Improvement of policymakers' understanding of transition 6. Improvement of public understanding of transition
Central category	Policy institution	1. Creation and diffusion of policy learning 2. Improvement of policy transfer as a whole 3. Development of horizontal interactions and learning networks between different policy areas 4. Improvement of learning-by-comparing through international comparison 5. Improvement of the policy of absorptive capacity
Context	Institutions	1. Institutional convergence 2. Facilitation of foreign direct investment 3. Integration in the institutional structure of the society 4. Institutional learning diffusion and cohesion 5. Enhancement of intellectual property rights (IPRs) & its enforcement
Intervening conditions	Information and Communication Technology	1. ICT's infrastructure development 2. E-Government development
	social capital	1. Social trust improvement 2. Social cohesion improvement 3. Social participation improvement 4. Public awareness improvement 5. Creation of a powerful civil society 6. Networks development as the core of social capital to improve social communications
	Macro-economic conditions	1. Open economy and improvement of competition 2. Formulation and implementation of an integrated and comprehensive strategy 3. Improvement of private sector participation 4. Improvement of economic management by taking an indigenous approach 5. Creation and improvement of legal security for investments 6. Improvement of international competitiveness at the international level

Elements of the paradigm model	Themes (categories)	Components (concepts)
Action and interaction strategies	Regional development	1. Industrial clusters development 2. Learning networks development thorough horizontal interactions in the region 3. Production structure improvement
	Learning firms	1. Building and diffusing organizational trust 2. Accelerating the development and application of ICTs 3. Improving firms' absorptive capacity
	Improved research and education systems	1. Developing vocational learning 2. Improving the quality of educational content by focusing on the relation between theory and action based on real problems which the society face and integrating external action courses and training plans 3. Enhancing the interactions between government, university, and industry 4. Building and diffusing interdisciplinary research and education 5. Enhancing international communications 6. Making reforms in higher education system and building creative education programs 7. Developing students' social skills in training systems
	GIU interactions	1. Designing a framework for improving policymaking and monitoring the role of government 2. Improving university-industry collaboration thorough special institutions
	Collaborative learning	1. Building intentional learning processes at the national level and improving social learning 2. Improving collaboration

Elements of the paradigm model	Themes (categories)	Components (concepts)
Consequences	Learning economy	1. Systemic and aggressive learning form the basis of the economy; 2. Science and technology policies are considered national assets; 3. Developed and well-educated humans as capital exist; 4. System capability exists in terms of interactive links; 5. Knowledge will be produced to address the society problems and utilized in relevant contexts; 6. University is considered as an economic and scientific institution and university groups as knowledge firms; 7. Networking between university institutions and private corporation exist; 8. Interdisciplinary learning is vital and activities should be based on real operational problems; 9. Special institutions exist for solving the contradictions that result from the structural changes and development and growth processes; 10. There are some attempts to integrate experts formally and informally; 11. Attempts are also made to build sequential capability; 12. Technological capability will be improved for main industries; 13. Science and technology policy is integrated with development strategies and macroeconomic policies.