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Effectiveness Function of Entrepreneurial Outsourcing Regarding Bureaucratic Culture Themes in Golestan Gas Company

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ABSTRACT

Entrepreneurial outsourcing is a new theory in entrepreneurship and a tool for sharing entrepreneurial investment risks. This concept is considered one of the macro-functional dimensions of companies at the content level, which can achieve greater integration and effectiveness by creating coordination with the dimensions of organizational culture. In fact, the importance of entrepreneurship in today's economy is the basis for development and sustainability in the face of constant environmental change, and developed countries seek to increase the level of competitive performance by building a link between the cultural dimensions of the organization and entrepreneurship. The purpose of this research is to choose the practical function of entrepreneurial outsourcing under themes of bureaucratic culture in Golestan Gas Company by analysis CARD and developed theory of rough (ERST). The statistical population of the study included two qualitative and quantitative sections, in which 14 experts in the fields of management and entrepreneurship participated in the form of panel members. In the quantitative section, 25 managers and deputies in different layers of the gas company in Golestan province also participated. The basis of this study's analysis was content analysis to identify the functional components of entrepreneurial outsourcing and propositions of bureaucratic culture themes. Raff's analysis set was also used for matrix analysis to identify the most important stimulus for promoting entrepreneurial outsourcing in the first section and in the second section so as to select the most effective entrepreneurial outsourcing function under the theme of bureaucratic culture. The results show that the most important proposition of bureaucratic culture is the proposition of codified systems and the most effective function of entrepreneurial outsourcing in Golestan Gas Company is strategic.

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1. Introduction

One of the most significant achievements of the traditional paradigm of public administration was the mere focus on bureaucracy as a structural basis that paid particular attention to authority and behavioral standardization. Contrary to this paradigm, many critics, without denying all the positive effects of the traditional paradigm, developed the management-oriented dimension to create a new paradigm for public administration called modern government management. The stark difference between the new management paradigm and the traditional paradigm was the difference in market-based approaches and entrepreneurial management (Forouharfar, 2020). Modern government management theorists have focused on the organization's ways of interacting with the market, criticizing the mere emphasis on hierarchy and ignoring the private sector. Nevertheless, the main problem was forming a culture that contrasts with the new paradigm approach because the structure and strategies have a long-standing relationship with culture, and changing one section alone cannot lead the organization to a new paradigm. Therefore, creating alignment between cultural dimensions and even bureaucratic cultural dimensions can help increase the effectiveness of the company's macro functions in the external environment (Volkova and Chiker, 2020). Therefore, many researchers such as Gayarre et al. (1992), Molnar (2018), and Santana (2017) have defined organizational culture as a miniature of the macro processes of the organizational environment and confirmed the connection between the cultural dimensions of the organization and new approaches to modern government management such as entrepreneurship. Recognizing and evaluating an organization's culture as a platform for organizational change play a vital role in the success of organizations. Culture in an organization is the personality of a human being forming the basis of its existence and causing the organization's cohesion in moving toward the goals. Because organizational culture shapes the behavior of members of the organization, including employees and managers at different levels, it can significantly affect the organization's ability to create change and strategic orientation (Moghimi, 2010). Without an influential organizational culture, one cannot expect entrepreneurial activities, mainly entrepreneurial outsourcing functions, because the cultural context as an underlying factor or even the basis of other necessary platforms for entrepreneurship, requires profound changes in the knowledge of beliefs, rights, customs, and ethics in an organization (Hosini and Baddast, 2011). Outsourcing is a tool to reduce and divide the risks and risks of investing in businesses, especially in a competitive environment. A company can outsource various business activities by selecting different contractors and developing its entrepreneurial functions (Banerjee et al., 2019). In this way, while reducing costs and using the capital and workforce of other companies, it reduces risks such as the risk of technological disability, technical knowledge, and skills and enables the company to outsource so as to keep future costs low by choosing the most competitive bidding contract (Bruccoleri et al., 2019).

It should be noted that the alignment of bureaucratic culture in structures with a dual nature of public and private, such as state-owned companies, has different and sometimes multidimensional dimensions than other organizational cultures in structures with a state nature (Sepehvand et al., 2019). Because state-owned companies are market-based in nature, such as monetization, they are structurally subordinated to the government and report under the supervision and accountability of the cabinet. In this situation, state-owned companies such as the gas company must receive the necessary funds based on the services they provide to customers, which is why the structure suffers from a kind of dual conflict in content and performance. Often, the organizational culture in such structures as a bureaucratic culture seeks to increase values of standardization and control. Nevertheless, on the other hand, the development of practical functions to reduce the pressure on the government and reduce the scope must be part of its innovative activities under objectives such as agility, efficiency, reducing costs, and outsourcing to pursue the goals of the market sector, which are the nature of companies in a competitive market environment. Therefore, this study, understanding this issue and the nature of bureaucratic culture in these structures, seeks to select the most effective entrepreneurial outsourcing functions through *Rough* analysis.

2. Literature review

2.1. Bureaucratic culture

The organizational culture in a harmonious definition, is a unique pattern of values. It is common institutionalized norms and procedures among the people of society such as the organization, which leads to coherent activities such as social behavior, interpersonal

interactions, and organizational effectiveness and gradually forms symbols for the people of an organization to follow (Karakasnaki et al., 2019). Bureaucratic culture is seen as a unique feature of government organizations. The generic features of the bureaucratic culture are as follows. Management style is relatively authoritarian, a high degree of control, top-down communication, individuals search for stability, limited initiatives, and centralized decision making (Claver et al., 1999). In contrast, empowering leadership facilitates empowered work environments by enabling and encouraging workers in their work roles, including supporting, coaching, informing, and developing the participative decision-making to enhance the meaning and significance of work (Raub and Robert, 2010). Jogulu (2010) confirmed the organizational culture related to leadership style, and there are significant differences between leadership style and culture of the group. In a specific organizational culture dimension, Taormina (2008) has found that leader behaviors to be more control-oriented in bureaucratic culture. This indicates that the bureaucratic culture is in line with the behavior of control-oriented leaders.

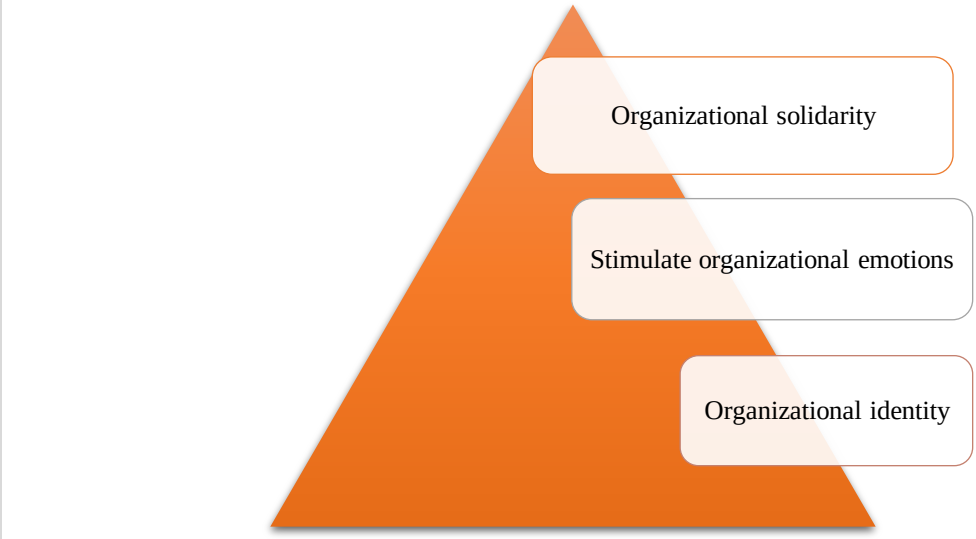

Figure 1. Consequences of bureaucratic culture.

In developing these dimensions, Siswadi (2012) states that solidarity among the organization members and increasing the level of identity awareness among the organization members can strengthen the level of emotions in more outstanding commitment to the goals and strategies of the organization.

2.2. Entrepreneurial outsourcing

Outsourcing is a decision taken by an organization to provide or sell its assets, human resources, and services to a third party, the contractor must undertake to provide or manage the assets and services listed in the contract in return for a specified income and in a given time (Embleton and Wright, 1998; Javalgi et al., 2009). The theoretical concept of outsourcing refers to the transaction cost theory (Coase, 1937; Williamson, 1979).

In this regard, outsourcing as a "make-or-buy" decision refers to the attempts implementing to acquire services from external providers or to handle internal functions with the help of another firm (Grover et al., 1994; Kalaignanam and Varadarajan, 2012). Instead, it can be defined as accomplishing firms' internal tasks by third elements (commercial and service companies outside the organization), building systematic and purposeful collaboration with external partners in order to buy services or share tasks and responsibilities (Willems and Van Dooren, 2011; Yeboah, 2013). Outsourcing can be the delivery of services or tools for organizations. It can also occur in the case of a manufacturing or service organization. The important thing about outsourcing service organizations is that the vital activities of the service organizations should be outsourced scrupulously and carefully because the nature of these organizations is based on their services, and any wrongdoing in outsourcing and reducing the effectiveness of the activities can undermine the nature of goals in the organization (Ndubisi, 2013). Although there are different theories in outsourcing, the logic of these definitions is the same, and they generally carry the

same meaning. The main theories of outsourcing can be cited as follows.

In line with Kakumanu and Portanova (2006), outsourcing is, in fact, a fundamental change in the structure of tomorrow's international organizations, pointing out that there is no more necessity for big companies, governmental agencies, hospitals, and major universities to employ a large number of people. Such institutions become organizations that gain excellent revenues and dependable results because they only concentrate on what they are assigned to do and do things strictly related to their organizational goals. They do things in the scope of their activities, and they are familiar with the intricacies; other services of such organizations entrusted to external entities. Van Nattem and Proveniers (2012) have defined exploiting sustainable competitive advantage, innovation, and organizational leadership through outsourcing and defined entrepreneurial outsourcing as a multidimensional structure based on intermittent and sustainable valuation techniques. Based on the theoretical foundations, the research questions are:

1. What are the most important propositions of bureaucratic culture themes based on the process of gray hierarchical analysis?
2. What are the most critical components of entrepreneurial outsourcing based on the gray hierarchical analysis process?
3. What are the most effective functions of entrepreneurial outsourcing under the themes of bureaucratic culture in Golestan Province Gas Company based on the decision tree analysis (CARD) and the developed Rough theory (ERST)?

3. Methodology

Since each study is defined based on three dimensions of research results, objectives, and data type, the study was developmental in terms of results. The concept of entrepreneurial outsourcing effectiveness regarding bureaucratic culture themes theoretically has no coherent framework or integrated theoretical structure. The present study contributed to developing the theoretical foundations of this concept in promoting entrepreneurial outsourcing effectiveness. Considering the research objective, the study was descriptive as it aimed to explain the concept in the target population. Finally, the data collection rationale was inductive–deductive since, relying on inductive approaches, the qualitative part first examined the theoretical foundations of the bureaucratic culture themes and entrepreneurial outsourcing criteria. Then, the deductive approach was adopted to explain the identified themes and components at the community level.

3.1. Statistical population and sampling method

Given the nature of the study, the statistical population was divided into qualitative and quantitative sections. In the qualitative section, the target population encompassed all studies on the concerned topic and 14 experts in the field of entrepreneurship and public administration at the university level, who contributed to the meta-combination, critical assessment, and Delphi analysis methods to detect bureaucratic culture themes and outsourcing components and confirm theoretical saturation of the detected criteria. Accordingly, the homogeneous sampling method based was used to differentiate experts as panel members. In the quantitative section, 25 managers and deputies having different positions in Golestan Gas Company explained the research topic in the target community. It is worth noting that the size of the statistical population was in line with scientific theories of the ERST. Some researchers (e.g., Zhang et al., 2016; Pavlak, 2005) predicted the optimal sample size to be 15–25 persons. They also added that the convenience sampling method needed to be used concerning the nature of the study. The group in the quantitative section was to explain the results of the qualitative section in terms of entrepreneurial outsourcing policies and strategies. Since the concerned method was an analysis of the complex systems at certain levels and should have been performed based on a specific benchmark such as the participants' experience or expertise, 15–30 persons were included to avoid tremendous, incomprehensible responses to the matrix questionnaire.

3.2. Validity

Content validity ratio (CVR) was used to confirm the content validity of the developed questionnaires, according to which 10 panel members were asked to use the three options "necessary", "useful but unnecessary", and "unnecessary" in their evaluations. Each participant was asked to select one of the options mentioned above to confirm the questionnaires' validity. According to the findings, all the themes and components surpassed the set standard CVR.

3.3. ERST

Rough test exploits information systems to compile knowledge and manage inaccurate data and encompasses

four main dimensions: knowledge representation, set approximation, knowledge reduction, and rule comparison. The information system contains environmental attributes and a decision attribute, as shown below:

$$IS = (U.\Omega.W.f) \quad (1)$$

where U is a non-null set with limits and *n* members $\{p_1.p_2.\ldots.p_n\}$; Ω is a non-null set with limits and *m* members $\{q_1.q_2.\ldots.q_n\}$; W represents multiplication range of $\Omega \times U$; f is $U \times \Omega \to W$ representing information function for $q \in \Omega$, $p \in U$, $f(p.q) \in w$, $(x.y) \in U \times U$; and x and y stand for two objects.

Discernibility indicates the failure to differentiate objects in a distinct set, resulting in similar information derived from different observations. The discernibility of x and y is as follows:

$$IND(Q) = \{(x.y) \in U \times U: f(x.q) = f(y.q) \forall_q \in Q\} \quad (2)$$

A discernibility relationship divides the global standard into a group of equivalent classes. The equivalent classes in Equation (2) are IND called Q-elementary set in IS. $[x]_{IND(Q)}$ is equal to the Q-elementary set containing x objective objects ($x \in U$). The objects in the elementary sets include objects, which can be distinguished concerning conditions. However, none of such objects can fit in a specific set according to the conditions. Approximations of a set are defined in terms of lower and upper approximations. Lower approximation and upper approximation are two basic mathematical concepts used to detect information in inaccurate data. Lower approximations refer to objects belonging to a specific subset of the target set, and upper approximation encompasses objects that may not belong to a specific subset. In this study, $Q \subseteq U$ and $X \subseteq U$. Q is a lower approximation and an upper approximation. The lower approximation X(QL) and the upper approximation X(QU) are given by Equation (3):

$$X(QL) = \{x \in U: [X]_{IND(P)} \subseteq X\} \quad (3)$$

$$X(QU) = \{x \in U: [X]_{IND(P)} \cap X \neq \phi\} \quad (4)$$

In contrast to the upper and lower approximations, there is also a boundary region. In other words, if an object is classified as a boundary region, it is impossible to detect to which set it belongs. These sets are based on the discernibility of the elementary sets, as discussed in $IND(Q)$. $RED(Q)$ and $CORE(Q)$ are used to decrease information. Attribute reduction is conducted to eliminate irrelevant or duplicate attributes without reducing the approximation quality of an information system regarding the main set of attributes (Pie et al., 2010). The discernibility of a set of attributes remains unchanged when unrelated or duplicate attributes are removed. *Reduct* is the minimum attribute of a subset, which can classify similar components as a whole; hence, attributes not belonging to a *Reduct* are unnecessary in classifying components. CORE is the common part or chapter of all *Reducts* and is considered the most important subset of attributes. A discernibility matrix is a set distinguishing between two objects or two sets. The relationship between the *Reducts* and CORE is as follows:

$$CORE(Q) = RED(Q) \quad (5)$$

Rough set theory (RST) provides useful information; however, it cannot be observed visually. The useful rules are presented according to a new decision-making table, which uses a specific *Reduct*. Each decision rule describes only a part of the data table and presents the number of records corresponding to the rules. Equation (6) presents the support for a rule, where x is equal to the identified specific rules, and CARD is the power of the set.

$$Supp_x = CARD[(\Omega(x) \cap W(x)] \quad (6)$$

On the other hand, Equation (7) represents the power of the rule. The ruling power is used to indicate the ratio of a rule to the information table. The support is divided by the objects in the information table. The greater the power of a rule is, the more information is provided by a database that can be classified according to decision-making rules.

$$Strength = Supp_x/CARD(U) \quad (7)$$

Furthermore, coverage is another significant criterion to measure the function of the ERST, which represents the credibility of a decision and is calculated by:

$$\text{Coverage}(W) = \frac{\text{Supp}(W)}{\text{CARD}(W)} \quad (8)$$

Supp(W) and CARD(W) show the total number of objects and supports for a particular class of decisions, respectively. Finally, Equation (9) indicates the accuracy of an approximation from the set X regarding the attribute set Q, defined as the ratio of the lower approximation power to the upper approximation power.

$$\text{Accuracy} = \left[\sum \text{CARD}(X(QL) \Big/ \sum \text{CARD}(X(QU)\right] \quad (9)$$

Two significant problems emerge in performing RST: (1) estimating time for creating *Reduct* and (2) determining the best *Reduct* in a set. Accordingly, CARD is used to manage *Reduct* creation. In the present study, CARD software is a decision tree with binary branches, which works well in similar attributes and rates the significance of the attribute to contribute to the entrepreneurial outsourcing effectiveness in the target community.

4. Classification and decision tree

The decision tree is a self-descriptive model. In other words, it depicts classification graphically in the absence of an expert in the field. Regarding its simplicity and comprehensibility, it is well-known in data mining. Noteworthy, when there are many tree nodes, the graphical representation and interpretation can be somehow complicated. Each internal node stands for a variable, and each edge represents a possible value for the concerned variable. A leaf node shows the predicted value of a target variable (the variable to be predicted). In other words, the leaves indicate the final classification, and the path to a leaf shows the process of reaching that node. The learning process of a tree, in which nodes and edges are determined, is usually initiated by examining the value of an attribute in the first step and splitting a data set into subsets related to the values of that attribute. The process is repeated recursively in each subset obtained from splitting. In other words, several subsets are created in a subset based on the value of another attribute. The splitting operation stops when further splitting is no longer efficient, or classification can be applied to all samples in the obtained subset. The tree producing the minimum number of leaves and edges would usually be the final option in this process.

CARD is first divided into three parts. In the first phase, it is a huge tree growing based on the recursive partitioning of the data set. This tree contains some terminal nodes. Although the tree generally describes the data set, it usually provides unacceptable predictive results for new samples. Accordingly, detecting a smaller tree with higher predictive power seems necessary without losing the terminal node, the parent node (c), and the offspring node (e).

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$$Pa = P(J) + a|\bar{J}| \Leftrightarrow a = Pa - P(J)/\bar{J} \quad (10)$$

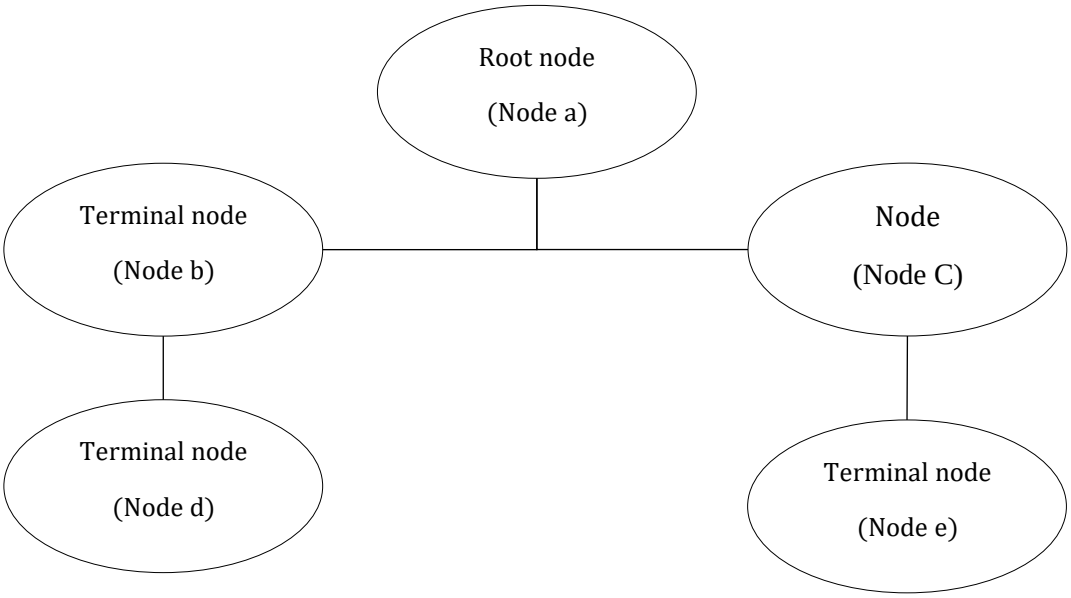

Figure 2: Classification structure and decision tree CARD (groups c, d, b, and e are leaves).

where P(J) is the calculated replacement error, which is for the wrong classification error in CARD; $|\bar{J}|$ is the size of the subtree of *a* complexity parameter, and the parameter is complexity. During the pruning phase, *a* accepts values from 0 to 1, and the sequence size of the nested trees decreases (Caetano et al., 2005). Among all subtrees of the same size, only one tree is equal to Equation (10). The last phase is to select the optimal tree size equal to the smallest prediction error for new samples.

The prediction errors are usually estimated in one of the following ways: independent tests and cross-validation. Independent tests can be used when the primary data set is large enough to be divided into a test set and a practice set. When the elementary data set is not large enough, the cross-validation method (V-fold) is a must. The final prediction error equals the total rate of the wrong classification for a tree of any size, and the optimal tree is the simplest tree with the minimum cross-validation error in the standard cross-validation range (Brieman et al., 1984).

5. How to determine bureaucratic culture themes and entrepreneurial outsourcing components

To specify decision-making criteria and components, create a decision tree model, and determine the optimal point for understanding the bureaucratic culture themes to improve the effectiveness of entrepreneurial outsourcing, the research data need to be extracted logically based on the theoretical foundations of the study. In this regard, one of the effective methods is the content analysis of relevant sources, in which the keywords and criteria related to the research variable(s) are first determined by taking notes from each source. Tables 1 and 2 are considered to detect the bureaucratic culture themes (x) and entrepreneurial outsourcing components (y).

5.1. Detecting bureaucratic culture themes (x)

Bureaucratic culture is one type of organizational culture, which, following new theories and recent studies, has become increasingly significant in management and formed one of the key management issues. Bureaucratic culture guarantees stability and, consequently, the understanding of current social issues and their solutions. Bureaucratic culture encompasses rules enforced by standardized tendencies, practices, and behaviors (Dwiyanto, 2011: 6). Bureaucracy is mostly interpreted according to Max Weber's definition of bureaucracy, which is based on formal and hierarchical structures underpinned by standardized procedures governing individuals' actions. Accordingly, individuals experience less freedom in their actions and authority. The existence of rules and regulations and the integration caused by authorities make organizational functions highly inflexible (Sepahvand et al., 2009: 30). Different

dimensions have been proposed for bureaucratic culture; however, the bureaucratic culture contains the following dimensions (Table 1).

The definitions of the main dimensions of bureaucratic culture are briefly presented in Table 2.

Table 1. The main dimensions of bureaucratic culture.

Bureaucratic culture dimensions	References
Integration	Teräväinen and Junnonen (2019); Karlsson et al. (2018)
Criterionaly	Nguyen et al. (2019); Jain (2015); Mousavi et al. (2020)
Logical	Volkova and Chiker (2020); Saha and Kumar (2018)
Modified	Saha and Kumar (2018); Belak (2016); Ghaffari and Rostamnia (2017)

Table 2: Definitions of bureaucratic culture dimensions.

Bureaucratic culture dimensions	Description
Integration	A coherent and synergistic set of structures, systems, methods, and procedures; an integrated network of authority and management; and the general agreement of employees on critical organizational issues and coordination and coherence among organizational units (Karlsson et al., 2018: 13).
Criterion	Observation of rules and regulations and instructions, compliance, the existence of formal relations and defined chains, discipline, organized affairs, and the existence of specific positions and career paths (Mousavi et al., 2020: 277).
Logical	Establishment of reasonable and purposeful relationships among jobs, formal standards, availability of process and procedure metrics, consistency and predictability of work procedures, reengineering, and consistent process improvement (Belak, 2016)
Modified	Efficient and functional systems, purposeful and systematic interactions of subsystems, consideration of communication infrastructures, intelligent and accurate information networks (Ghaffari and Rostamnia, 2017: 311).

5.2. Detecting entrepreneurial outsourcing components (*y*)

In this phase, the meta-analysis method was used to detect the entrepreneurial outsourcing components in this study since there is no specified foundation and exact framework. Accordingly, all relevant studies on entrepreneurial outsourcing published during 2015–2020 were first screened to extract the relevant components. The following screening procedure was adopted in the present study.

As illustrated in Figure 2, 31 primary sources were detected. After several screening phases in terms of content, title, and analysis, 12 studies with appropriate and relevant content, title, and analytical procedure were selected. Then, concepts should be broken down into components according to Attride-Stirling's (2001)

method to specify the entrepreneurial outsourcing components in the form of checklists. According to this method, the 12 studies approved for both research criteria were assessed using the following 10 critical research benchmarks: research objectives, the rationale of research method, research design, sampling, data collection, generalization, analysis accuracy, the transparent description of research findings theoretically, and the significance of the study. To this end, 14 experts participated in the analysis process to achieve a more coherent understanding of the nature of the research. As noted, the entrepreneurial outsourcing components were determined based on Attride-Stirling's (2001) method using meta-analysis and critical evaluation checklist.

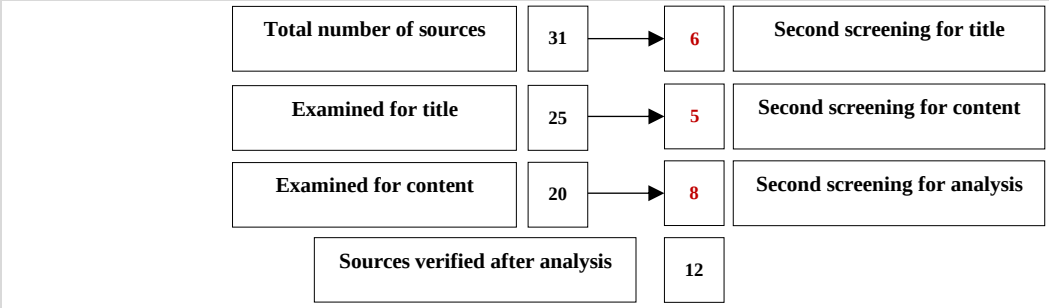

Figure 3: Screening analysis of research proportionate.

Next, concepts should be broken down into components according to Attride-Stirling's (2001) method to specify the entrepreneurial outsourcing components in the form of checklists. According to this method, the 12 studies approved by research criteria were assessed using the following 10 critical research benchmarks: research objectives, the rationale of research method, research design, sampling, data collection, generalization, analysis accuracy, the transparent description of research findings theoretically, and the significance of the study.

According to the total scores calculated for the selected studies and given the inclusion criteria set in the present study for studies with scores ≥ 30, the four studies, namely Ghasemi et al. (2016), Banerjee et al. (2019), Globerman and Vining (2017), and Monsson and Jørgensen (2016), were excluded. Then, Attride-Stirling's (2001) method was used to extract the research themes, and the following scoring method was used to determine the entrepreneurial outsourcing components. According to this method, all sub-criteria extracted from the texts of the included articles are listed in columns, and the authors are listed in the rows (see Table 4). In this table, if the researcher used the concerned sub-criteria in the columns, a tick mark (☑) is inserted. Finally, the sub-criteria scores are summed up, and the scores above the mean are selected as the research components.

As observed, three components of human resource functions, productivity functions, and strategic functions have the highest frequencies; hence, they were examined in this study as the main criteria for selecting the most effective entrepreneurial outsourcing function in Golestan Gas Company. The following table presents the entrepreneurial outsourcing functions regarding the analyses of the theoretical foundations in the selected research.

6. Findings

6.1. Delphi analysis

In this phase, to specify the research components in the model, the detected research components and items were distributed in the form of a scoring checklist according to Table 5 among 14 experts, who were selected using homogeneous sampling method, to extract their comments on the relationship between the bureaucratic culture themes and entrepreneurial outsourcing scores. In other words, Delphi analysis was used to reach the theoretical saturation to ensure the reliability of the extracted components (entrepreneurial outsourcing functions as the rules in Rough analysis) and items (bureaucratic culture themes as the basis in Rough analysis). In this regard, these components and items were submitted to the experts in the form of a checklist with seven options. Table 6 shows the results of the Delphi analysis.

As presented in Table 6, the entrepreneurial outsourcing components and the bureaucratic culture themes were confirmed during the two stages of Delphi analysis to determine the theoretical saturation point. Regarding the seven-point checklist submitted to the

research experts and considering the Delphi analysis and Kappa Statistics, the scores ≥ 5 and the coefficient of agreement ≥ 0.5 indicated the approval of the research components and items.

Table 3: The evaluation process of selected studies to determine entrepreneurial outsourcing.

Studies	Other countries									Iran		
	1	2	3	4	5	6	7	8	9	10	11	12
Critical evaluation criteria/research	Urbanic and Zeur (2020)	Edwardson et al. (2019)	Brokoleri et al. (2019)	Banerjee et al. (2019)	Franco-Rodriguez and Rivera (2019)	Globerman and Vining (2017)	Goldschmidt and Schmieder (2017)	Monsson and Jørgensen (2016)	Battiston and Gamba (2016)	**Ghasemi et al. (2020)**	Farhangi et al. (2009)	Dehghani Poodeh et al. (2017)
Accepted ☑	☑	☑	☑	--	☑	--	☑	--	☑	--	☑	☑
Rejected ☒	---	---	---	☒	---	☒	---	☒	---	☒	---	---
Research objective	3	2	4	2	4	3	4	3	3	3	4	5
Research methodology	2	3	3	2	3	4	4	4	3	3	4	5
Research design	3	3	4	2	4	3	4	3	3	4	4	4
Sampling	3	2	4	3	4	4	4	4	4	3	4	5
Data collection method	3	2	3	3	3	4	5	4	3	3	5	4
Generalization of findings	2	2	4	3	4	4	4	3	4	4	4	5
Ethical issues	2	2	4	2	4	3	5	4	4	3	4	4
Statistical analysis	2	2	3	2	5	4	5	4	3	4	5	4
Theoretical foundations	2	2	3	2	3	4	4	3	4	4	4	4
Research significance	3	3	4	3	4	4	4	4	4	4	5	5
Total	25	24	36	**25**	**38**	**37**	**39**	**36**	**34**	**35**	**43**	**45**

Table 4: The process of determining the main research components.

Researchers	Human resource functions	Productivity functions	Climatic functions	Structural functions	Strategic functions	Structural functions
Urbanic and Zeur (2020)	☑	☑	☑	-	-	☑
Edwardson et al. (2019)	☑	☑	☑	-	☑	-
Brokoleri et al. (2019)	-	☑	☑	-	☑	☑
Franco-Rodriguez and Rivera (2019)	☑	-	-	-	☑	☑
Goldschmidt and Schmieder (2017)	☑	☑	☑	-	☑	☑
Gorsgard et al. (2016)	-	☑	-	-	☑	☑
Farhangi et al. (2009)	☑	☑	☑	-	☑	☑
Dehghani Poodeh et al. (2017)	☑	☑	☑	☑	-	☑
Total	***6***	***7***	**7**	**4**	***6***	**8**

Table 5: Definitions of entrepreneurial outsourcing functions.

Entrepreneurial outsourcing components	Description	References
Human resource functions	As the basis of entrepreneurial outsourcing, human resource functions encompass a set of learning, control, and monitoring processes of human knowledge developed in different dimensions such as training specialized communication skills and capabilities and developing decision-making functions. Human beings show the highest level of involvement in decision-making and problem-solving issues.	Urbanic and Zeur (2020) Edwardson et al. (2019) Brokoleri et al. (2019) Franco-Rodriguez and Rivera (2019) Goldschmidt and Schmieder (2017) Gorsgard et al. (2016) Farhangi et al. (2009)
Productivity functions	Productivity functions are regarded as a macro foundation in the content features of companies since, by balancing strategies and the agility nature and capacity, they contribute to enhancing the rate of return on investment, reducing costs in various dimensions, allocating resources optimally, and making innovation effective in operational and executive processes as a competitive advantage.	
Strategic functions	The strategic function of entrepreneurial outsourcing is considered a tremendous competitive foundation for companies. Having strategic planning to focus on critical activities reduces enterprise ownership and downsizing to meet the changing needs and develop technical and innovative capabilities. The strategic approach to entrepreneurial outsourcing can also change conventional practices and processes in business life cycles and increase dynamic capabilities for sustainable development.	

Table 6: Delphi analysis results.

Criteria	Components and items	Mean of the first round	Coefficient of agreement in the first round	Accepted ☑	Rejected ☒	Mean of the first round	Coefficient of agreement in the first round	Result
Entrepreneurial outsourcing functions	Human resource functions	5.10	0.75	☑	-	5.25	0.85	Confirmed
	Productivity functions	5	0.70	☑	-	5.10	0.75	Confirmed
	Strategic functions	5	0.70	☑	-	5.20	0.82	Confirmed
Bureaucratic culture themes	Integration	5.10	0.75	☑	-	5.30	0.90	Confirmed
	Criterionaly	5.20	0.82	☑	-	6	0.95	Confirmed
	Logical	5	0.70	☑	-	5.20	0.82	Confirmed
	Modified	5.10	0.75	☑	-	5.30	0.80	Confirmed

6.2. Hierarchical analysis

After detecting the criteria for bureaucratic culture themes and entrepreneurial outsourcing functions, the weights of the research variables were determined using the gray analytic hierarchy process. To this end, after forming the pairwise comparison matrix of the problem, the experts' comments were collected. Then, the incompatibility of each pairwise comparison matrix was determined. If the incompatibility of the pairwise comparison matrix were standard (< 0.1), the next step would be started; otherwise, the pairwise comparison questionnaires were returned to the experts for review. Table 7 presents the results of the gray analytic hierarchy process.

Table 7: Results of gray analytic hierarchy process.

Criteria	Components and items	Code	Weight of indices		Total weight of indices	
			Lower bound (L)	Upper bound (U)	Lower bound (L)	Upper bound (U)
Entrepreneurial outsourcing functions	Human resource functions	(Y1)	0.414	0.522	0.338	0.522
	Productivity functions	(Y2)	0.209	0.255	0.178	0.209
	Strategic functions	(Y3)	0.147	0.213	0.106	0.213
Bureaucratic culture themes	Integration	(X1)	0.356	0.501	0.288	0.499
	Criterionaly	(X2)	0.298	0.473	0.193	0.473
	Logical	(X3)	0.769	0.988	0.613	0.989
	Modified	(X4)	0.331	0.457	0.320	0.457

6.3. Decision tree analysis (CARD) and ERST

After going through the data preparation process and decreasing their distribution, the ERST model was reviewed and analyzed, and testing accuracy and testing coverage were performed according to the following table.

As presented in Table 8, regarding the testing accuracy and testing coverage (i.e., STAC model), the highest effectiveness for the bureaucratic culture themes in promoting the effectiveness of entrepreneurial outsourcing functions was observed for the codified systems (X4). This method is called cross-validation, which is of great significance in terms of the bureaucratic culture themes (namely integration, criterionaly, logical, and codified systems) for the effective development of entrepreneurial outsourcing in Golestan Gas Company. One of the advantages of this method is that it prevents the potential problem of similarities among the options (i.e., overfitting). The decision tree (i.e., data reduction by CARD) was examined to select the most effective entrepreneurial outsourcing function based on the concerned codes in Table 9. Accordingly, the opinions of each participant in the Golestan Gas Company on the consistency between the bureaucratic culture themes and the entrepreneurial outsourcing functions were extracted. As it was mentioned, 25 managers and deputies from the Golestan Gas Company participated in this study. Regarding the word count limit of the article, the findings are presented in part.

Table 8: Results of cross-validation test for bureaucratic culture themes.

Bureaucratic culture themes	Code	Best pruning of the rules	Testing Accuracy	Testing Coverage	STAC
Integration	(X1)	Pruning (limiting) rules with values <1	0.683	0.72	1.212**
Criterionaly	(X2)	Pruning (limiting) rules with values <1	0.490	0.52	1.032
Logical	(X3)	Pruning (limiting) rules with values <1	0.560	0.61	1.176
Modified	(X4)	Pruning (limiting) rules with values <1	0.749	0.88	**1.354***

Table 9: Experts' opinions on the consistency between the bureaucratic culture themes and the entrepreneurial outsourcing functions.

First participant		Integration	Criterionaly	Logical	Codified Systems	Second participant		Integration	Criterionaly	Logical	Codified systems
		X1	X2	X3	X4			X1	X2	X3	X4
Human resource functions	(Y1)	4	3	3	4	Human resource functions	(Y1)	2	3	3	4
Productivity functions	(Y2)	2	3	3	4	Productivity functions	(Y2)	2	1	2	4
Strategic functions	(Y3)	3	2	2	4	Strategic functions	(Y3)	3	1	3	3
Third participant		**Integration**	**Criterionaly**	**Logical**	**Codified Systems**	**Fourth participant**		**Integration**	**Criterionaly**	**Logical**	**Codified systems**
		X1	**X2**	**X3**	**X4**			**X1**	**X2**	**X3**	**X4**
Human resource functions	(Y1)	3	2	3	3	Human resource functions	(Y1)	2	3	3	4
Productivity functions	(Y2)	2	3	3	2	Productivity functions	(Y2)	4	1	2	4
Strategic functions	(Y3)	2	2	3	4	Strategic functions	(Y3)	4	3	3	4

After distributing the questionnaires and analyzing the participants' opinions in the quantitative section regarding the consistency between the bureaucratic culture themes and the entrepreneurial outsourcing functions, a decision-making matrix was formed to analyze the problem (i.e., detecting the most effective entrepreneurial outsourcing function). The participants' comments should first be converted into interval numbers to form a decision table for problem-solving. According to Equation (10) and Table 10, the total scores were determined and presented in Figure 3.

Table 10: Significance of competitive criteria.

Entrepreneurial outsourcing functions	Code	Sig.	Explanatory power	Priority
Human resource functions	(Y1)	0.266	5.84	3rd
Productivity functions	(Y2)	0.294	6.117	2nd
Strategic functions	(Y3)	0.321	7.177	1st

It can be noticed that the most effective entrepreneurial outsourcing functions in Golestan Province Gas Company were strategic functions (Y3), productivity functions (Y2), and human resource functions (Y1), respectively.

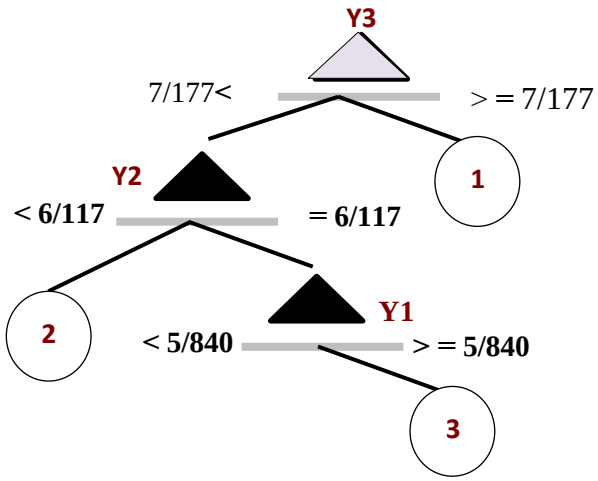

Figure 4: Feature selection using CAR.

In other words, as shown in Figure 4, the independent and meaningful bureaucratic culture themes, which closely correlated with entrepreneurial outsourcing functions, were prioritized to select the essential features based on the CARD method as the basis of the decision tree analysis. Figure 4 presents the most effective entrepreneurial outsourcing functions in Golestan Gas Company. Accordingly, it is noticed that the most effective entrepreneurial outsourcing function is the strategic function. ERST was then used to determine the most effective entrepreneurial outsourcing function regarding the bureaucratic culture themes. In this analysis, the five-section cross-validation was used to form the decision rules of the ERST model. Following the pruning process, the rule-based model was developed, and the accuracy and coverage of the model were then calculated. Witlox and Tindmans (2004) noted that many decision-making rules raise problems in human's direct understanding and make the decision-making process difficult for decision-makers. In this model, the number of decision rules decreases in the pruning process regarding the accuracy and coverage rates. The accuracy and coverage rates (i.e., STAC) are used as criteria in the rule-pruning phase (Pai et al., 2010). The STAC value is equal to the sum of testing accuracy and testing coverage. Table 8 presents the best pruning rule policy, number of rules, testing coverage rate, and the STAC value. As tabulated in Table 11, codified systems (X4) are the best way (rule), i.e., the best bureaucratic culture theme, to effectively promote entrepreneurial outsourcing functions so as to reach a competitive advantage since it has the largest values in terms of testing accuracy and testing coverage and the STAC value, compared to the other three bureaucratic culture themes.

In Table 11, given the higher percentage of the coefficient of agreement, the participants believe that the strategic functions of the bureaucratic culture themes should be focused on selecting the most effective entrepreneurial outsourcing function regarding the bureaucratic culture themes. Once more, to ensure selecting the most effective outsourcing function, the Gray analysis was used for the experts' opinion in Table 11. In Table 11, the results are converted into the distance decision matrix, which can be deduced from the following equation:

$$\underline{\mathrm{Apr}}\left(G_q\right) = \cup\{Y \in U | R(Y) \leq G_q\} \quad (11)$$

$$\overline{\mathrm{Apr}}\left(G_q\right) = \cup\{Y \in U | R(Y) \geq G_q\} \quad (12)$$

$$\begin{aligned}\mathrm{Bnd}\left(G_q\right) &= \cup\{Y \in U | R(Y) \neq G_q\} \\ &= \{Y \in U | R(Y) > G_q\} \\ &\cup \{Y \in U | R(Y) < G_q\}\end{aligned} \quad (13)$$

G_q can be represented by a rough number in the corresponding lower and upper bounds:

Table 11: Decision-making rules derived from X4 in the ERST model.

Decision rules	Agreement (%)
(Strategic function) has the significance level of 0.32; hence, it is the most influential factor in entrepreneurial outsourcing functions.	0.83
(Productivity function) has the significance level of 0.294; hence, it is the second most influential factor in entrepreneurial outsourcing functions.	0.69
(Human resource function) has the significance level of 0.266; hence, it is the second most influential factor in entrepreneurial outsourcing functions.	0.42
Note: Given that (X4), i.e., codified system, was the most important theme of bureaucratic culture and gained the highest degree of effectiveness in selecting the most effective entrepreneurial outsourcing function, among other bureaucratic culture themes (X1), (X2), and (X3), other decision-making rules must be derived from (X4). Then, the upper and lower bounds in the hierarchical analysis process were derived to determine the boundaries among the entrepreneurial outsourcing functions. Accordingly, a derivative, including the upper and lower bound integrals, is derived from the created function, using the following rule and directly providing the formula to calculate the integral derivative. The integral derivative $\int_{n(x)}^{m(x)} h(t)dt$ is given by: $$\left(\int_{n(x)}^{m(x)} h(t)dt\right)' = m'(x).h\big(m(x)\big) - n'(x).h(n(x))$$ It is a derivative of a function having an integral with a univariate function such as $h(t)$ and bounds of x such as upper bound $m(x)$) and lower bound $n(x)$. It equals the upper bound derivative multiplied by the function inside the integral whose variable is substituted by the upper bound minus the derivative of the lower bound, multiplied by the function inside the integral whose variable is substituted by the lower bound.	

$$\underline{\mathrm{Lim}}(G_q) = \frac{1}{M_L}\sum R(y)|Y \in \underline{\mathrm{Apr}}\,(G_q) \quad (14)$$

$$\overline{\mathrm{Lim}}(G_q) = \frac{1}{M_U}\sum R(y)|Y \in \overline{\mathrm{Apr}}(G_q) \quad (15)$$

$$\mathrm{RN}(G_q) = \left\lfloor \underline{\mathrm{Lim}}(G_q).\overline{\mathrm{Lim}}(G_q) \right\rfloor \quad (16)$$

where M and M_L are the values of $\underline{\mathrm{Apr}}\,(G_q)$ and $\overline{\mathrm{Apr}}(G_q)$ respectively.

The lower and upper bounds determine the mean value of the elements related to the upper and lower approximations respectively, and the Rough boundary distance defines the difference between the bounds.

$$\mathrm{IRBnd}(G_q) = \overline{\mathrm{Lim}}(G_q) - \overline{\mathrm{Lim}}(G_q) \quad (17)$$

The Rough boundary distance expresses ambiguity so that a higher value indicates more ambiguity, while a smaller value shows higher accuracy. Accordingly, cognitive information can be expressed by Rough values.

According to the result of the distance decision matrix, the codified system X4 is the most important bureaucratic culture theme, which affects entrepreneurial outsourcing functions. The research items should be re-analyzed to perform Gray Vikor analysis. For this purpose, after forming the decision matrices, the positive ideal level (f_j^*) and the ideal negative level (f_j^-) should be determined in the form of the decision matrix criteria, as listed in Table 13.

Table 12: The distance analysis matrix of decision analysis.

Components	Items	Integration X1		Criterionaly X2		Logical X3		Modified *X4*	
		Lower bound (L)	Upper bound (U)	Lower bound (L)	Upper bound (U)	Lower bound (L)	Upper bound (U)	Lower bound (L)	Upper bound (U)
Human resource functions	Y1	26.15	27.17	27.80	29.20	25	28	29	31
Productivity functions	Y2	28.55	30.07	28.17	30.45	27.56	29.19	26.17	28.10
Strategic functions	Y3	26.76	28.11	28.51	30.76	26.15	27.96	17.12	30.02
				The most effective items regarding research components					

Table 13: Determining positive and negative ideals

Items of bureaucratic culture	Integration	Criterionaly	Logical	Modified
	X1	X2	X3	*X4*
(f_j^*)	28.39	20.28	23.17	30.12
(f_j^-)	16.22	15.72	14.20	17.18

As shown, none of the items has a higher negative ideal than the positive ideal, indicating the effectiveness of all the bureaucratic culture themes in the entrepreneurial outsourcing functions. Once more, it was confirmed that the codified systems are the most important bureaucratic culture theme with a degree of desirability higher than the other bureaucratic culture themes, implying the most critical role of the codified systems among all the other bureaucratic culture themes regarding entrepreneurial outsourcing functions. To detect the most effective entrepreneurial outsourcing function regarding the bureaucratic culture themes, the standard analysis Q is a measure of the Gray Vikor analysis. In this regard, S_i^U, S_i^L, R_i^L, and S_i^L should be determined based on the following equation. Then, the main component of the Gray Vikor analysis (i.e., Q) needs to be determined. Table 14 presents the results of the calculations.

$$S_i^U = \sum_{j\in B} W_j^U \left(\frac{f_j^* - f_{ij}^L}{f_j^* - f_j^-}\right) + \sum_{j\in B} W_j^U \left(\frac{f_{ij}^U - f_j^*}{f_j^- - f_j^*}\right) \quad (18)$$

$$R_i^L = \max_j \begin{cases} W_j^L \left|\frac{f_j^* - f_{ij}^U}{f_j^* - f_j^-}\right| j \in B \\ W_j^L \left|\frac{f_{ij}^L - f_j^*}{f_j^- - f_j^*}\right| j \in C \end{cases} \quad (19)$$

$$R_i^U = \max_j \begin{cases} W_j^U \left|\frac{f_j^* - f_{ij}^L}{f_j^* - f_j^-}\right| j \in B \\ W_j^U \left|\frac{f_{ij}^U - f_j^*}{f_j^- - f_j^*}\right| j \in C \end{cases} \quad (20)$$

where W_j^L is the lower bound, and $W_j^U$is the upper bound of the weight for each criterion. The next step is to calculate the values $\left[Q_i^L Q_i^U\right]$.

$$Q_i^L = \nu\left(\frac{S_i^L - S^*}{S^- - S^*}\right) + (1-\nu)\left(\frac{R_i^L - R^*}{R^- - R^*}\right) \quad (21)$$

$$Q_i^U = \nu\left(\frac{S_i^U - S^*}{S^- - S^*}\right) + (1-\nu)\left(\frac{R_i^U - R^*}{R^- - R^*}\right) \quad (22)$$

$S^* = \mathrm{Min}_i S_i^L$, $S^- = \mathrm{Max} S_i^U$, $R^* = \mathrm{Min}_i R_i^L$, $R^* = \mathrm{Max}_i R_i^U$, and Q are a cumulative item.

In this equation, ν represents the weight of the maximum standard policy, and $\nu \in [0.1]$: usually, $\nu = 0.5$. Now, it is time to rank the options based on S, R,

and Q. Since the Gray Vikor analysis method provides distance weights for the research options, it is not possible to simply rank the items based on Q. There are several methods to rank distance weights, one of which is described below and is used in the present study.

$$A = [a_1 . a_2]; B[b_1 . b_2] \quad (23)$$

$$C = [c_1 . c_2] = A - B = [a_1 - b_2 . a_2 - b_1] \quad (24)$$

$$IF \frac{|c_1|}{c_2 - c_1} < \frac{|c_2|}{c_2 - c_1} \rightarrow \text{Then } A > B \quad (25)$$

$$IF \frac{|c_1|}{c_2 - c_1} < \frac{|c_2|}{c_2 - c_1} \rightarrow \text{Then } A \leq B \quad (26)$$

Table 14: Item analysis of Gray Vikor analysis method.

Entrepreneurial outsourcing functions	Code	S_i^U	S_i^L	R_i^U	R_i^L	Q_i^U	Q_i^L
Human resource functions	Y1	1.772615	2.891726	0.412909	0.781781	8200198/0	0.8200198
Productivity functions	Y2	1.506732	2.321728	0.377716	0.534266	6944381/0	0.6944381
Strategic functions	Y3	1.112168	2.281777	0.352718	0.493090	6182734/0	0.6182734
Assessment criteria	Criterion level			S^*	S^-	R^*	R^-
	Criterion value			0.700286	3.172677	0.526359	1

The analytic criterion Q was selected as a measure of the Gray Vikor analysis, and the highest rate of Q is obtained for the human resources function in entrepreneurial outsourcing. However, according to the analytical process and the instructions on such analysis, the inverse of the Rough analysis should be used as the most effective component since the lowest rates of Q indicate the influence of bureaucratic culture themes on the entrepreneurial outsourcing components. Accordingly, the lowest rate of the entrepreneurial outsourcing component was obtained for the strategic functions Y3 , suggesting the significant role of bureaucratic culture themes in entrepreneurial outsourcing functions. In other words, regarding the bureaucratic culture themes, especially the codified systems, Golestan Gas Company receives the most incredible benefits from the strategic functions of entrepreneurial outsourcing. This finding is consistent with the results in Table 11, i.e., ERST, which implies the significance of strategic outsourcing functions for the codified systems in bureaucratic culture themes.

7. Conclusions

Outsourcing in entrepreneurship is a new theoretical concept in entrepreneurship, which has been a hotbed of research. Unlike the previous research frameworks examining the relationship between organizational culture and organizational entrepreneurship, the present study adopted the content analysis of the bureaucratic culture themes and entrepreneurial outsourcing components using the ERST to select the most effective entrepreneurial outsourcing function affecting the bureaucratic culture themes. According to the findings, among the bureaucratic culture themes in Golestan Province Gas Company, the codified systems governing the company's organizational culture are the most crucial cultural approach, affecting internal and external procedures at strategic levels. The codified systems of the bureaucratic culture include a set of subsystems, which in addition to having well-codified and purposeful communication with other sectors, contribute to the development of effective communication processes using the immediate feedback from information received from intelligent information networks. In other words, the codified systems in bureaucratic culture express interactive communication to promote effectiveness in information circulation functions so as to promote learning in the company. Information sharing and the convergence of interpersonal experiences are the main advantages of this bureaucratic culture theme, which can stimulate the strategic functions of entrepreneurial outsourcing to be more effective.

Given that the strategic function was the most effective entrepreneurial outsourcing function in the

concerned gas company, it was also found that the intersection of the codified systems was a factor motivating the effect of this entrepreneurial outsourcing dimension further. In analyzing the findings, the existence of codified systems further promotes the strategic approaches to the competitive advantage resulting from entrepreneurial outsourcing since this entrepreneurial outsourcing function contributes to the company using strategic planning levels so as to promote creativity by sharing information and increasing the level of innovation and create more learning and knowledge by experts outside the company. From an operational and service perspective, the arousal of competitive ideas and innovations in the company can significantly help the company respond to rapid environmental changes, promote agility in the company, and reduce state ownership by eliminating some structural layers and procedures and reducing hierarchical positions. Moreover, it can increase the level of citizens' involvement based on the codified systems and information circulation from inside to outside and outside to inside, and this would further promote the company's development functions in terms of sustainability, i.e., the nature of the entrepreneurial outsourcing model. The findings are in line with those reported by Edwardson et al. (2019), Gorsgard et al. (2016), and Farhangi et al. (2009). According to the findings and regarding the contrast between a state perspective and the executive processes such as money-making from a private perspective, Golestan Gas Company should institutionalize a contingent culture subjected to flexibility approaches and procedures in the form of codified values and symbols in individuals and organizational structures so as to gradually promote the strategic perception between the company and employees and increase synergy and integration at an effectiveness level such as entrepreneurship.

On the other hand, entrepreneurship development requires consultants outside the organization for the organizational culture dimensions to promote the innovative perception of human resources while addressing greater productivity. In this regard, developing competitive strategies in a similar vein with entrepreneurial dimensions requires a link between culture and strategy under the theories connecting the content dimensions of an organizational structure. To this end, breaking the reference frameworks and exploiting cultural storytelling and symbolism would contribute to such consistency even under a bureaucratic culture.

References

Banerjee, A., Hanna, R., Kyle, J., Olken, B. A., and Sumarto, S. (2019). Private outsourcing and competition: subsidized food distribution in Indonesia, Journal of Political Economy, 127(1), 101–137.

Belak, J. (2016). Management and governance: organizational culture in relation to enterprise life cycle, Kybernetes, 45(4): 680–698. https://doi.org/10.1108/K-04-2014-0082.

Bhuiyan, F., Baird, K., Munir, R. (2020). The association between organizational culture, CSR practices and organizational performance in an emerging economy, Meditari Accountancy Research, https://doi.org/10.1108/MEDAR-09-2019-0574.

Bruccoleri, M., Perrone, G., Mazzola, E., and Handfield, R. (2019). The magnitude of a product recall: offshore outsourcing vs. captive offshoring effects, International Journal of Production Research, 57(13): 4211–4227.

Choudhry, A, Z. (2014). Application outsourcing governance model. Master's Thesis in information, Linnaeus University.

Dehghani Poudeh, H., Cheshmberah, M., Torabi, H., Karimi Gavareshki, M., Hosnavi, R. (2017). Determining and prioritizing the influence indices for the CoPS R & D projects outsourcing (a study on Aviation Industries Organization, Iran). Journal of Technology Development Management, 5(3): 139–168 (In Persian).

Dwiyanto, A. (2011). Mengembalikan Kepercayaan Publik Melalui Reformasi Birokrasi. Jakarta: PT. Gramedia Pustaka Utama.

Edvardsson, I, R., Durst, S., Oskarsson, G, K. (2019). Strategic outsourcing in SMEs, Journal of Small Business and Enterprise Development, 27(1): 73–84. https://doi.org/10.1108/JSBED-09-2019-0322.

Farhangi Farghani, N., Abbasnejad, T., Ghafournia, M. (2019). Evaluation of outsourcing activities of the subscribers services sector of water and wastewater company based on the system dynamic approach: Hormozgan Province. Industrial Management Journal, 11(1): 111–132. (In Persian).

Forouharfar A. (2020) Entrepreneurial bureaucracy. in: Farazmand A. (eds) Global Encyclopedia of

Public Administration, Public Policy, and Governance. Springer, Cham.

Franco-Rodriguez, C., and Rivera, C. F. (2019). Entrepreneurial spirit in family business successors: the case of Mexico. in Handbook of Research on Ethics, Entrepreneurship, and Governance in Higher Education (pp. 398–413). IGI Global.

Gayarre, J, L. (1992). From bureaucratic company to entrepreneurial management: a process of change, The International Executive, 34(1): 81–101. https://doi.org/10.1002/tie.5060340108.

Ghaffari, R., Rostamniya, Y. (2017). Organizational social inertia and laziness; dysfunctions of the bureaucratic organizational culture, Journal of Public Administration, 9(2): 307–332. (In Persian).

Ghasemi E, Mohajerani A, haghighian M. (2020). Investigating the effects of social components and institutional environment on agricultural entrepreneurship development (Case Study: Fasa city). Hafthesar, 8(31):75–83 (In Persian).

Globerman, S. and Vining, A. R. (2017). The outsourcing decision: a strategic framework. In Global Outsourcing Strategies (pp. 27–40). Routledge.

Goldschmidt, D. and Schmieder, J. F. (2017). The rise of domestic outsourcing and the evolution of the German wage structure, The Quarterly Journal of Economics, 132(3), 1165–1217.

Gross, A., Holtzblatt, M., Javalgi, R. (2013). Professional occupations, knowledge-driven firms, and entrepreneurship: a national and regional analysis, Business Economic, 48(2): 246–259. https://doi.org/10.1057/be.2013.22.

Größler, A., Timenes Laugen, B., Arkader, R., Fleury, A. (2013). Differences in outsourcing strategies between firms in emerging and in developed markets, International Journal of Operations and Production Management, 33(3): 296–321. https://doi.org/10.1108/01443571311300791.

Hosseni, S, H. and Baddast, B. (2011),Study of relationship between organizational culture and organizational entrepreneurship in Mallet Bank of Golestan Province, Journal of Cultural Management, 5(4): 100–114. (In Persian).

Jain, A, K. (2015). Volunteerism and organizational culture: relationship to organizational commitment and citizenship behaviors in India, Cross-Cultural Management: An International Journal, 22(1): 116–144. https://doi.org/10.1108/CCM-11-2013-0167.

Karakasnaki, M., Psomas, E., and Bouranta, N. (2019). The interrelationships among organizational culture and service quality under different levels of competitive intensity: an application in the shipping industry, International Journal of Quality and Service Sciences, 11(2): 217–234. https://doi.org/10.1108/IJQSS-10-2017-0096.

Karlsson, M., Denk, T., and Åström, J. (2018). Perceptions of organizational culture and value conflicts in information security management, Information, and Computer Security, 16(2): 213–229.

Korsgaard, S., Anderson, A. and Gaddefors, J. (2016). Entrepreneurship as resourcing: towards a new image of entrepreneurship in a time of financial, economic and socio-spatial crisis, Journal of Enterprising Communities: People and Places in the Global Economy, 10(2):178–202. https://doi.org/10.1108/JEC-03-2014-0002.

Kumar, N., Sharma, D, D. (2018). The role of organizational culture in the internationalization of new ventures, International Marketing Review, 35(5): 806–832. https://doi.org/10.1108/IMR-09-2014-0299.

Martín-Rojas, R., Fernández-Pérez, V. and García-Sánchez, E. (2017). We are encouraging organizational performance through the influence of technological distinctive competencies on components of corporate entrepreneurship, International Entrepreneurship and Management Journal, 13(2): 397–426, https://doi.org/10.1007/s11365-016-0406-7.

Moghimi, S., M. (2010). Transformation of public management culture from bureaucratic culture to entrepreneurial culture (case study: Ministry of Energy Headquarters), Scientific Journal of Business Strategies-Daneshvar (Former Behavior), 8(41): 293–310. (In Persian).

Molnar, A. (2018). Strategic management and innovative applications of e-government. IGI Global, Hershey.

Monavarian A, Ahmadi-Tonekaboni M. (2012). The effect of organizational culture on entrepreneurial

orientation in Bank Karafarin, JMDP, 25(2): 53–76 (In Persian).

Monsson, C, K., Jørgensen, S, B. (2016). How do entrepreneurs' characteristics influence the benefits from the various elements of a business incubator?, Journal of Small Business and Enterprise Development, 23(1): 224–239. https://doi.org/10.1108/JSBED-10-2013-0158.

Mousavi, S., Aref Negad, M., Fathi Chegeni, F., Sepahvand, M. (2020). An analysis of the effect of bureaucratic culture on the invisibility of employees with the mediating role of passive leadership: a case study of Lorestan province governmental organizations. Organizational Culture Management, 18(2): 273–296 (In Persian).

Murphy, P, J., Wu, Z., Welsch, H., Heiser, D, R., Young, S, T., Jiang, B. (2012). Small firm entrepreneurial outsourcing: traditional problems, nontraditional solutions, Strategic Outsourcing: An International Journal, 5(3): 248–275. https://doi.org/10.1108/17538291211291774.

Nguyen, V, T., Siengthai, S., Swierczek, F., Bamel, U, K. (2019). The effects of organizational culture and commitment on employee innovation: evidence from Vietnam's IT industry, Journal of Asia Business Studies, 13(4): 719–742. https://doi.org/10.1108/JABS-09-2018-0253.

Saha, S., Kumar, S, P. (2018). Organizational culture as a moderator between affective commitment and job satisfaction: empirical evidence from Indian public sector enterprises, International Journal of Public Sector Management, 31(2): 184–206. https://doi.org/10.1108/IJPSM-03-2017-0078.

Santana, M, D. (2017). Promoting entrepreneurship: a growing instrument of soft-diplomacy in the MENA region, IEMD Mediterranean Yearbook. Strategic Sectors: Economy and Territory, 2(2): 251–254.

Sepahvand, R., Saedi, A., Shariatzadeh, A. (2019). Analyzing effect of leaders' sense of humor on feelings of followers through the mediating role of bureaucratic culture (case study: employees of Lorestan University), Journal of Human Resource Management, 9(3), 27–50. (In Persian).

Siswadi, E. (2012). Birokrasi Masa Depan: Menuju Tata Kelola Pemerintahan yang Efektif dan Prima. Bandung: Mutiara Press.

Tayauova, G. (2012). Advantages and disadvantages of outsourcing: analysis of outsourcing practices of Kazakhstan Banks. Social and Behavioral Sciences, 41, 188–195.

Teräväinen, V, J., Junnonen, J, M. (2019). The promoters and the barriers for organizational culture change in a Finnish construction company, Construction Innovation, 19(4): 672–688. https://doi.org/10.1108/CI-04-2019-0029.

Urbaniec, M., Żur, A. (2020). Business model innovation in corporate entrepreneurship: exploratory insights from corporate accelerators, International Entrepreneurship and Management Journal, https://doi.org/10.1007/s11365-020-00646-1.

Van Nattem, R. Proveniers, A. (2012). Entrepreneurial cooperation: Aa model for CREM in times of economic crisis? a case study at Eindhoven University of Technology, Journal of Corporate Real Estate, 14(2):121–133. https://doi.org/10.1108/14630011211261713.

Volkova, N., Chiker, V. (2020). What demographics matter for organizational culture, commitment, and identification? a case in Russian settings, International Journal of Organizational Analysis, 28(1): 274–290. https://doi.org/10.1108/IJOA-05-2019-1762.