

An Analysis of Transformation Institutions in the Knowledge and Innovation System of the Handmade Carpet Industry

E. Ahmadifard¹, and H. Farhadian^{1*}

ABSTRACT

The rich diversity of Persian carpets is a symbol of different cultures and traditions in this country. To ensure sustainability of the Handmade Carpet Industry Knowledge and Innovation System (HCKIS), attention should be paid to the transformative approach that pursues holistic transformation in the production and consumption systems. The present study aimed to identify Formal Transformation Institutions (FTIs), classify them into main categories, and analyze them based on the production step, approval date, institution type, and geographical area of approval. Based on the results, there were 316 Formal Institutions (FIs) in the Handmade Carpet Industry (HCI). By open coding, 372 concepts were extracted from 509 concepts derived from different FTIs. Based on the axial coding, the FIs were divided into six initial categories of “carpet authority”, “carpet sales and maintenance inside Iran”, “handmade carpet exports and imports”, “carpet production infrastructure”, “handmade carpet production”, and “sanitary-therapeutic category”. At the next step, the matrix of the main categories based on different production steps was drawn. Among the main categories, the highest frequency was related to the category of “carpet production infrastructure” and the subcategory of “financial supply of carpet”. Although there are many FIs that support production, carpet weavers, as the main people involved in production, have received minimum supports during their working years due to unawareness of supports and loan conditions.

Keywords: Carpet production infrastructure, Formal transformation institutions, Persian carpet.

INTRODUCTION

Handmade carpets are one of the most well-known handicrafts in the world. Persian handmade carpets are not only a commercial commodity but also a symbol of the rich cultural, artistic, historical, and social background of Iran (Pourmoradian *et al.*, 2021). Protection coefficient of factors show that producers pay indirect taxes for using these factors. Effective protection cost shows that the sum of government protection of production and government indirect policy on tradable factors such as handmade carpets is positive and, generally, government policy supports the handmade carpets production process (Assari Arani and

Rezagholizadeh, 2009).

However, this handicraft has faced numerous challenges in recent years. A review of the literature shows that the decrease in the number of carpet weavers' in rural areas has caused a decline in carpet weaving in recent years. The nontransparent situation of the rural handmade carpet art industry in Iran's annual budget, the non-accomplishment of the Fifth Development Plan's goals (development and targeting of research, education, production and advertising of carpets), managerial instability, poor performance of governmental organizations in charge of carpets, and low effectiveness of non-governmental organizations reveal

¹ Department of Agricultural Extension and Education, Faculty of Agriculture, Tarbiat Modares University, Tehran, Islamic Republic of Iran.

*Corresponding author; e-mail: h.farhadian@modares.ac.ir



weak management and policymaking in the HCI. The insurance and financial system have also exhibited a weak performance when one looks at the limited access of weavers' to financial and credit sources, the partial deviation of carpet-related facilities, and poor organization of the social insurance of carpet weavers'. Handmade carpet production suffers such barriers and limitations as material unavailability, inadequate training programs for enhancing the quality and coordinating production with market demands, poor organization of production workshops, unsuitable occupational conditions of carpet weaving and inattention to the quality and identity values of handmade carpet-weaving. Improper market structure, lack of a proper marketing system at the national and international level, reduced demand in global markets, more fierce competition at the international level, and government's insufficient support of exports are examples of sales obstacles and limitations (Varmazyari *et al.*, 2018). Mahboobi and Avarand (2017) enumerated the challenges of handmade carpet as political and operational deterrents, personal, cultural, supportive, legal and personal health, marketing, technical and motivational, economic, price, and occupational health institutional.

Amiri Aghdaie and Zare Zardeini (2012) have mentioned the scattering, small, and non-commercial weaving workshops as the most important weaknesses in the production of handmade carpets. Emodi and Madukwe (2008) review of policies, acts, and initiatives in rice IS in Nigeria showed that the policies, initiatives and acts failed to recognize the problems of the actors, because they were detached to the cultural and tradition practices of the actors.

In the meantime, the most important challenge of handmade carpet production, which has mainly been responsible for other issues, is the weakness in the production, development, diffusion, and

application of proper innovations in this industry (Bilgin *et al.*, 2011).

It is imperative to study Knowledge and Innovation Systems (KIS) to understand the status of the IS in the HCI and discover its gaps and issues (Wieczorek and Hekkert, 2012). There are three approaches to studying KIS including structural, functional, and transformation-oriented analysis. The framework presented by Lamprinopoulou *et al.* (2014) includes three analytical blocks for the comprehensive study of the IS – structural, functional, and transformation-oriented. The central block is the structural analysis and deals with the structural elements that constitute ISs. The functional analysis addresses the dynamism of some key processes related to the development, diffusion, and use of new technology, which is important for the flawless functioning of the system. Transformation-oriented analysis is required for further fitting, aligning, and coordinating structures and functions (Borremans *et al.*, 2018).

Several questions arise in the analysis of FTIs in the HCIKIS, which are as follows:

1. What FTIs exist in the HCIKIS (based on document analysis)?
2. What FTIs exist in the HCIKIS (from the perspective of weaving households)?
3. What challenges and issues are FTIs faced with (from the perspective of weaving households)?
4. To what production stage belong each FTIs classified by the main categories?

According to the subjects mentioned and the importance of handmade carpet in the livelihood of rural households, to improve the HCIKIS, the analysis of FTIs is needed in the HCIKIS from two functional and transformational approaches to analyze existing policies and explore gaps, challenges and the level of awareness of the target community.

The present research aimed to determine what FTIs including regulations, bylaws, agreements, procedures, guidelines,

charters, and so on exist in the HCKIS, with emphasis on FTIs. Although there are FIs based on the functions of the KIS, they need to be investigated in separate research.

MATERIALS AND METHODS

Basic and Theoretical Concepts

Innovation System of the Handmade Carpet

Innovation is receiving growing attention among policymakers as an instrument for coping with sustainable economic development challenges (Lamprinopoulou *et al.*, 2014). The technological innovations are usually regarded as the result of an interactive learning process (Edquist, 2013).

An Agricultural Knowledge and Innovation Systems (AKIS) is formally defined as a set of agricultural organizations and/or individuals and their ties and interactions (Fieldsend *et al.*, 2021), that are involved in producing, evolving, transferring, storing, retrieving, integrating, diffusing, and applying knowledge and information for the sake of synergy for the support of decision-making, problem-solving, and innovation in agriculture (Röling and Engel, 1991; SCAR, 2015). ISs have key effects on the renovation process of societies. ISs include 'biotops' of all institutions involved in scientific research and knowledge collection and diffusion and work on the education of employed people, technology development, production, and innovation and its diffusion processes (Kuhlmann *et al.*, 2010). The Agricultural Innovation System (AIS) approach recognizes that innovation is the result of an interactive and co-evolutionary process where an extensive network of actors is involved and the orientation and pace of the innovation processes are influenced by the

institutional and political environment (Lamprinopoulou *et al.*, 2014).

Elements of Oriented Analysis of the HCI

Regarding the elements of ISs, Lundvall (1992) distinguishes limited and broad definitions. The limited definition includes organizations and institutions involved in search and pursuit. The broad definition includes all sectors and aspects of the economic structure and the institutional facilities influencing learning, search, and pursuit. The structure of an IS includes four elements (Wieczorek *et al.*, 2013): (i) Actors, (ii) Institutions, (iii) Interactions, and (iv) Infrastructure.

Structural analysis is used to study the structural elements of ISs including actors, institutions and infrastructure. This analysis focuses on identifying failures in ISs, which are called blocking mechanisms. Woolthuis *et al.* (2005) lists four categories including infrastructure, institutions, interactions, and capabilities (Lamprinopoulou *et al.*, 2014).

In the functional analysis, Bergek *et al.* (2008), Hekkert *et al.* (2007), and Johnson (2001) focus on processes that are important for the good performance of ISs and clarify the dynamism of systems. Hekkert *et al.* (2007) proposed seven functions: entrepreneurial activities, knowledge development, knowledge diffusion, search orientation, market creation, resources mobilization, and legitimization.

The structure makes sense of the function, whereas a coherent functional-structural analysis provides an all-inclusive view of what is happening in the systems. Such analysis is also a precise base for policy recommendations when compared to classical functional analysis (Wieczorek and Hekkert, 2012).

It is widely recognized that innovation in its various forms has a crucial role to play in realizing the kind of transformative change needed. The notion of long-term transformative change captures the idea that



fundamental changes are needed in our models for production and consumption, if either major threats to our societies are to be prevented, or significant new opportunities to be seized. However, for realizing long-term transformative change, more is needed than individual product or process innovations at the firm level, but comprehensive ISs, i.e. modern forms of actors, institutions, and practices that bring a new style of operation of entire sectors or systems of consumption and production. (Weber and Rohrer, 2012).

Structural-functional analysis based on the studies of Van Mierlo *et al.* (2010) and Weber and Rohrer (2012) was supplemented by transformation analysis. Four types of potential transformation failures have been defined for ISs, i.e., (i) Directionality, which is related to the extent of shared vision with respect to the process goals and direction, (ii) Demand articulation, which refers to spatial access for predicting and learning about user needs to enable innovation adoption, (iii) Coordination policy, which shows the level of multi-level policy across different systemic levels and background, and (iv) Reflexivity, which is related to the system's potential of monitoring, predicting, and engaging actors in self-monitoring. These transformation failures were included in the failure framework as 'macro-failures' (Borremans *et al.*, 2018).

Social Institutions of the HCI

It seems that most innovation theorists define institutions as per its common meaning as tangibles that deal with organizing and using R&D. 'Institutions' should be put at the core of process and ISs analysis (Edquist and Johnson, 1997). Institutions are human-designed limitations that shape political, economic, and social interactions. They include both informal limitations (enforcement guarantees, prohibitions, customs, traditions, and behavioral etiquette) and formal laws

(constitutions, civil laws, and ownership laws) (Deegan *et al.*, 2021; Garzik, 2022; North, 1991).

The conceptual basis and the implementation of transformation-oriented policies can effectively be improved by combining the strengths of the structure-oriented IS approaches and the multi-level transformation-oriented perspectives. Higher adoption in policy circles can be ensured by more interactively resorting to the system failures as justification for policy intervention (Weber and Rohrer, 2012; Wiczorek and Hekkert, 2012).

With our notion of transformation-oriented innovation policy, we go beyond the realm of narrowly defined ISs by addressing also ISs in the associated systems of production and consumption. We argue that 'structural innovation' policies that pursue optimizing the structure of ISs and their ability to produce knowledge and novel technology are supplemented by 'transformation-oriented innovation policies' that strategically concentrate on the transformation of the whole ISs (Weber and Rohrer, 2012).

In this section, while introducing the importance of innovation in policymaking, the KIS includes a set of organizations, individuals, links and their interactions that the speed and direction of processes are affected by the institutional and political environment. The KIS analysis has three approaches: structural, functional and transformational. The application of transformational approach in the analysis of FIs has been less used in various industries, while most studies with a structural and functional approach have analyzed FIs in the KIS.

Research Methodology and Data Collection

The present research is a qualitative study in which an analytical approach was adopted to identify the TIs in the HClKIS of Iran. Data were collected by the qualitative

technique using document analysis and semi-structured interviews with carpet-weaver rural families. The document analysis was conducted by grounded theory. Grounded theory aims to create contexts using the theoretical structures created from bottom-up data. According to Strauss and Corbin, description, explanation, and formulation of a phenomenon are only partially rooted in data while the remaining is based on the researcher's interpretation. Based on this less empiricism view, they provided a coding paradigm (Floersch *et al.*, 2010).

In this research, the grounded theory approach was conducted in some steps (Birks and Mills, 2015) including: (i) Development of research questions, (ii) Data collection, (iii) data coding including open, axial, and selective coding, and (iv) Theory writing and formulation.

Data Collection and Analysis Design

In the first step, the research questions were asked. The questions were related to two data groups including documents and interviews with rural families.

The questions asked in the document analysis included 'what FIs exist in the HCI?' and 'what FTIs exist in the transformative approach towards HCKIS?'

The questions addressed in the semi-structured interviews with the weavers included 'what FIs exist in the HCI?' and 'what challenges and problems the FIs are faced with?'

In the second step, data were collected by document analysis and interviews with rural silk-weaver families. Given the high population of weavers and the diversity of fibers used in carpet production and the higher proportion of innovations in silk carpet production, the target population included the weavers of silk carpets. In the study site, i.e., Zanjan Province, the villages were selected based on the number of their weavers. The Organization of Industry, Mining, and Trade of Zanjan Province stated

that four counties were the center of silk carpet production in this province. Then, the village district governors were contacted to find out the number of weavers in each county according to which the weavers were found to be mostly residing in three counties. So, the research was confined to the three counties, namely, Zanjan, Tarom, and Khodabandeh, to save time and expenses. Based on interviews with the rural district governors, key weavers, and employers, one village with the highest population of weavers was selected from each county. They included the villages of Meshkin in Zanjan, Validar in Tarom, and Amirlu in Khodabandeh. Then, the researchers visited the villages, initiated the interview process with one weaver, and kept on interviewing using the snowball technique. Finally, data saturation was achieved after interviewing five families from each village.

Data were collected by semi-structured interviews and document review including handmade carpet regulations of Iran (Heshmati Razavi, 2002), a research report on the legal issues and gaps of Persian handmade carpet production and trade (2006), the official websites of the relevant organizations, and the rules enacted by the Islamic Parliament (Islamic Parliament Research Center, 2021). The five-year programs and the budget guidelines, procedures, and agreements were all retrieved from the portal of the National Iranian Carpet Center and other relevant organizations.

To increase the research reliability and validity (Yin, 2012; Yin *et al.*, 2009), it was necessary to relate the data collected by the interviews to the document and create a chain of evidence. So, the data collected by the interviews with the weavers were compared with the other families and formal documents. The data showed that the weavers were very lowly familiar with FIs, but in those cases of familiarity, the interviews supported the documents. In addition, for the cross-investigation of the data, new documents (FIs) were identified



during the analysis process so that, when a text referred to another document or organization, they were explored too. The interviews were read to the weavers to ensure their accuracy. Also, three different researchers (in the research team) checked the accuracy of data collection and analysis to enhance the research reliability, which led to identifying all FIs in the target timeframe.

In the third step, the documents and interviews were fed into the MS-Word software package so that they could be subjected to data analysis by grounded theory using the NVIVO software package. The concepts were related to the FIs in the context of production, trade, and service for carpet, rug, and handmade carpet weavers.

In the fourth step, the concepts related to the FIs were coded by reviewing the individual sentences and paragraphs, which resulted in the extraction of 509 concepts. These codes were re-checked and re-organized in the next steps.

In the fifth step, 372 codes related to 272 FTIs were extracted from 509 concepts of the HCI by cluster analysis and based on the literature review. These concepts were categorized into 18 initial categories and six main categories (carpet authority, carpet sales and maintenance inside Iran, handmade carpet exports and imports, carpet production infrastructure, handmade carpet production, and sanitary-therapeutic category).

The first to fifth steps were continuously repeated during the research. Some FIs might have been missed or other FIs might have been referred to inside the rule text during the analysis of the institutions. In these cases, the resources were re-checked and analyzed.

In the sixth step, the relationships between the categories were examined and the matrix of the six main categories was drawn based on different production steps.

In the seventh step, the six main categories were classified based on the FIs' approval date, geographical area of application, and type.

RESULTS

The results are based on the research questions as follows:

The results of interviews with the families. In order to answer the second question (FTIs from the perspective of weaving households) and the third question (Challenges in the field of FTIs from the perspective of weaving households) showed that the weavers were not adequately aware of the FIs related to the handmade carpet. A few weavers mentioned some institutions.

The challenges listed by the weavers for these FIs are as follows:

1. **Weaving health:** Some educational courses and workshops held in their villages dealt with the correct manner of sitting before the vertical loom and the weaving place. Despite the awareness of some weavers, they said that they could not observe these health requirements. One reason was that they were accustomed to the wrong way of sitting since their childhood. Also, they mentioned the lack of time as a reason why they did not take care of the health requirements, because the weavers were required to take a break every so often. Also, the distance between the weaver and the loom and the need for sitting vertical reduces the weaving speed.

2. **Weavers' insurance:** Most weavers pointed to the need for the government and/or employers to insure them because they believed that carpet weaving is back-breaking and weavers usually need insurance, after 10 years of working, for the diseases caused by carpet weaving such as the loss of eyesight, backache, and so on. However, the government had stopped insuring the weavers for about nine years during which it had canceled the insurance of real weavers in most cases. Due to the poor market conditions, most weavers did not pay their insurance premium in a timely manner due to the delay in selling their carpets and/or receiving their wage, and the government canceled their insurance regardless of their conditions. Also, the government did not monitor the insurance

soundly, so, they canceled the insurance in some cases only by reference to the neighbors. However, the participant weavers did not reject that some insured weavers had indeed no skill in carpet weaving. Also, there were cases of insurance cancelation since, when the government agents visited, the carpet had recently been finished and marketed.

3. Financial supports and service-providing organizations: Most weavers were unaware of the supports and facilities provided by the government. A weaver blamed the council members and rural district governors for the unawareness of the rural people, because such supports were announced by the government to the governorship and the governorship has announced to the council and rural district governors of each village to inform the rural people. However, in most cases, these officials inform their relatives and friends and inform other weavers only when the supports have terminated and the application deadline has passed. Most weavers mentioned the visit of the Imam Khomeini Relief Foundation to support low-income rural families.

In order to answer the first question (FTIs based on document analysis), data collected by the document analysis were explored by grounded theory through the following three steps:

1) Open Coding

After the data were collected on 316 FIs in the HCI, the concepts related to the HCI were extracted by open coding and the review of the data line by line. At this stage, using the cluster analysis and literature review, 372 concepts related to the FTIs component were extracted from 509 concepts and were finally categorized into 18 initial categories.

2) Axial coding

At this stage, the coded data were frequently compared to organize the initial

categories within clusters fitted with the categories. Finally, six categories were identified as the FTIs of the HClKIS. These primary categories are described below:

- **Carpet authority:** This category, which includes 15 FIs, is ranked the last among six categories. The subcategory of “carpet authority at different production levels” includes carpet authority, museums authority, sales and marketing, carpet cooperatives and unions, and carpet material improvement authority. The subcategory of “delegation of carpet tenure to the non-governmental sector” includes resolutions about the delegation of Iran Carpet Company and the prohibition of tenure by the government.

- **Carpet sales and maintenance inside Iran:** The FIs in this category is ranked third among all categories with 37 FIs. “Carpet trade” with 37 FIs and “the maintenance of elegant carpets” with 3 FIs constitute its subcategories. The “Carpet trade” category refers to rules, bylaws, resolutions, and five-year programs about establishing carpet exhibitions and chambers, support of the purchase of Persian carpets by the government, and regulations regarding the sales of governmental carpets, smuggling, and deserted carpets by Iran Carpet Company.

- **Handmade carpet exports and imports:** There are 84 FIs in this field, and the category is in the second rank. The highest frequency is 34 institutions for the subcategory of “supporting exports and exporters” that include regulations and resolutions on the foreign exchange earned from the exports, commodity imports by foreign exchanges, or the transfer of the foreign exchange to exporters, exporters’ declarations and other supports and incentives mentioned in the regulations, charters, five-year programs, agreements, and resolutions for carpet exports and exporters.

There are 32 institutions for the subcategory of “carpet exporting rules” that includes trade regulations, tax rules, customs tariffs, foreign exchange treaty, exemptions,



bylaws, and charters regarding the obligation to issue trade cards.

The subcategories of “carpet exports control” and “imports control” are with 17 and 11 FIs.

“Carpet exports control” includes charters and resolutions on monitoring exports for increasing quality and creating a healthy competitive environment, prohibition of carpet smuggling, and the exports of machine-woven carpets, as well as laws, bylaws, and resolutions on the exemption of passengers from providing trade cards and adhering to exchange treaty when they are taking carpets less than 120 m² with them. Another FI involved in this category involves the regulations and resolutions on carpet export to different countries and the export permit. “Carpet imports control” also includes laws and resolutions on the permission for importing silkworm, design glass, rug fiber, wool and silk fiber, washing, packaging, and preparing items, and VAT exemption of silkworm importers. In addition, regulations and resolutions on prohibition of importing commodities with internal production advantages such as handmade carpets and alternative commodities such as machine-woven carpets and their smuggling, can be mentioned.

• **Carpet production infrastructure:**

The frequency of these FIs in this category show that the category is ranked first among all categories with 136 FIs. The highest frequency is 103 FIs for “the supply of financial resources” that encompasses financial support of different carpet-related sections such as the Ministry of Industry, Mine and Trade, Expert Development Center, Iran Silk Company, Iran Carpet Company, and other carpet companies, Export Assurance Fund, and carpet cooperatives, unions, and clusters. In addition, supporting production, producers, production with relative advantages, exports, advertisement, R&D in carpet, and infrastructure development, as well as other supports of the private and public sector for the repayment of loans and weavers’

insurance, are included in this category. “The supply of physical resources” with 39 FIs that covers the supply of place, and the supply inputs, as well as physical resources, for Iran Carpet Company. “Information resources” include guidelines and procedures on informing new laws of darning and repair, the agreement between National Carpet Center and Jahad-e Daneshgahi on informing training courses and workshops, and laws and agreements on launching an information center for the Ministry of Trade and a database of carpet cluster, “information resources” and “the supply of human resources”. Finally “information resources” and “the supply of human resources”, with 5 and 4 FIs.

“The supply of human resources”, includes resolutions on the supply of human resources for Iran Carpet Company and the Carpet Company in Qom Province, as well as guidelines and bylaws on the assessment of designers and dyers.

• **Handmade carpet production:** The frequency of the FIs shows that the category is ranked fourth among all categories with 23 FIs in which the highest frequency is 14 FIs related to “carpet-weaving complexes and workshops” including supports, exemptions, and supervision of the produced carpet quality, bylaws and agreements on the internal affairs of the complexes, bylaws and guidelines about the need for issuing a work permit for the carpet-weaving complexes, and the entity in charge of permit issuance. The subcategory of “carpet cooperatives and unions” has 8 FIs that include supports and exceptions of carpet cooperatives, rules, resolutions, and agreements on forming various carpet unions, and regulations on the credit of normal documents of the cooperatives. The subcategory of “texture age and weaver statistics has 4 FIs that includes laws, bylaws, and resolutions on the weaver age condition in carpet-weaving complexes and workshops, the law of supporting handicraft artists and masters, and continuous examination of the statistical population to enhance the status of Persian handmade carpets.

• *Sanitary-therapeutic category*: This category includes 22 FIs and is ranked fifth among all categories. The highest frequency is for the subcategory of “various carpet-weaving insurance types” that includes Social Security Insurance, Healthcare Services Insurance, Carpet-weavers’ and Related Professions Insurance, and Social Insurance Fund. The Healthcare Services Insurance is for the weavers working in carpet-weaving complexes and workshops where the weaver should be insured by the employer. Since 2009, following the approval of the Law of Social Insurances of Rug weavers’, Carpet weavers, and Handicraft Professions, all weavers and masters of handmade carpet should be covered by carpet-weaving social insurance in which 20% should be paid by the government and 7% by the insured person regardless of having or not having an employer or working in a single-weaving home workshop, in cooperatives, or in small or large-sized complexes. In 2018, an agreement was signed between the Social Insurance Fund and the National Iranian Carpet Center, according to which the Social Insurance Fund is obliged to cover all weavers who have no social insurance with retirement, old age, and disability pension.

There are 8 FIs in “weaver safety and health protection” that includes environmental health and weavers’ personal health. The weavers’ personal health means optimal equipment as per the guidelines of the Ministry of Health, or the so-called the ergonomics fitted with human capabilities and limitations. In the agreement between the Imam Khomeini Relief Foundation and the National Iranian Carpet Center, they have agreed to cooperate on improving the working environment of the weavers and their personal health. Workplace health means all regulations, bylaws, and agreements on the weavers’ workplace health, supports of workplace health, and the introduction of entities in charge of the weavers’ workplace health. Based on the Labor Law, Governmental Discretionary Punishment Law, and the Law of Support of

Establishment and Administration of Large and Centralized Carpet-weaving Complexes, all workshops and employers are obliged to meet the labor health requirements. Also, the Ministry of Health and the Ministry of Cooperation were mentioned by the participants to play a role in improving workplace health.

There are 4 FIs in “carpet-weaving insurance conditions” that include all rules and guidelines according to which only the weavers who hold the carpet-weaving skill card will be covered by the carpet-weaving insurance.

3) Selective Coding

In the last step, in order to answer the fourth question (FTIs based on the main categories in different production stage), the matrix of the main categories extracted from the axial coding was drawn based on the production steps. This step aims to have a holistic view on the FIs and to check which category is related to which production step and what steps are emphasized more by the policies. After drawing the matrix of main categories/different production steps, the results as per Table 1 reveal that the category of “carpet authority” is related to the pre-production and post-production steps.

The categories of “carpet sales and maintenance inside Iran” and “handmade carpet exports and imports” are mostly related to the post-production step. The category of “carpet production infrastructure” is related to all three production-steps. The highest frequency is related to the pre-production step and the lowest to the in-production step. Regarding the category “handmade carpet production”, the FIs are related to all three production-steps, although the highest frequency is related to the pre-production step. Figure 1 depicts the matrix of the main categories/production steps. It is evident that the highest frequency is related to the category of “carpet production

Table 1. Selective coding (main categories based on the production steps).

Main Categories	Number of FIs available at different production steps						
	Before	During	After	All steps	Before and during	During and after	Before and after
Carpet authority	8	0	4	0	0	0	4
Carpet sales and maintenance inside Iran	6	0	31	0	0	0	3
Handmade carpet exports and imports	10	0	71	0	0	0	13
Carpet production infrastructure	99	2	21	8	4	0	17
Handmade carpet production	11	2	2	0	3	0	8
Sanitary-therapeutic category	7	14	0	0	3	1	0

infrastructure” among all categories and the pre-production step among all production steps.

To better analyze the FTIs, the main categories extracted from the axial coding were classified in terms of the FIs type, approval date, and geographical area of application.

Classification of Main Categories by the Type of FI

The frequency in terms of the FI type shows that the highest frequency in ‘rules

and regulations’, ‘bylaws and resolutions’, and ‘agreements’ are related to the category of “carpet production infrastructure” followed by “handmade carpet exports and imports” (Figure 2). In ‘charters’ and ‘five-year programs’, the highest frequency is related to ‘handmade carpet exports and imports’. There is only one ‘project’ and one ‘agreement’, which were among the FIs of the categories of “carpet authority” and “handmade carpet production”, respectively. The highest frequency (329 FIs) is related to ‘bylaws and resolutions’.

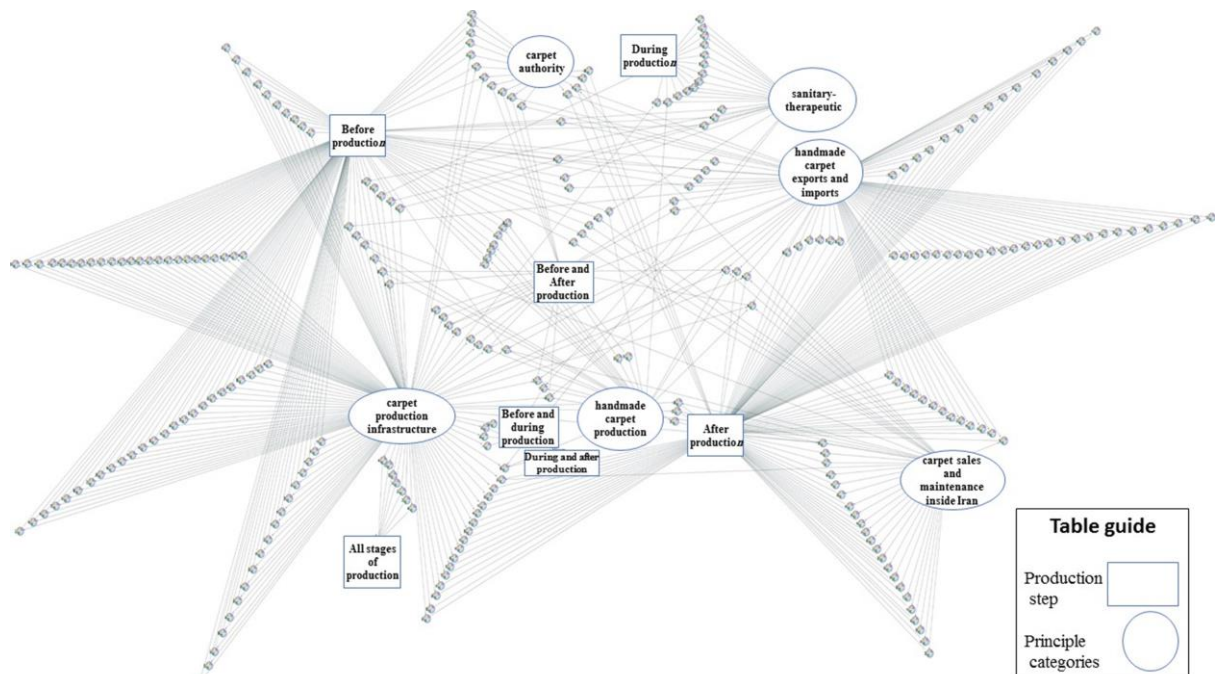


Figure 1. TIs based on different production steps in the HCKIS.

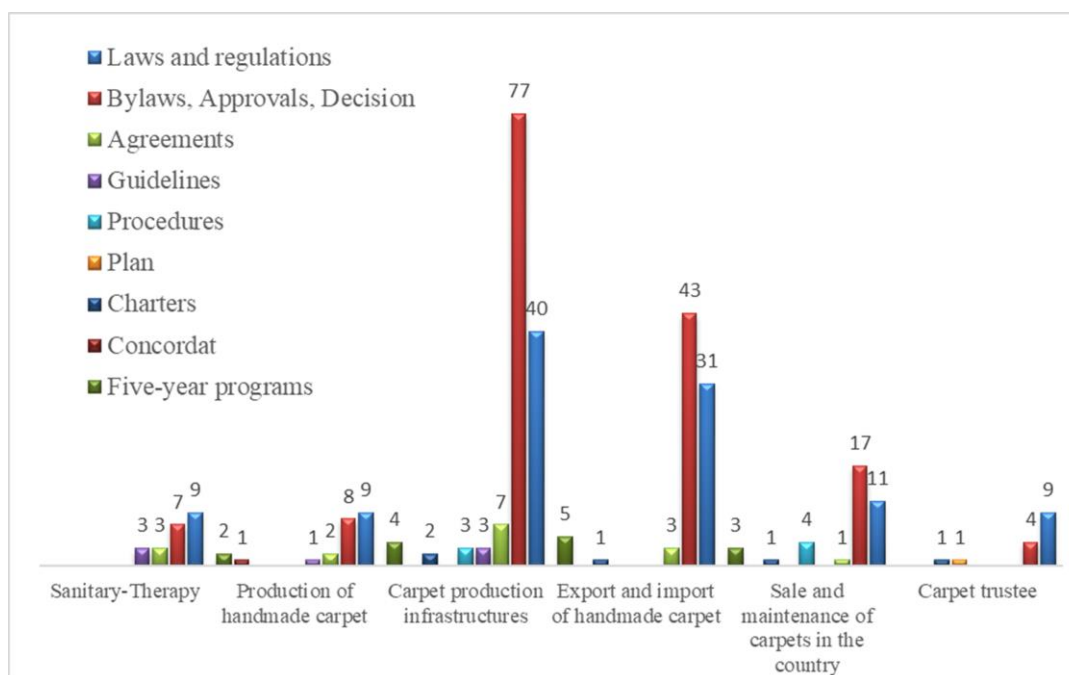


Figure 2. Classification of the main categories by the type of FI.

Classification of the Main Categories by the Approval Date of the TIs

The frequency of the categories shows that the highest frequency was related to the category of “carpet production infrastructure” in the 1940s, 1970s, 1980s, 1990s, 2000s, and 2010s, and to the category of “handmade carpet exports and imports” in the 1920s, 1930s, and 1940s. The highest frequencies were 168 and 166 FIs related to the 1990s and 2000s, respectively (Figure 3).

Classification of the Main Categories by the Geographical Area of Approval

The frequency of the categories by the geographical area of approval shows that the highest frequency at the national and regional levels is related to “carpet production infrastructure”, whereas there is no FI in this category at the international level. The highest frequency at this level is related to “handmade carpet exports and imports” (Figure 4) and the highest frequency is related to the national level with 477 FIs.

DISCUSSION

The cultural, economic, social, and national importance of handmade carpets, as well as their role in the livelihood of rural families, requires a transformation-oriented investigation, especially an exploration of FTIs. In a transformation-oriented innovation policy, we go beyond the narrow realm of ISs to the FIs beyond the structure of KIS. To understand transformative changes, we should transcend the personal product or innovation processes at the corporate level so that a new form of actors and institutions and a new style of performance are required in different production and consumption sectors. In this research, the FIs identified by the transformation analysis were classified into six main categories of “carpet authority”, “carpet sales and maintenance inside Iran”, “handmade carpet exports and imports”, “carpet production infrastructure”, “handmade carpet production”, and “sanitary-therapeutic category”. The frequency of the FIs reveals that the

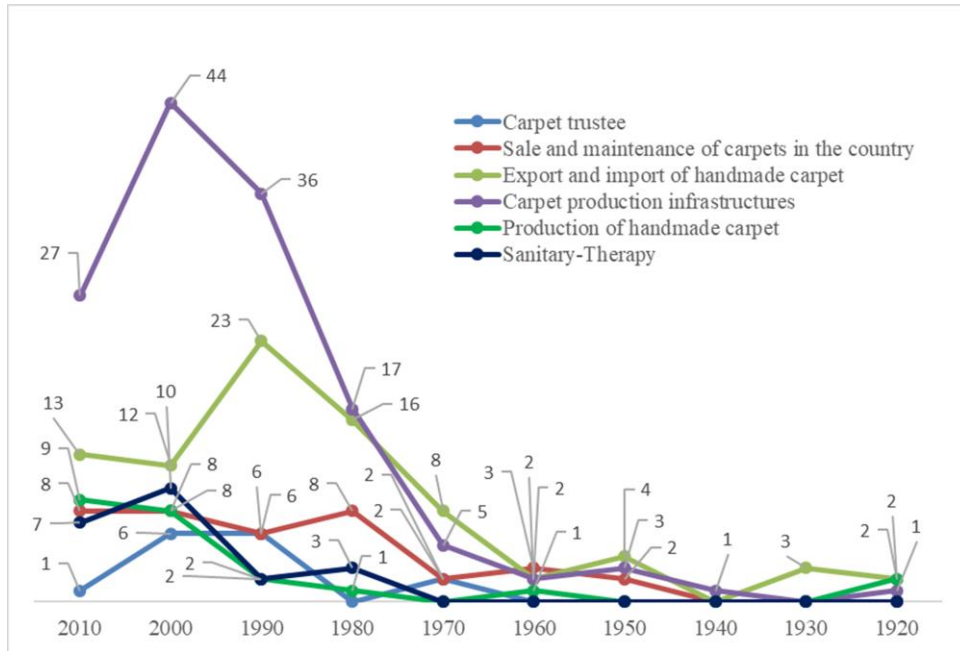


Figure 3. Classification of the main categories by the approval date of the TIs.

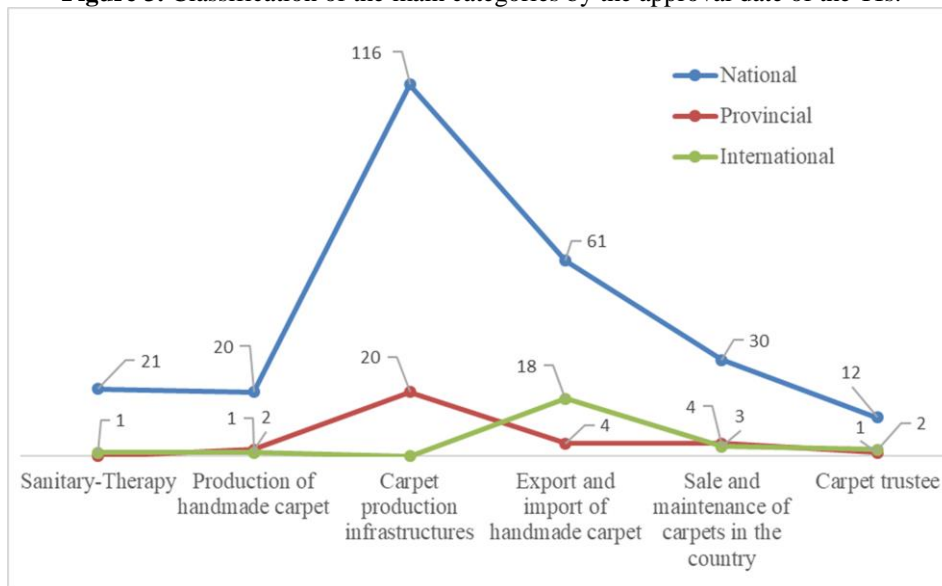


Figure 4. Classification of the main categories by the geographical area of approval.

category of “carpet production infrastructure” has the highest number of FIs in which the highest frequency is related to “bylaws and resolutions”. A more precise look at the subcategories of this category shows that the least attention is paid to the support of producers with only four FIs regardless of the high frequency of the financial support of carpet production and despite the significant role of carpet weavers in the HCI. The results as to the FIs related to production support indicate that there are

many FIs for supporting production and creating employment in the carpet industry. This is consistent with the report of AssariArani and Rezagholizadeh (2009) regarding government support for production. However, based on the interviews with the rural weavers, only very few weavers are aware of very few supports. A more precise examination of the supports reveals that the channel by which the users are informed about the supports starts from the departments and organizations related to

the county governorship and leads to the rural district governorships and councils. In most cases, the rural people expressed that the council members and rural district governors provided information to their own family members, relatives, and friends, and the other carpet weavers got informed only when the support was terminated or the deadline for application had passed. Some weavers suggest that the loan payment conditions should be changed as per the condition of the rural people and the fact that most rural people have no governmental job thus they cannot provide a civil servant guarantor. Some weavers have had to give a part of their loan to guarantors to compel them to guarantee their loans.

After the main category of “carpet production infrastructure”, the category of “handmade carpet exports and imports” was found to have the highest frequency of FIs. The results show that exports, in general, and carpet exporters, in particular, enjoy extensive supports through providing export permits and incentives, providing export subsidies, giving foreign exchange obtained from the export to the exporter, and allowing importation of commodities by the foreign exchange obtained from carpet export. This shows the great attention of the government to carpet exports. Data on the FTIs indicate that the government has supported the HCI in the 1950s, 1960s, 1970s, and 1990s by purchasing handmade carpets for governmental buildings, whereas in recent decades there are only some resolutions on holding permanent exhibitions for the support of the domestic purchase of handmade carpets. Paying attention to the domestic purchase of carpet and policymaking for it in the present sanction conditions and other conditions will contribute to supporting carpet producers and the sustainability of this precious art.

In the main category of “handmade carpet production”, most FIs are related to the support of carpet-weaving cooperatives, complexes, and workshops with just limited attention to self-employed producers. The interviews show that most weavers in rural

areas are wage-workers and self-employed; this is consistent with the report of Amiri Aghdaie and Zare Zardeini (2012) concerning weaving in the small weaving workshop, making it even more necessary to make plans and policies for them. Also, this is consistent with the report of Emodi and Madukwe (2008), regarding separate of government policies and actions from cultural practices, detach to the cultural and tradition practices from policies and with the report of Varmazyari *et al.*, (2018) regarding poor governmental policymaking and planning.

In view of the above issues, the followings are suggested:

The government should have more oversight of the support and facilities it provides to weavers.

Facilities such as loans and other financial support to a group should be planned according to their conditions.

The Social Security Organization should regulate the payment of insurance according to the conditions of weavers, who sometimes receive their wages after one year.

Limitation

The most important limitations of this study are as follows:

Because the FTIs in the HCI have been examined, results cannot be generalized to other industries.

Results might have been affected by the concurrence of data collection with Covid-19 disease that restricted access to all actors.

REFERENCES

1. Assari Arrani, A. and Rezagholizadeh, M. 2009. A Study of Protective Policies and Comparative Advantage in Handmade Carpet Production. *Knowl. Dev.*, **28(16)**: 45-76. (in Persian with an English Abstract)
2. Amiri Aghdaie, S. F. A. and Zardeini, H. Z. 2012. A SWOT Analysis of Persian Handmade Carpet Exports. *Int. J. Bus. Manag.*, **7(2)**: 243 .
3. Varmazyari, H., Razani, B. and Moradi, M. 2018. Exploration of Challenges and Solutions for Development of Iranian Rural



- Handmade Carpet: Implications for Policymaking. *Goljaam*, **14(33)**: 83-103. (in Persian with an English Abstract)
4. Mahboobi, M. R. and Avarand, A. 2017. Production Inhibitors of Turkmen Handmade Carpet Enterprises in Gonbad Kavuos County. *Journal of Entrepreneurial Strategies in Agriculture*, **3(6)**: 16-23. (in Persian with an English Abstract).
 5. Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S. and Rickne, A. 2008. Analyzing the Functional Dynamics of Technological Innovation Systems: A Scheme of Analysis. *Res. Policy*, **37(3)**: 407-429.
 6. Bilgin, M. H., Demir, E., Lau, M. C. K., Kin-Man To, C. and Zhang, Z. M. 2011. The Turkish Handmade Carpet Industry: An Analysis in Comparison with Select Asian Countries. *J. Text. Inst.*, **102(6)**: 514-526 .
 7. Birks, M. and Mills, J. 2015. *Grounded Theory: A Practical Guide*. SAGE Publications Ltd., 208 PP.
 8. Borremans, L., Marchand, F., Visser, M. and Wauters, E. 2018. Nurturing Agroforestry Systems in Flanders: Analysis from an Agricultural Innovation Systems Perspective. *Agricultural Systems*, **162**: 205-219.
 9. Deegan, J., Solheim, M. C., Jakobsen, S. E. and Isaksen, A. 2021 OR 2022??. One Coast, Two Systems: Regional Innovation Systems and Entrepreneurial Discovery in Western Norway. *Growth Change*, **53(2)**: 490-514.
 10. Edquist, C. 2013. *Systems of Innovation: Technologies, Institutions and Organizations*. Routledge: London, UK, 446 PP.
 11. Edquist, C. and Johnson, B. 1997. *Institutions and Organizations in Systems of Innovation*. In: "*System of Innovation*". eBook ISBN 9780203357620, Routledge, PP. 41-63.
 12. Emodi, I., and Madukwe, M. 2008. A Review of Policies, Acts and Initiatives in Rice Innovation System in Nigeria. *J. Agric. Ext.*, **12(2)**: 76-83.
 13. Fieldsend, A. F., Cronin, E., Varga, E., Biró, S. and Rogge, E. 2021. 'Sharing the Space' in the Agricultural Knowledge and Innovation System: Multi-Actor Innovation Partnerships with Farmers and Foresters in Europe. *J. Agric. Educ. Ext.*, **27(4)**: 423-442
 14. Floersch, J., Longhofer, J. L., Kranke, D., and Townsend, L. 2010. Integrating Thematic, Grounded Theory and Narrative Analysis: A Case Study of Adolescent Psychotropic Treatment. *Qual. Soc. Work*, **9(3)**: 407-425.
 15. Garzik, L. 2022. *Successful Innovation Systems. A Resource-Oriented and Regional Perspective for Policy and Practice*. Springer Cham, PP. 39-56.
 16. Hekkert, M. P., Suurs, R. A. A., Negro, S. O., Kuhlmann, S. and Smits, R. E. H. M. 2007. Functions of Innovation Systems: A New Approach for Analysing Technological Change. *Technol. Forecast. Soc. Change*, **74(4)**: 413-432.
 17. Johnso, A. 2001. Functions in Innovation System Approaches. *Paper Presented at the Nelson and Winter Conference*, Aalborg, Denmark.
 18. Islamic Parliament Research Center, 2021. Legal. Access through: <https://rc.majlis.ir/en>
 19. Kuhlmann, S., Shapira, P. and Smits, R. 2010. Introduction. A Systemic Perspective: the Innovation Policy Dance. In: "*The Theory and Practice of Innovation Policy*". Chapter 1, An International Research Handbook, Edward Elgar Publishing, PP. 1-22 .
 20. Lamprinopoulou, C., Renwick, A., Klerkx, L., Hermans, F. and Roep, D. 2014. Application of an Integrated Systemic Framework for Analysing Agricultural Innovation Systems and Informing Innovation Policies: Comparing the Dutch and Scottish Agrifood Sectors. *Agric. Sys.*, **129**: 40-54.
 21. Lundvall, B. A., 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter Publishers, London. ISBN 1-85567-063-1, pp.342.
 22. North, D. C. 1991. Institutions. *J. Econ. Perspect.*, **5(1)**: 97-112.
 23. Pourmoradian, S., Vandshoari, A., Omarzadeh, D., Sharifi, A., Sanobuar, N. and Samad Hosseini, S. 2021. An Integrated Approach to Assess Potential and Sustainability of Handmade Carpet Production in Different Areas of the East Azerbaijan Province of Iran. *Sustainability*, **13(4)**: 2251.

24. Röling, N. and Engel, P. 1991. The Development of the Concept of Agricultural Knowledge and Information Systems (AKIS): Implications for Extension. In: "Agricultural Extension: Worldwide Institutional Evolution and Forces for Change", (Eds.): Rivera, W. and Gustafson, D. Elsevier, PP. 125-139.
25. SCAR. 2015. *Agricultural Knowledge and Innovation Systems towards the Future: A Foresight Paper*. Standing Committee on Agricultural Research (SCAR), Collaborative Working Group AKIS, Brussels, 148 PP.
26. Strauss, A., and Corbin, J. M. 1997. *Grounded Theory in Practice*. Sage. 280p.
27. Van Mierlo, B., Arkesteijn, M. and Leeuwis, C. 2010. Enhancing the Reflexivity of System Innovation Projects with System Analyses. *Am. J. Eva.*, **31(2)**: 143-1.
28. Weber, K. M. and Rohrer, H. 2012. Legitimizing Research, Technology and Innovation Policies for Transformative Change: Combining Insights from Innovation Systems and Multi-Level Perspective in a Comprehensive 'Failures' Framework. *Res. Policy*, **41(6)**: 1037-1047.
29. Wiecek, A. J. and Hekkert, M. P. 2012. Systemic Instruments for Systemic Innovation Problems: A Framework for Policy Makers and Innovation Scholars. *Sci. Public Policy*, **39(1)**: 74-87.
30. Wiecek, A. J., Negro, S. O., Harmsen, R., Heimeriks, G. J., Luo, L. and Hekkert, M. P. 2013. A Review of the European Offshore Wind Innovation System. *Renew. Sust. Energy Rev.*, **26**: 294-306.
31. Woolthuis, R. K., Lankhuizen, M., and Gilsing, V. 2005. A System Failure Framework for Innovation Policy Design. *Technovation*, **25(6)**: 609-619.
32. Yin, Y. R. K. 2012. Case Study Methods. In: "APA Handbooks in Psychology, APA Handbook of Research Methods in Psychology", (Eds.): Cooper, H., et al. Vol. 2: Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological, American Psychological Association, PP. 141-155.
33. Yin, Y. R., K., Zhang, X., Peng, D. and Li, X. 2009. Model Validation and Case Study on Internally Cooled/Heated Dehumidifier/Regenerator of Liquid Desiccant Systems. *Int. J. Therm. Sci.*, **48(8)**: 1664-1671.

تحلیل نهادهای دگرگونی در نظام دانش و نوآوری صنعت فرش دستباف

۱. احمدی فرد، و ه. فرهادیان

چکیده

صنعت فرش دستباف ایرانی دربرگیرنده ابعاد مختلف اقتصادی، اجتماعی و ملی می‌باشد. تنوع غنی از فرش‌های ایرانی نشانه‌ای از فرهنگ‌ها و سنت‌های مختلف موجود در کشور است. به منظور پایداری نظام دانش و نوآوری صنعت فرش دستباف، علاوه بر پرداختن به رویکردهای غالب نظام‌های نوآوری بایستی به رویکرد تحول‌گرا که بر تغییر کل نظام‌های تولید و مصرف می‌پردازد، توجه نمود. هدف این تحقیق شناسایی نهادهای رسمی دگرگونی و طبقه‌بندی آن‌ها در مقوله‌های اصلی و تجزیه و تحلیل آن‌ها براساس مراحل مختلف تولید، دهه‌های تصویب، نوع نهاد و سطوح جغرافیایی تصویب می‌باشد. نتایج نشان داد که ۳۱۶ نهاد رسمی در



صنعت فرش دستباف وجود دارد. براساس کدگذاری باز، ۳۷۲ مفهوم از ۵۰۹ مفهوم استخراج شده از نوع نهادهای رسمی دگرگونی بودند. براساس کدگذاری محوری، نهادهای رسمی به شش مقوله اساسی شامل «متولی فرش»، «فروش و نگهداری فرش در داخل کشور»، «صادرات و واردات فرش دستباف»، «زیرساخت‌های تولید فرش»، «تولید فرش دستباف» و «بهداشتی-درمانی» تقسیم‌بندی شدند. پس از این مرحله، ماتریس مقوله‌های اصلی براساس مراحل مختلف تولید ترسیم گردید. در بین مقوله‌های اصلی بیشترین فراوانی مرتبط با «زیرساخت‌های تولید فرش» و زیرمقوله «تأمین مالی فرش» است. با وجود تعداد زیاد نهادهای رسمی در زمینه حمایت از تولید، با این حال بافندگان فرش به عنوان قشر اصلی تولید به دلیل عدم اطلاع از حمایت‌ها و شرایط پرداخت وام، در طی سال‌های بافت، حمایت‌های کمی دریافت نموده‌اند. از سوی دیگر در نهادهای رسمی دگرگونی بررسی شده، تأکید زیاد بر صادرات و حمایت از صادرکنندگان و شیوه‌های تولید تعاونی و کارگاه‌ها مشاهده گردید که نشان از لزوم سیاست‌گذاری و حمایت از فروش داخلی و شیوه‌های تولیدی مزدی خانگی و خویش‌فرمایی می‌باشد.