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# Investigation of the strategic entrepreneurship components' effect on the knowledge-based companies' performance by applying new dimensions of balanced score card

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**Abstract**

Nowadays, due to the increasing trend of environmental changes and developments, knowledge-based companies need strategic entrepreneurship to respond effectively to their environmental needs. Therefore, the present research, which has a mixed research approach (qualitative-quantitative) and has an application-development orientation, tries to investigate in two stages the effect of strategic entrepreneurship components on the performance of knowledge-based companies by applying new dimensions of balanced score card. The first stage, which is qualitative and based on the purpose is the fundamental type and based on the method of research is the descriptive-analytical type, in order to identify the components of strategic entrepreneurship using the Meta-synthesis method, the findings of studies in this regard, as They were systematically reviewed and analyzed based on the formation process and output achievement. Then, by referring to the valid documents available on the sites and after reviewing the information of English sources from 2000 to 2019 and Persian sources from 1380 to 1399, out of a large number of initial articles, 88 suitable articles were identified. In order to analyze the selected articles, constituent concepts and influential components, the content analysis method was used and in order to validate the extracted concepts, the Delphi panel method was used with the presence of 8 experts and specialists in the field of university and industry. Then, the research findings were identified and classified in the form of 49 concepts, 10 sub-components and 5 components, and the conceptual model obtained from the meta-synthesis based on the findings was presented. Also, the rank and importance of experts' opinions regarding strategic entrepreneurship components based on the results of the Friedman ranking test were the components of leadership, opportunism, innovative learning, attitude and resources, respectively. In the quantitative stage of the research, which is applied based on the purpose and descriptive survey based on the research method, in order to investigate the effect of strategic entrepreneurship components on the performance of knowledge-based companies by applying new dimensions of a balanced scorecard, the model method Structural equation modelling (SEM) was used to test research hypotheses using Excel 2013, SPSS 21, and Smart pls3 software. The statistical population studied at this stage is 102 senior managers of knowledge-based companies located in Yazd Science and Technology Park. In order to select a sample by simple random method, 80 samples were selected from the Morgan table and questionnaires were collected. The results of the hypothesis test showed that the components of strategic entrepreneurship affect the six dimensions of the balanced scorecard of knowledge-based companies including financial, customers, learning and growth, internal processes, employees satisfaction and the environment and society dimensions.

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## 1 Introduction

Knowledge-based companies are an important and needed part of any country's economy. These companies create significant employment with relatively little investment, so they are very important in the employment of production factors. The rapid procedure of industry developments and rapid change puts intense competitive pressure on knowledge-based companies with limited resources and capital [104]. Also, the number of knowledge-based companies and technology units located in parks and science and technology growth centres has increased in recent years, which shows the increase in the technologists and entrepreneurs society in the country. But despite the good increase in the number of parks and the science and technology growth centres, the low quality of performance of some of them, the lack of accurate organization and evaluation system for their performance in some years have led to cause some shortcomings in these structures and failure to one hundred percent realization of their goals [89]. In today's world, the ability to compete and adopt the most appropriate policy against environmental changes determines the continuation of the existence and activity of the organization, and one of the most effective methods used by organizations in this regard is the application of performance evaluation to determine the weaknesses of the organization in order to eliminate them and its strengths to improve. Hexahedron balanced scorecard is one of the most important and effective ways to carry out the mission and strategies of strategy-oriented organizations whose relations can be determined based on some indexes which can be developed, implemented, and evaluated so that to achieve the organization to the set goals [49].

The hexahedron balanced scorecard method is one of the modern techniques of strategic comprehensive performance evaluation, which evaluates an organization's financial and non-financial performance and consists of six dimensions, including financial, customers, internal procedures, learning and growth, staff satisfaction and environment and society. Strategic entrepreneurship is an effective tool to increase productivity and optimal use of capacities and capabilities of human resources to achieve organizational goals and better performance of organizations. The basic idea of strategic entrepreneurship is that the concepts of strategy have been designed to answer the question "why do some companies perform better than others?" can be used in the entrepreneurship conditions and context. With respect to the thematic nature of competitive advantage roles in strategic management research, strategic entrepreneurship integrates the entrepreneurial (opportunity) and strategic (advantage) perspectives in the formulation and transformation that is designed to create wealth defined. In other words, strategic entrepreneurship is Entrepreneurial action with a strategic view. Strategic entrepreneurship has key dimensions such as entrepreneurial mindset, entrepreneurial culture, entrepreneurial leadership, resource strategic management, and application of creativity to develop innovation [63], through which improvement and Performance upgrades can be achieved for organizations and companies. Strategic entrepreneurship allows the organization to act creatively and innovatively and avoid them to act passively to shape its future and allows entrepreneurial companies to influence and own creativity rather than just react to factors. A lack of strategic perspective in entrepreneurial activities can cause very irreparable damage to entrepreneurs and especially their entrepreneurial activities in start-up companies. Small and new business entrepreneurs are most successful in identifying opportunities. But they will face high environmental uncertainty after entering the market. This uncertainty can cause their decline and collapse because they pay less attention to maintaining and developing competitive advantage strategies to take advantage of opportunities [3].

One of the methods that have been introduced to review, combine, and pathology of past researches In the last few years is Meta-study. Which is generally of four parts meta-analysis (quantitative analysis of the initial studies' content) and meta-synthesis (qualitative analysis of the initial studies' content) and meta-theoretical (analysis of the initial studies' theories), and meta-method (methodological analysis of initial studies) [19]. In this research, the meta-synthesis method will be used for a systematic review of previous research. Then, the experimental data will be analyzed, and a comprehensive model for identifying the strategic entrepreneurship components in Iran will be presented.

Finally, the research seeks to find out first, what are the components of strategic entrepreneurship in Iran? And second, do the identified components of strategic entrepreneurship affect the performance of knowledge-based companies by applying new dimensions of a balanced score cards?

## 2 Theoretical basics and hypotheses expansion

### 2.1 Strategic entrepreneurship: Opportunities, learning, and innovation

Strategic entrepreneurship is a newfound concept and a combination of entrepreneurship and strategic management science [63]. In fact, strategic entrepreneurship is entrepreneurial action with a strategic perspective [58]. Ireland and Webb believe that strategic entrepreneurship is actually a combination of entrepreneurship and strategy [64]. Companies that have built a competitive advantage but have lost the ability to identify valuable entrepreneurial opportunities are unlikely to be able to preserve this advantage over time, therefore, all companies should strive for two dimensions of seeking opportunity and advantage and the wealth will be created only in this way [63]. The importance of entrepreneurial opportunities recognition has been mentioned as one of the vital elements of entrepreneurial behaviour and also as one of the central concepts of entrepreneurship definition in many types of research in the entrepreneurship field and it is called the heart of entrepreneurship [110]. Puhakka [91] believes that entrepreneurial opportunities consist of dimensions such as competitive scan related to the information collection and analysis, pioneer search for future values opportunities which is related to a brief picture of the future, and the innovative opportunities creation to create opportunities that are related to various economic activities.

Organizational learning provides the necessary context and conditions for innovation and subsequently improves the competitive performance and advantage, and in turn, organizational innovations enrich, upgrade and update the organizational knowledge base [101]. Organizational learning and innovation are influenced by a series of strategic factors such as individual dominance, transformational leadership, environment, pioneer, and common perspective as important and key capabilities to promote entrepreneurship and improve organizational performance, which has been analyzed as an event in literature relater to organizational innovation and on the other hand, progress in organizational performance is one of the consequences of organizational learning and innovation in the organization [65]. In fact, innovation is an important and vital factor for organizations to create value and sustainable competitive advantage, and organizations will be more successful with more innovation in response to changing environments and create and develop new capabilities that allow them to perform better [74]. On the other hand, it is considered one of the most important components of the process of creating innovation in the literature related to innovation and knowledge. Saffar and Charkhkar [100] investigated the role of strategic entrepreneurship in identifying and discovering entrepreneurial opportunities in Yazd industrial estate companies. The research's results showed that the effect of strategic entrepreneurship and its dimensions on identifying and discovering entrepreneurial opportunities is positive and significant. The research results the of Kuse Qaravi and Saffarian Hamedani [71] in designing a strategic entrepreneurial marketing model in the construction industry with a mixed exploratory approach in construction companies in the north of the country (Golestan, Mazandaran and Gilan provinces), showed that influential causal conditions on strategic entrepreneurial marketing include connectivity capability, organizational capability, organization strategy, manager and organization support, and organizational systems. Interferer conditions include relationship orientation, environmental capability, and corporate governance and contextual conditions include systematic thinking, technology application, and organizational culture. Boudreaux [21] examines the importance of the strategic entrepreneurial industries in Kaufman from North America's classified industry system industry using Porter's five-force model, explaining why some industries are more profitable than others. The results showed that the service industries, especially the professional, technical, and scientific service ones, enjoy higher profits and survival than other industries. In contrast, the retail and manufacturing industries generally perform worse at this rate because they have lower profitability and survival rates. Kiyabo and Isaga [69] investigated the impact of strategic entrepreneurship on the performance of small and medium-sized enterprises through competitive advantage in the Welding industry in Tanzania. The findings of this study showed that resource-based theory has a better chance of describing the impact of strategic entrepreneurship components on the performance of small and medium-sized enterprises through a competitive advantage over resource-based and knowledge-based perspectives.

### 2.2 Evaluation of performance and new dimensions of balanced score card

The performance measurement system is a type of information system which is the beating heart of improvement and performance management [30]. The overall performance of the organization and related processes are also evaluated in performance evaluation in addition to individuals [67]. Performance evaluation is one of the most important approaches for managers to achieve success. Today, experts and thinkers in the field of management and development emphasize the importance and position of performance evaluation models as one of the most valid indicators of the societies and organizations' development and also as a vital key to realizing development goals in individual and social dimensions. Because the need for performance evaluation management is inevitable due to rapid changes in the environment, intensification of the competitive environment, shortening the life cycle of products and Increasing expectations of society [51].

In the past, financial criteria were the foundation of organizations' performance evaluation, and cost accounting was considered the official language of business, but in the present era, on the one hand, the limitations of traditional methods of performance evaluation and on the other hand new attitudes to the organization or firm have led to a change in attitude in the way performance evaluation. Through new attitudes, different approaches, such as the integrated and excellence approach, have been proposed to evaluate the organization. The balanced scorecard approach is one of the integrated methods in an organization's performance evaluation that was offered by Kaplan and Norton [66] to demonstrate the strategy. The Balanced scorecard is a framework for describing the activities of an organization from four different perspectives, which is done through some indicators. This approach can translate the best strategies into concrete goals and criteria and create a kind of balance in the organization's measurement by combining two categories of functional and guiding indexes in four organizational aspects, including financial, customer, internal process and growth and learning [26]. However, this approach ignores the important aspects of sustainable development in the performance evaluation process; therefore, some studies have been conducted to develop a new method based on a balanced scorecard for the sustainable performance of the organization. According to the above-mentioned problem and principles, the following hypotheses will be designed and tested for the model test section:

**The main hypothesis (1):** The components of strategic entrepreneurship affect the performance of knowledge-based companies by applying new dimensions of a balanced score card.

*The sub-hypothesis (1-1):* The components of strategic entrepreneurship affect the financial dimension of knowledge-based companies.

*The sub-hypothesis (1-2):* The components of strategic entrepreneurship affect the customers' dimension of knowledge-based companies.

*The sub-hypothesis (1-3):* The components of strategic entrepreneurship affect the internal processes dimension of knowledge-based companies.

*The sub-hypothesis (1-4):* The components of strategic entrepreneurship affect the learning and growth dimension of knowledge-based companies.

*The sub-hypothesis (1-5):* The components of strategic entrepreneurship affect the employees' satisfaction dimension of knowledge-based companies.

*The sub-hypothesis (1-6):* The components of strategic entrepreneurship affect the environment and social dimension of knowledge-based companies.

## 3 Methodology

This research has been done in a mixed-method (qualitative-quantitative) and has an application-development orientation. The research method of the qualitative part is a fundamental type based on the purpose because it deals with theoretical models creation to explain phenomena and discover laws and scientific principles and seeks to develop the set of existing contents about facts, and it is a descriptive-analytical type based on the research method. The research method of the quantitative part is applied type based on the purpose because it emphasizes more on achieving the most effective solutions and actions and studies theoretical constructions in practical and real contexts and situations and leads to the method. It is of descriptive-survey type based on the research method. The statistical society understudy in the first part includes all articles related to the research topic. In order to conduct research after designing the research question, a systematic search based on the keyword of strategic entrepreneurship from google scholar, ScienceDirect, emeraldinsight, magiran, sid, irandoc, noormags, and civilica databases will be performed between the Gregorian years 2000 to 2019 and Solar years 1380 to 1399 and The quantitative part of the statistical population under study includes 102 the senior managers of knowledge-based companies located in the Science and Technology Park of Yazd province. Determining the minimum sample size is a very important issue in factor analysis and structural equation modelling. There is no general agreement on the sample size required for factor analysis and structural models. In this part, 80 people were randomly selected through the Morgan table from sample members for the purpose of more generalizability with the population under study, and the questionnaires were distributed among them and then collected. The data collection method in the field of research literature is the library. For this purpose, books, research of other researchers, Persian and Latin articles and publications available on websites and libraries were used in order to codify theoretical sections (in the field of theoretical basics and research background) and fish-taking tools were applied to collect this data. The data collection method in the qualitative phase is Library-field. In the library method of the qualitative phase, data which includes articles and scientific research in authentic scientific databases and journals were collected through a literature systematic review method called meta-synthesis.

In the field method of the qualitative phase, data are collected by the use of an interview with a general guidance approach and in a semi-structured way with the presence of experts and specialists in the field of University and Industry. The number of initially found articles for meta-synthesis was more than 990, from which about 282 articles were examined in more detail following reviewing the titles of indexed articles according to the subject, question, and purpose of the research. The mentioned 282 articles were analyzed through the COREQ 32-item catalogue, which is a tool to evaluate the resources under review in qualitative methods [110] and was evaluated with the help of the research focal group, and their quality was classified into three categories including high, medium and poor. Among them, 38 articles received scores above 28 (high level), 50 articles were between 22 to 27 (medium level), and the rest scored were below 22 (low level). Finally, according to the mentioned criteria, 88 more important articles with high and medium quality were selected for information extraction. Kappa coefficient was used to evaluate the reliability of the research. Cohen [102] invented the kappa formula to calculate the expected agreement:

$$Kappa = \frac{p_o - p_e}{1 - p_e} \tag{3.1}$$

where $P_o$ is the observed agreement, and $P_e$ is the expected agreement. The kappa value fluctuates between 0 to 1, and the closer it is to one, the more agreement there is between browsers [93]. In this study, the kappa index was calculated to be 0.91, which indicates a high agreement between browsers. In this study, as mentioned, all 88 studies and components have been approved by experts in terms of quality.

The data collection method is a quantitative phase in the field and the questionnaire tool is used to collect data based on qualitative data analysis. The questionnaire is the most common data collection tool that assesses people's attitudes toward a fact and contains two sections of individual and specific questions for the respondent and specialized questions in line with research hypotheses. Content validity was used to assess the validity of the questionnaire. First, the questions were designed in accordance with the theoretical foundations and then were given to an 8 number of experts and specialists in the field of University and Industry, and a questionnaire was designed following their final confirmation. Cronbach's alpha method was used, which was calculated by SPSS software to determine the reliability of the questionnaire for a set of questions related to each variable. Table 1 shows the reliability of each research variable based on Cronbach's alpha test. Considering the value of Cronbach's coefficient, which is more than 0.75, it can be concluded that each of the sub-indexes of the questionnaire enjoys good reliability.

Table 1: Reliability related to questionnaire questions

| **Variable** | **The number of questions** | **Cronbach's alpha as a percentage** |
|---|---|---|
| Leadership | 10 | 84.2 |
| Attitude | 7 | 75 |
| Resources | 9 | 84.1 |
| Opportunisms | 14 | 85.9 |
| Innovative learning | 9 | 83 |
| Performance evaluation | 38 | 91.7 |
| Total tool | 87 | 96.3 |

Meta-synthesis method as one of the systematic study methods of literature was used to analyze data in the qualitative phase. Meta-synthesis method is applicable in science whose studies are more based on qualitative analysis. So far, different methods have been proposed for the implementation of meta-synthesis. The systematic seven-step procedure of Sandelowski and Barroso [102] was implemented to take advantage of this research method in which articles' information has been classified at the fourth stage of research following the first three steps of the meta-synthesis method including setting the research question, reviewing the literature in a systematic way and searching and selecting appropriate texts and the primary conceptual pattern was presented through open coding.

On the quantitative stage, data is analyzed into two statistical parts in which descriptive statistics were used to Investigate and analyze data in both parts of questions including individual and specialized, and describe the research's variables and demographic by the use of some indexes such as mean, percentage, frequency, median and standard deviation in Excel2013 and SPSS21 and the inferential statistic was applied in order to test the hypotheses and Investigate the relationships of the observed variables and simultaneous effect of research variables on each other and measurement of their direct and indirect impact on each other and structural equation model was used in Smartpls3 software. Also, confirmatory factor analysis was used in order to investigate the effect size of questionnaire items (observed variables) in explaining the hidden variable and a model fit indicator (model verification indices) was applied in order to investigate model suitable fit.

## 4 Findings

In this research, previous models and research are considered, and by extracting the concepts of strategic entrepreneurship, which is a feasible and doable thing and has been proven in previous research, a model for strategic entrepreneurship is presented using the meta-synthesis method. As Table 2 shows, it is compared and acknowledged by categorizing sources such as Omotosho and Anyigba [88], Antonakis et al. [10], Ireland et al. [63], and Bagherian and Bagherian [18] and Movahhed Manesh et al. [86]. According to Braun and Clarke's [23] method, the sub-components of each component were arranged in such a way that the equivalent sub-components were identified and placed in their respective component. Tangible and intangible extraction indices were also classified and analyzed in accordance with the sub-components of all components and according to the equivalence rule. Finally, according to the above-mentioned issues and after multiple consultations with experts about the findings of the previous steps, 49 concepts were identified, and the components of strategic entrepreneurship were classified into 10 sub-components and 5 components.

Table 2: The concepts, sub-components, and components of strategic entrepreneurship

| components | subcomponents | Concepts | Frequency | resources |
|---|---|---|---|---|
| Leadership | Individual characteristics | Flexibility | 8 | [13, 22, 32, 35, 40, 44, 72, 83] |
| | | Risk-taking | 5 | [20, 35, 50, 72, 98] |
| | | lack of trust Acceptance | 3 | [5, 35, 75] |
| | | Mindset | 5 | [82, 83, 88, 90] |
| | Managerial characteristics | Tolerate failure | 2 | [40, 63] |
| | | Believe in sacred | 3 | [7, 9, 78] |
| | | Entrepreneurial leadership | 6 | [10, 18, 63, 86, 88, 96] |
| | | Entrepreneurial action | 2 | [44, 105] |
| | | Create a competitive advantage | 2 | [17, 77] |
| | | Existence of excellent management teams | 4 | [38, 42, 56, 81] |
| Attitude | Organizational | Organizational strategic perspective | 4 | [43, 52, 54, 72] |
| | | Effective governance strategies | 3 | [15, 33, 80] |
| | | Entrepreneurship mindset | 3 | [63, 76, 109] |
| | Social culture | Social attitude | 3 | [25, 48, 107] |
| | | Entrepreneurship culture | 4 | [63, 64, 86, 88] |
| | | Organizational culture | 6 | [6, 14, 33, 64, 68, 105] |
| | | Cultural perspective | 1 | [15] |
| Resources | Financial | Effective investment management | 3 | [46, 92, 108] |
| | | Financial resources management | 4 | [18, 29, 72, 86] |
| | | Application of suitable resources | 2 | [62, 73] |
| | Non-financial | Organizational structure | 5 | [5, 25, 48, 64, 70] |
| | | Learner resources | 2 | [45, 114] |
| | | Resource development knowledge | 3 | [24, 60, 69] |
| | | Access to communicational networks | 5 | [32, 54, 80, 87, 107] |

In the next stage, collecting information was done in the qualitative part by interview method to reconcile the theoretical foundations and data collection strategies, and the interview questionnaire was designed on the history of literature related to the topic and the details of the topic and research objectives was described, and interviewers

| | | | | |
|---|---|---|---|---|
| | | Technology | 2 | [2, 8] |
| | | Human resource adaptation | 2 | [61, 95] |
| opportunism | Discovery and creation path | Opportunities identification | 3 | [64, 72, 116] |
| | | Opportunities discovery | 5 | [34, 36, 58, 63, 106] |
| | | Opportunity-seeking | 2 | [2, 8] |
| | | Communicational channels | 4 | [20, 33, 71, 92] |
| | | Alliance with external networks | 2 | [57, 58] |
| | | Communication and information systems | 1 | [55] |
| | | Ecology | 3 | [52, 70, 108] |
| | | Scanning and monitoring | 2 | [12, 16] |
| | utilization | Utilization of opportunities | 2 | [63, 64] |
| | | Organizational activities variety | 2 | [64, 84] |
| | | Developmental activities | 1 | [39] |
| | | Globalization | 1 | [94] |
| | | Value creation | 3 | [32, 72, 107] |
| | | Organizational growth | 2 | [99, 112] |
| Innovative learning | education | Individual knowledge and awareness promotion | 3 | [41, 92, 96] |
| | | Organizational knowledge and awareness promotion | 3 | [41, 92, 96] |
| | | Educational plan | 4 | [15, 37, 54, 117] |
| | | Organizational learning | 3 | [32, 58, 96] |
| | | Gaining skill | 2 | [118, 120] |
| | Creation and innovation | Specialized creativity | 2 | [7, 20] |
| | | Collaborative innovation | 6 | [29, 58, 72, 84, 86, 96] |
| | | Continuous innovation | 6 | [6, 13, 47, 63, 64, 85] |
| | | Open innovation | 2 | [79, 97] |

were responded without bias and with complete confidence. In the open coding stage, 101 codes have been extracted into 49 concepts, 10 sub-categories, and finally, 5 main categories have been identified. The fuzzy Delphi method has been used to screen and ensure the importance of the identified indicators and to select the final indicators. Experts' perspectives have been used to assess the importance of the indexes. Various methods have been proposed to aggregate the views of $n$ respondents. In fact, these aggregation methods are experimental methods that have been proposed by various researchers. For example, a conventional method has been considered for aggregating a set of triangular fuzzy numbers from the minimum $l$, the geometric mean $m$, and the maximum $u$.

$$F_{AGR} = \left(\min\{l\}, \prod\{m\}, \max\{u\}\right) \tag{4.1}$$

$$F_{AGR} = \left(\min\{l\}, \left\{\frac{\sum m}{n}\right\}, \max\{u\}\right) \tag{4.2}$$

$$F_{AVE} = \left(\left\{\frac{\sum l}{n}\right\}, \left\{\frac{\sum m}{n}\right\}, \left\{\frac{\sum u}{n}\right\}\right) \tag{4.3}$$

Any triangular fuzzy number resulting from the aggregation of experts' views for the $j$ index has been shown as follows:

$$\begin{aligned} \tau_j &= (L_j, M_j, U_j) \\ L_j &= \min\left(X_{ij}\right) \\ M_j &= \sqrt[n]{\prod_{i=1}^{n} X_{ij}} \\ U_j &= \max\left(X_{ij}\right) \end{aligned} \tag{4.4}$$

Where index $i$ refers to the expert. So that:

$X_{ij}$ : The value of the $i_m$ expert evaluation of the $j_m$ criterion

$L_j$ : The minimum value of evaluations for the criterion $j$

$M_j$ : The geometric mean of the experts' assessment of the performance of the criterion $j_m$

$U_j$ : The maximum value of evaluations for the criterion $j_m$

In this study, we have used the fuzzy mean method. The sum of the mean of triangular and trapezoidal fuzzy numbers can usually be summed up by a definite value which is the best corresponding mean. This operation is called de-fuzzing. There are several methods for de-fuzzing. In most cases, the following simple method is used for de-fuzzing.

$$x_m^1 = \frac{L + M + U}{3} \tag{4.5}$$

The other one of a simple way for de-fuzzing of triangular fuzzy numbers mean is as follows:

$$\begin{aligned} F_{AVE} &= (L, M, U) \\ x_m^1 = \frac{L + M + U}{3};\ x_m^2 &== \frac{L + 2M + U}{4};\ x_m^3 == \frac{L + 4M + U}{6} \\ \text{Crisp number} = Z* &= \max(x_{\max}^1, x_{\max}^2, x_{\max}^3) \end{aligned} \tag{4.6}$$

The $x_{\max}^i$ Values are not much different, and they are always close to $M$. The $M$ shows the mean of the sum of possible $m$ from triangular fuzzy numbers. However, the definite value of the largest calculated $x_{\max}^i$ is considered. In this study, the surface center method is used for de-fuzzing as follows:

$$DF_{ij} = \frac{[(u_{ij} - l_{ij}) + (m_{ij} - l_{ij})]}{3} + l_{ij} \tag{4.7}$$

According to the results of fuzzy mean and de-fuzzy output, the de-fuzzy value greater than 0.7 is acceptable, and an index with a score less than 7 is rejected. Although experts use their mental competencies and abilities to make comparisons, it should be noted that the traditional process of quantifying individuals' perspectives does not fully reflect the human thinking style. Triangular fuzzy numbers have been used to fuzz the experts' point of view. Experts' views on the importance of each indicator are collected with a 7-degree fuzzy spectrum.

Based on the classification of factors mentioned in the literature, the following basic conceptual model in response to the research question in the meta-synthesis section was presented as follows. In this conceptual model, 5 components, including leadership, attitude, resources, opportunism, and innovative learning, were identified. The conceptual model obtained from the meta-synthesis is presented in figure 1 based on the findings of the literature study.

### 4.1 Confirmatory factor analysis and testing hypotheses

The factor analysis method is the most appropriate way to assess the validity of the structure. Confirmatory factor analysis is a way to build questionnaires to measure concepts (hidden variables). The collected data were analyzed by SmartPLS 3 software with 80 research questionnaires. Due to the significance of the t-test, all path coefficients or factor loads were significant. In the present study, structural equation modeling methods, that is, the Partial Least Squares (PLS) method, were used to test the research hypotheses. The relationship between the studied variables in each of the research hypotheses is tested based on a causal structure with the partial least squares technique. The overall goodness of fitness (GOF criterion) is related to the general part of structural equation models. This means that by this criterion, the researcher can control the overall section fit after examining the fit of the measurement part and the structural part of the general research model. The GOF criterion Was invented by Tenenhaus et al. [113] and is calculated according to the following formula:

$$\text{GOF} = \sqrt{Avg(\text{Communalities}) \times R^2} \tag{4.8}$$

Communalities is the mean of the common values of each structure, and $R^2$ is the mean value of the explained variance of the model's endogenous structures. According to Tenenhaus et al. [113], the GOF index in the PLS

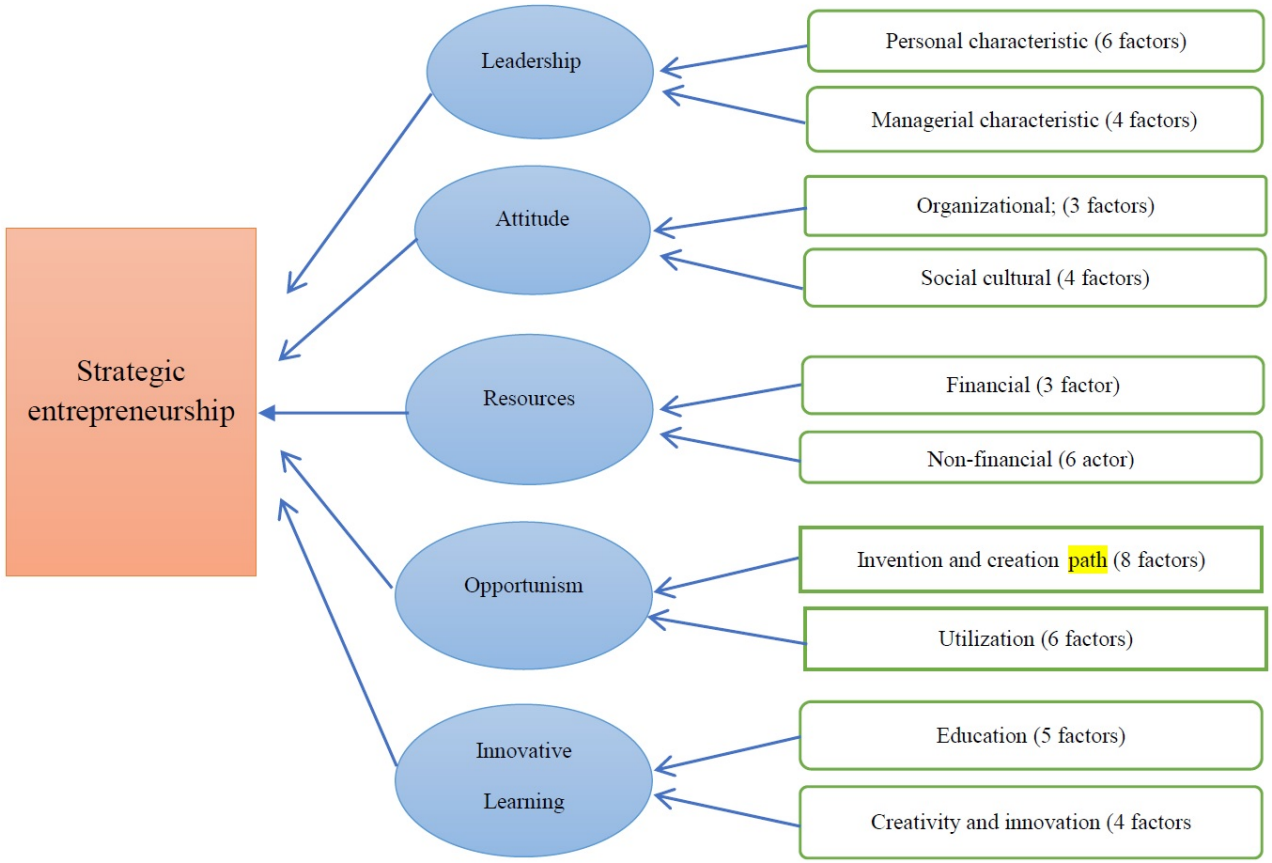


Figure 1: Conceptual framework of strategic entrepreneurship

model is a practical solution to this problem by examining the overall fit of the model and acts as fit indices in covariance-based methods and can be used to assess the validity or quality of the PLS model in general. Wetzels et al. [115] introduced three values of 0.1, 0.25, and 0.36 as a weak, medium, and strong values for GOF. GOF criterion calculation [113]:

$$\text{GOF} = \sqrt[2]{0.629 \times 0.335} = 0.459 \tag{4.9}$$

The coefficient $R^2$ is a criterion used to connect the measurement part and the structural part of structural equation modeling and shows the effect that an exogenous variable has on an endogenous variable. How much the value of $R^2$ for the endogenous structures of a model is high, the model fitness will be greater. Chin [27] sets three values of 0.19-0.33-0.67 as a weak, medium, strong model. The value of $R^2$ for model structures is 0.629. According to three values, the appropriate of the structural model's fitness is confirmed:

$$Avg(R^2) = 0.629 \tag{4.10}$$

According to the results, all the path coefficients have been obtained higher than 0.5, and also, the t-statistic related to any path coefficient was greater than 1.96. Therefore, all assumed relationships in the model are confirmed. The relationship of the studied variables in each of the research hypotheses is tested based on a causal structure with the partial least squares technique. After explaining the suitability of the model and determining that the model has good suitability, the research hypotheses are tested. According to the above table and figures, the confirmation path analysis of the research hypothesis has been confirmed according to the standard path coefficients and significant numbers and shows that the existing relationships are based on the extracted theories and data collection of the sample is at a significance level of 0.05 as follows.

According to Table 3 and performing calculations and also after reviewing the results of the structural model, the innovative learning component has the highest direct effect, and the leadership component has the lowest effect on

the financial dimension of knowledge-based companies. Also, according to the table's information, all components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the financial dimension of knowledge-based companies.

Table 3: Calculation of the effects of strategic entrepreneurship components on the financial dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' financial dimension | 0.206 | 3.222 |
| Attitude component ⟶ knowledge-based companies' financial dimension | 0.294 | 2.903 |
| Resources component ⟶ knowledge-based companies' financial dimension | 0.384 | 4.156 |
| Opportunism component ⟶ knowledge-based companies' financial dimension | 0.239 | 4.491 |
| Innovative learning component ⟶ knowledge-based companies' financial dimension | 0.495 | 8.356 |

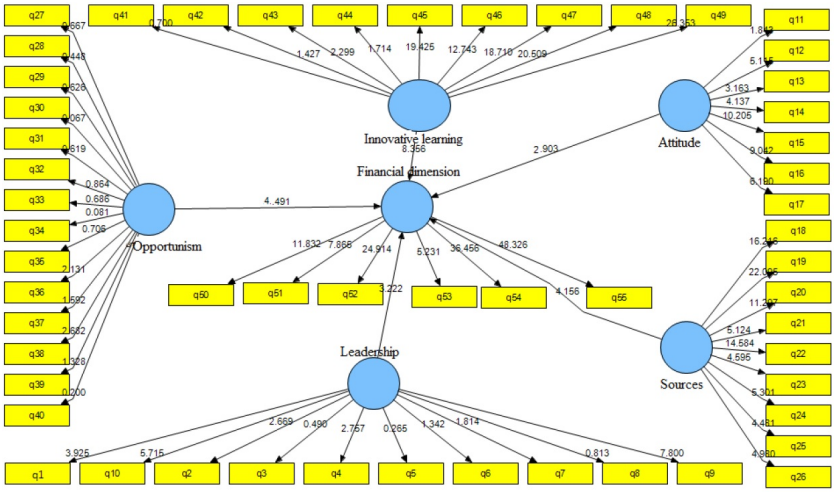


Figure 2: confirmative factor analysis chart on standard mode

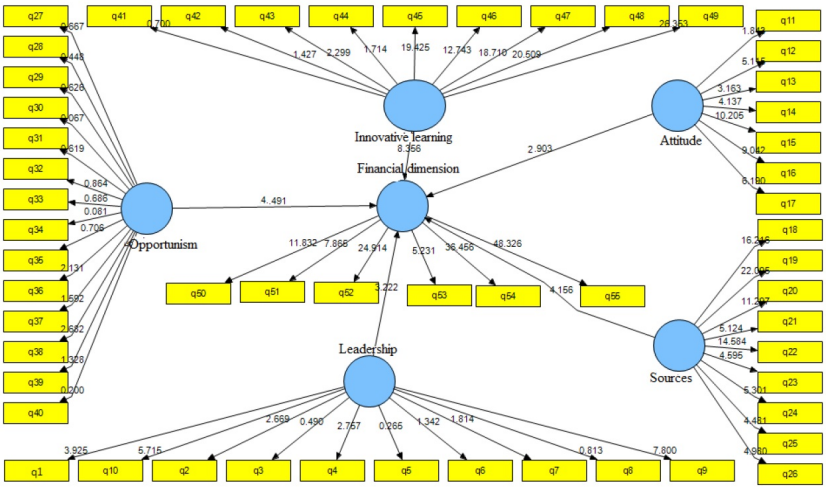


Figure 3: confirmative factor analysis chart on significance mode

According to table 4 and performing calculations and also after reviewing the results of the structural model, the resources component has the highest direct effect, and the attitude component has the lowest effect on the customers dimension of knowledge-based companies. Also, according to the table's information, all components of strategic entrepreneurship have a t value higher than 1.96. so, this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the customers dimension of knowledge-based companies.

Table 4: Calculation of the effects of strategic entrepreneurship components on customers dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' customers dimension | 0.124 | 2.048 |
| Attitude component ⟶ knowledge-based companies' customers dimension | 0.101 | 2.862 |
| Resources component ⟶ knowledge-based companies' customers dimension | 0.425 | 3.638 |
| Opportunism component ⟶ knowledge-based companies' customers dimension | 0.371 | 2.956 |
| Innovative learning component ⟶ knowledge-based companies' customers dimension | 0.215 | 2.902 |

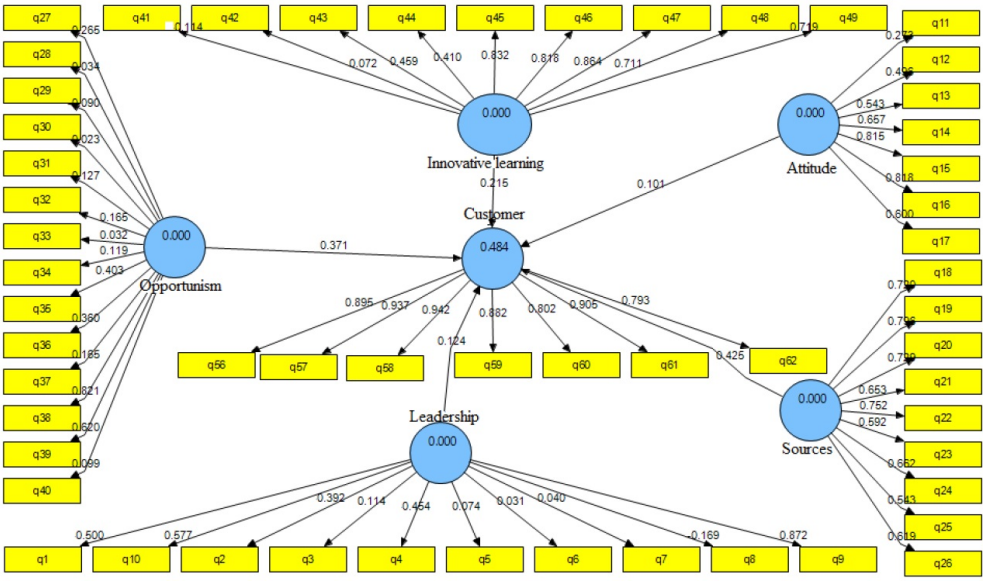


Figure 4: Confirmative analytical analysis chart on standard mode

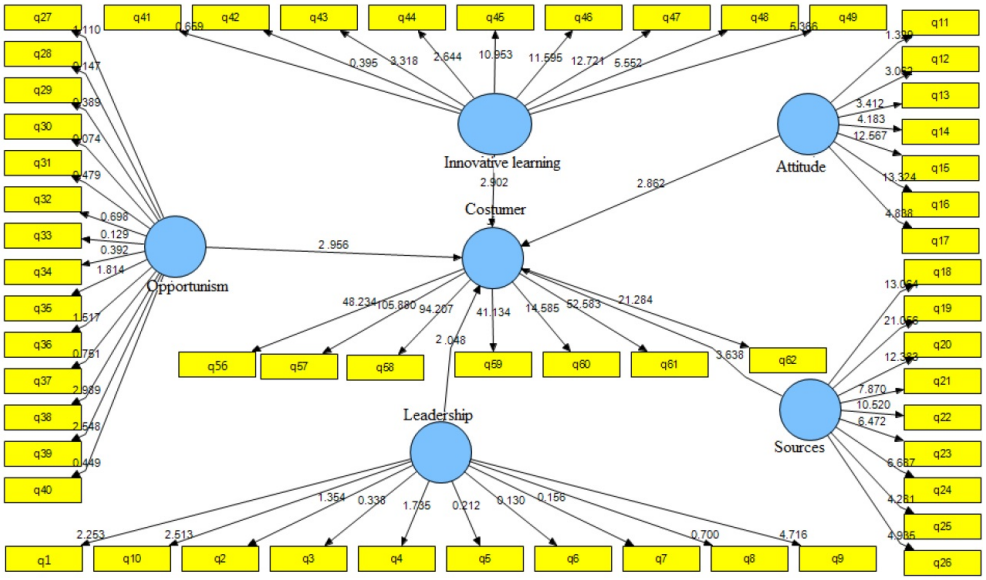


Figure 5: Confirmative factor analysis chart on significance mode

According to Table 5 and performing calculations and also after reviewing the results of the structural model, the opportunism component has the highest direct effect, and the innovative learning component has the lowest effect on the internal processes dimension of knowledge-based companies. Also, according to the table's information, all

components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the internal processes dimension of knowledge-based companies.

Table 5: Calculation of the effects of strategic entrepreneurship components on the internal processes' dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' internal processes dimension | 0.271 | 2.526 |
| Attitude component ⟶ knowledge-based companies' internal processes dimension | 0.147 | 2.945 |
| Resources component ⟶ knowledge-based companies' internal processes dimension | 0.162 | 2.800 |
| Opportunism component ⟶ knowledge-based companies' internal processes dimension | 0.407 | 2.498 |
| Innovative learning component ⟶ knowledge-based companies' internal processes dimension | 0.077 | 2.532 |

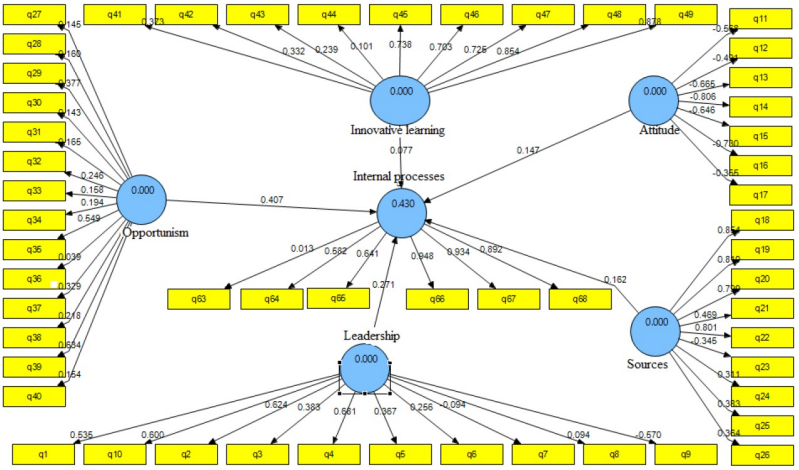


Figure 6: Confirmative factor analysis chart on the standard mode

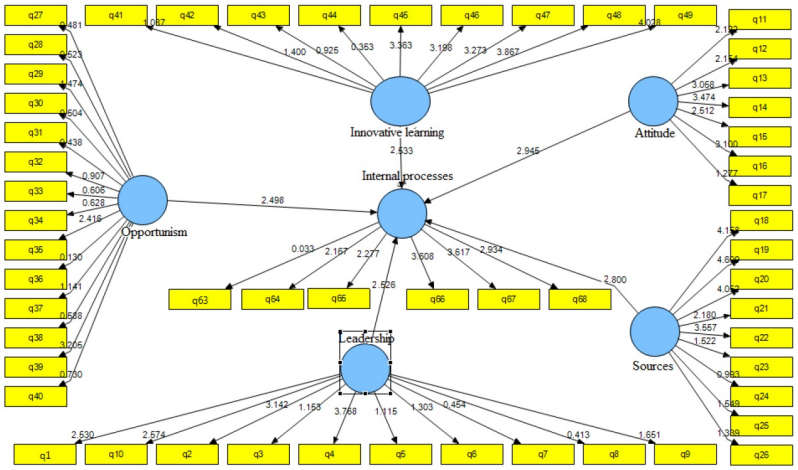


Figure 7: Confirmative factor analysis chart on the significance mode

According to Table 6 and performing calculations and also after reviewing the results of the structural model, the attitude component has the highest direct effect, and the resources component has the lowest effect on the learning and growth dimension of knowledge-based companies. Also, according to the table's information, all components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the learning and growth dimension of knowledge-based companies.

Table 6: Calculation of the effects of strategic entrepreneurship components on the learning and growth dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' learning and growth dimension | 0.169 | 2.720 |
| Attitude component ⟶ knowledge-based companies' learning and growth dimension | 0.257 | 2.151 |
| Resources component ⟶ knowledge-based companies' learning and growth dimension | 0.055 | 2.499 |
| Opportunism component ⟶ knowledge-based companies' learning and growth dimension | 0.211 | 2.062 |
| Innovative learning component ⟶ knowledge-based companies' learning and growth dimension | 0.196 | 2.818 |

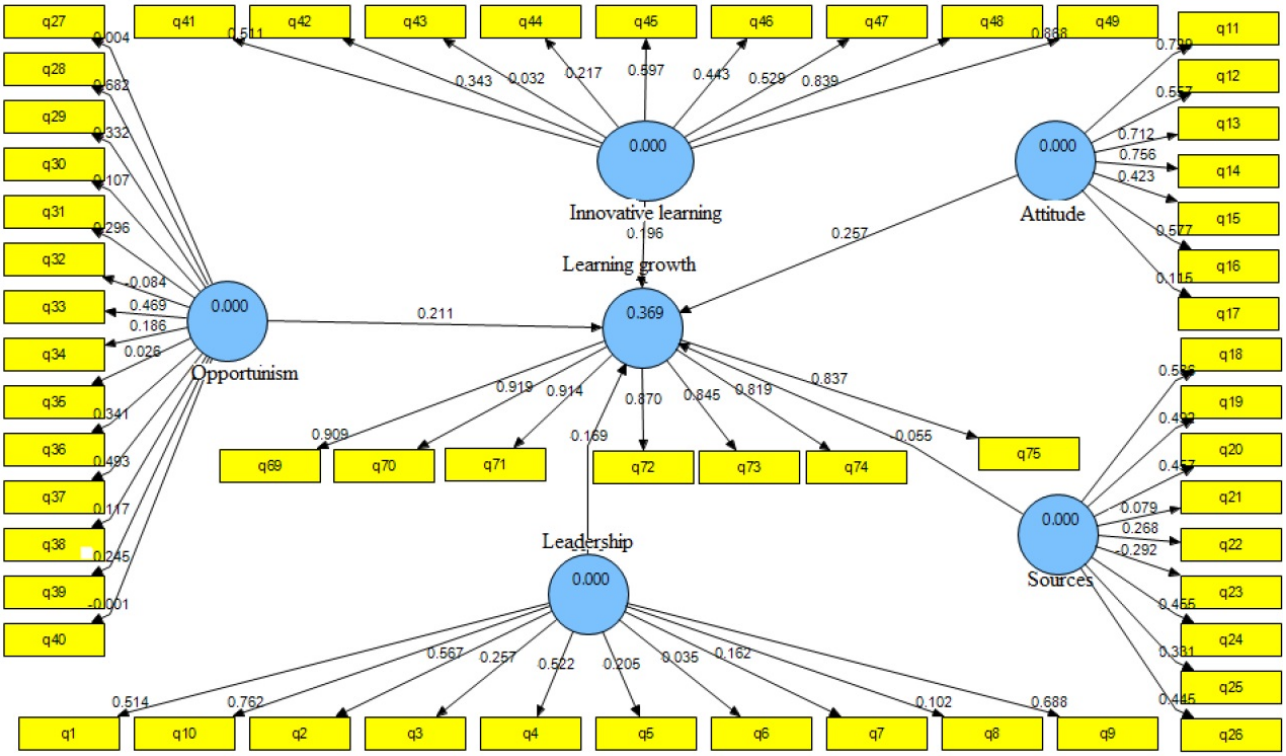


Figure 8: Confirmative analytical analysis chart on the standard mode

According to Table 7 and performing calculations and also after reviewing the results of the structural model, the innovative learning component has the highest direct effect, and the resources component has the lowest effect on the employees satisfaction dimension of knowledge-based companies. Also, according to the table's information, all components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the employees satisfaction dimension of knowledge-based companies.

According to Table 8 and performing calculations and also after reviewing the results of the structural model, the opportunism component has the highest direct effect, and the leadership component has the lowest effect on the environment and society dimension of knowledge-based companies. Also, according to the table's information, all components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis is confirmed. Hence, the components of strategic entrepreneurship affect the environment and society dimension of knowledge-based companies.

### 4.2 Complimentary analysis

In the continuation of this stage of the research, the enumerated categories by experts were examined. The results of the expert review have been reported in table 9. With respect to the results extracted from the table 9, the average comments of experts about all dimensions of strategic entrepreneurship are significantly higher than 3, which indicates

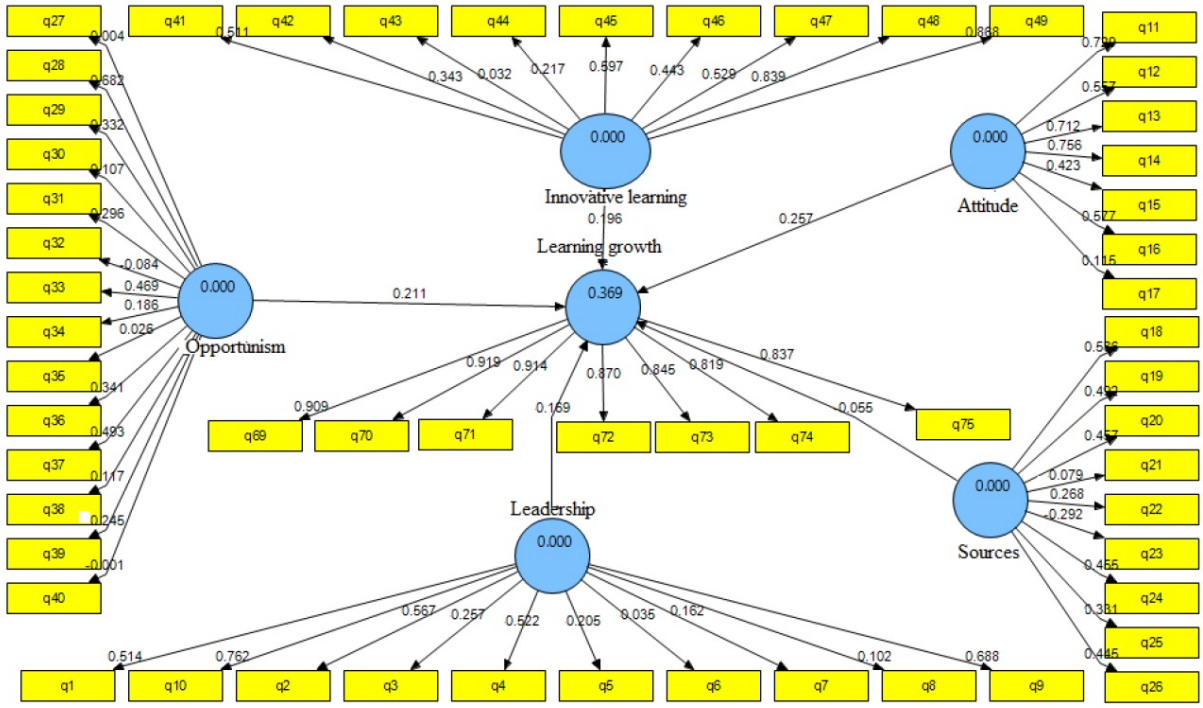


Figure 9: Confirmative analytical analysis chart on the significance mode

Table 7: Calculation of the effects of strategic entrepreneurship components on the employees satisfaction dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' employees satisfaction dimension | 0.281 | 3.867 |
| Attitude component ⟶ knowledge-based companies' employees satisfaction dimension | 0.341 | 4.371 |
| Resources component ⟶ knowledge-based companies' employees satisfaction dimension | 0.245 | 2.942 |
| Opportunism component ⟶ knowledge-based companies' employees satisfaction dimension | 0.312 | 3.086 |
| Innovative learning component ⟶ knowledge-based companies' employees satisfaction dimension | 0.375 | 5.186 |

Table 8: Calculation of the effects of strategic entrepreneurship components on the environment and society dimension

| **Studied path** | **Effect coefficient** | **T-VALUE** |
|---|---|---|
| Leadership component ⟶ knowledge-based companies' environment and society dimension | 0.134 | 2.067 |
| Attitude component ⟶ knowledge-based companies' employees satisfaction dimension | 0.277 | 2.576 |
| Resources component ⟶ knowledge-based companies' employees satisfaction dimension | 0.276 | 2.663 |
| Opportunism component ⟶ knowledge-based companies' employees satisfaction dimension | 0.408 | 2.980 |
| Innovative learning component ⟶ knowledge-based companies' employees satisfaction dimension | 0.190 | 2.102 |

that all dimensions are confirmed. In other words, the significance of all dimensions is less than 0.05, resulting in that all dimensions are important from the experts' point of view.

Also, the results of Friedman ranking test are as follows table. According to the results of table 10, the rank and

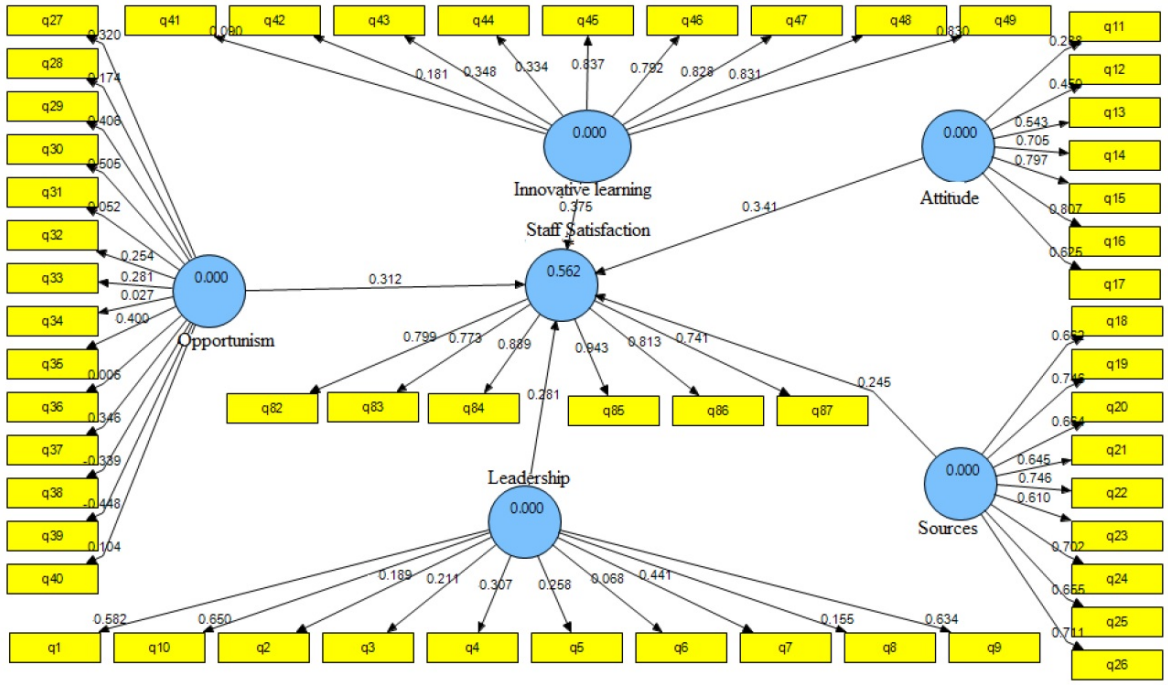


Figure 10: Confirmative analytical analysis chart on the standard mode

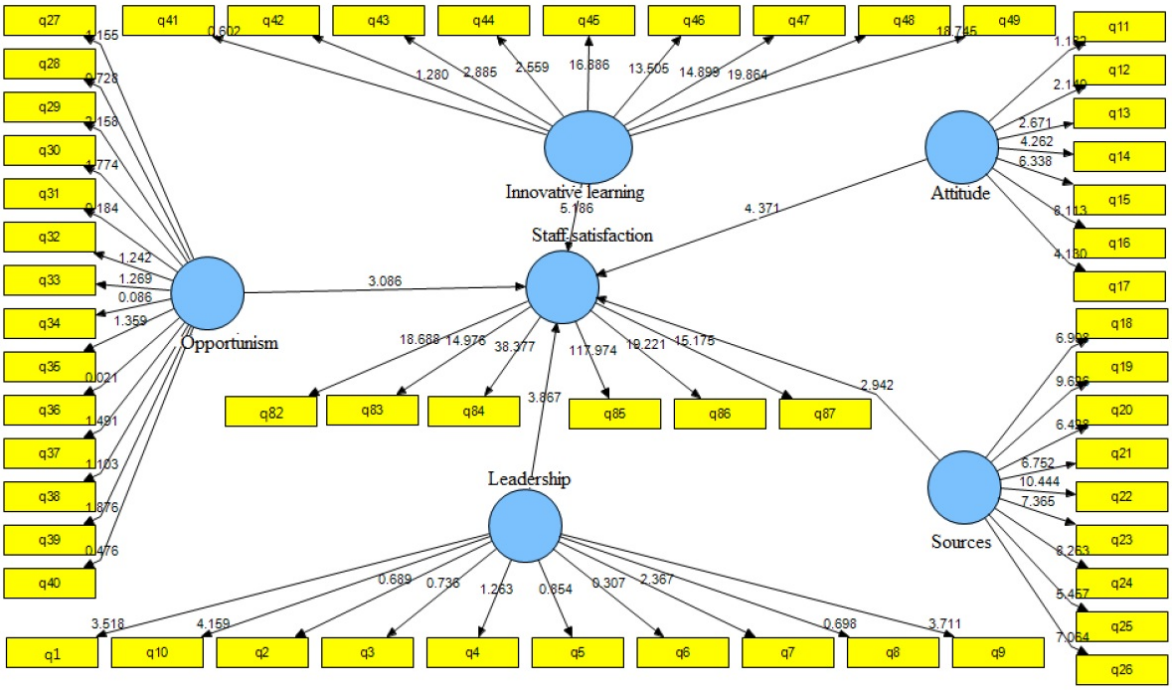


Figure 11: Confirmative analytical analysis chart on the significance mode

importance of experts' opinions regarding strategic entrepreneurship components are the characteristics of leadership, opportunism, innovative learning, attitude and resources, respectively.

## 5 Discussion and conclusion

The results of meta-synthesis findings were identified and classified in the form of 5 components including leadership, attitude, resources, opportunism, and innovative learning, and 10 sub-components including individual characteris-

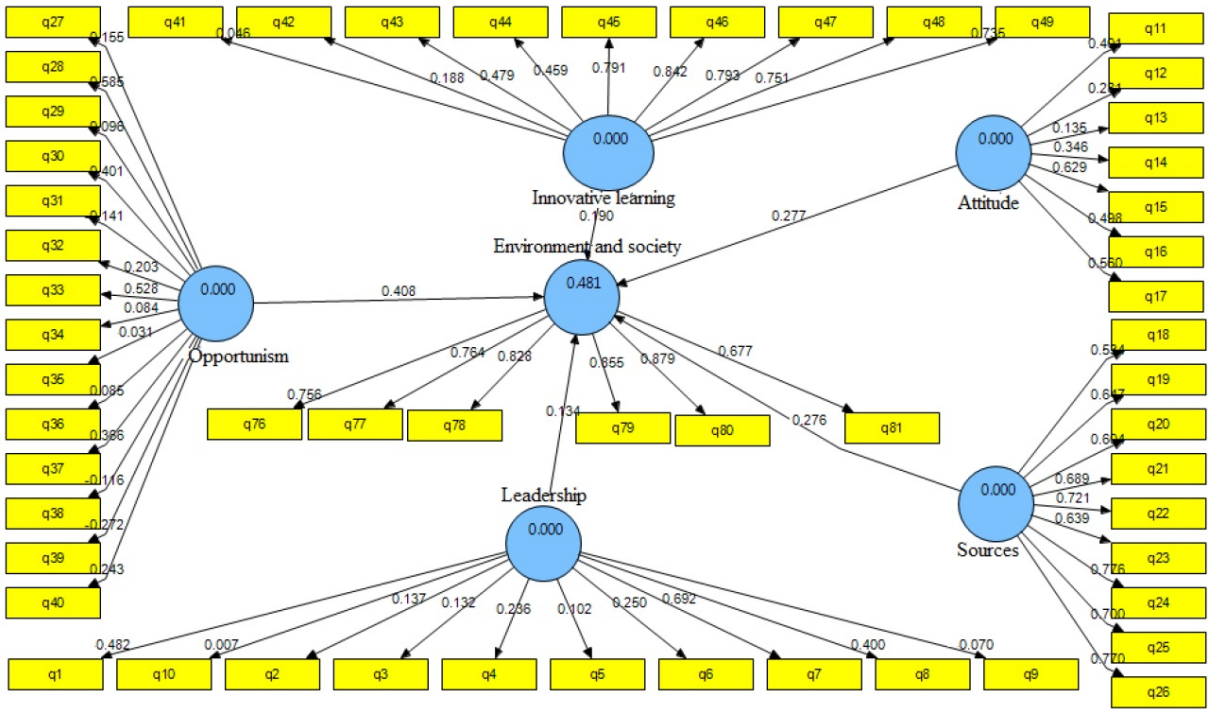


Figure 12: Confirmative analytical analysis chart on the standard mode

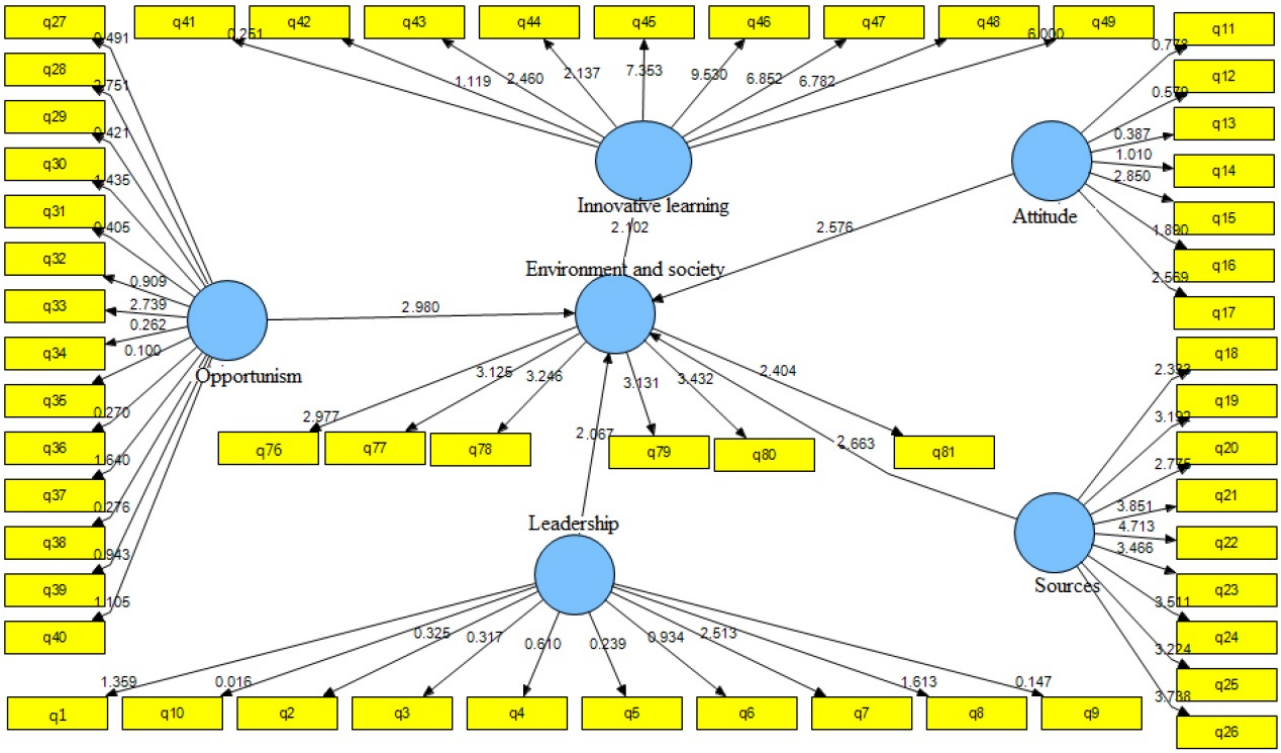


Figure 13: Confirmative analytical analysis chart on the significance mode

tics, managerial characteristics, organizational, social culture, financial, non-financial, discovery and creation path, utilization, education and creation and innovation and 49 concepts. Also, the rank and importance of experts' opinions regarding strategic entrepreneurship components are the characteristics of leadership, opportunism, innovative learning, attitude and resources, respectively.

Table 9: Investigation Results of experts' opinion

| Components | Number | mean | Standard deviation | T statistic | significance |
|---|---|---|---|---|---|
| Leadership | 8 | 4.50 | 0.3779 | 33.68 | 0.000 |
| Attitude | 8 | 4.16 | 0.4672 | 25.18 | 0.000 |
| Resources | 8 | 4.08 | 0.5499 | 21.00 | 0.000 |
| Opportunism | 8 | 4.15 | 0.4682 | 25.07 | 0.000 |
| Innovative learning | 8 | 4.26 | 0.6141 | 19.63 | 0.000 |

Table 10: Investigation of Friedman ranking test

| Components | Mean rank | Rank |
|---|---|---|
| Leadership | 4.38 | 1 |
| Attitude | 2.69 | 4 |
| Resources | 2.19 | 5 |
| Opportunism | 2.88 | 2 |
| Innovative learning | 2.76 | 3 |

In the present study, six hypotheses were obtained from qualitative propositions and tested by questionnaire data. after reviewing the results of the structural model of the strategic entrepreneurship components on the financial dimension of knowledge-based companies, the innovative learning component has the highest effect and the leadership component has the lowest effect also according to the obtained information, all components of strategic entrepreneurship affect the financial dimension of knowledge-based companies, so this hypothesis was confirmed. Based on the results of the structural model of strategic entrepreneurship components on the customers' dimension of knowledge-based companies, the resources dimension has the highest effect and the attitude dimension has the lowest effect on the customers' dimension of knowledge-based companies. Also, based on the obtained information, all the components of strategic entrepreneurship have a value of t above 1.96, so this hypothesis was confirmed. According to the calculations and reviewing the results of the structural model of strategic entrepreneurship components on the internal processes dimension of knowledge-based companies, the opportunism dimension has the highest effect and the innovative learning dimension has the lowest effect on the internal processes dimension of knowledge-based companies and also according to the obtained information, all the components of strategic entrepreneurship affect the internal processes dimension of knowledge-based companies, so this hypothesis was confirmed. According to the results of the structural model of strategic entrepreneurship components on the learning and growth dimension of knowledge-based companies, the attitude component has the highest effect, and the resources component has the lowest effect on the learning and growth dimension of knowledge-based companies. Based on the results, all components of strategic entrepreneurship also have a value of t above 1.96, in other words, this hypothesis was confirmed. According to the results of the structural model of strategic entrepreneurship components on the employee satisfaction dimension of knowledge-based companies, the innovative learning component has the highest effect, and the resources component has the lowest effect. Also, all the components of strategic entrepreneurship have a value of t above 1.96 which indicates the confirmation of the above hypothesis. After reviewing the results of the structural model of strategic entrepreneurship components on the environment and social dimension of knowledge-based companies, the opportunism component has the highest effect and the leadership component has the lowest effect on the environment and society of knowledge-based companies, and also all the components of strategic entrepreneurship affect the environment and social dimension of knowledge-based companies, in other words, this hypothesis was confirmed.

Results of the above hypotheses are consistent and compatible with the results of research by Askarizadeh and Nategh Golestan [11], Abbaspour Qomi [1], Haqiqi [53], Adab et al. [4], Davarian [31], Tavana [111], Hoque [59], Zhao and Li [119] and Sands et al. [103]. Based on the results in the meta-synthesis method, which achieved a model for strategic entrepreneurship in knowledge-based companies, we can present a strategy of what model should be used to achieve and implement strategic entrepreneurship. Overall, this model is an experienced guide to achieving strategic entrepreneurship goals in knowledge-based companies based on past studies. According to the research done so far, no research has been done in the field of knowledge-based companies with this title. Basically, the issue of strategic entrepreneurship is one of the new concepts that have the field of extensive research and due to its great importance for senior management of the organization is very important and decisive and this research is consistent with the needs of strategic management of the organization. This research is based on strategic entrepreneurship studies in the past decades. Therefore, the results of this research and the suggestions made based on this research have a practical aspect.

The leadership component of strategic entrepreneurship was effective in the performance of knowledge-based companies by applying new dimensions of a balanced scorecard.

Therefore, according to the results of this hypothesis, it is suggested that the effective role of managers and leaders in fundamental changes in the organization is undeniable, and they should create culture through social influence and lead them to achieve supreme goals and gain competitive advantage in a knowledge-based economy. The attitude component of strategic entrepreneurship was effective in the performance of knowledge-based companies by applying new dimensions of a balanced scorecard. Therefore, knowledge-based companies are suggested to pay attention to the organizational expectations of internal members as well as their expectations from interactions with foreign shareholders of the company. An effective entrepreneurial attitude and culture is characterized by multiple expectations and facilitates the company's efforts to manage resources strategically. An effective entrepreneurial culture encourages new, creative, and risk-taking ideas to be encouraged and tolerated; Promotes learning, supports the production, process, and management of innovations, and views continuous change as a transmitter of opportunities through a commitment to equal attention to opportunistic and advantageous behaviours, an entrepreneurial culture, therefore, supports ongoing research into entrepreneurial opportunities to take advantage of ongoing competitive advantage.

The resources component of strategic entrepreneurship was effective in the performance of knowledge-based companies by applying new dimensions of a balanced scorecard.

Therefore, knowledge-based companies are advised to pay attention to how the company is financed and its ability to raise capital. Because the influential factors in this sector are good communication with venture capital centres and how to adopt various financing strategies such as selling ownership shares, joint ventures, loans, licensing products, etc. The opportunism component of strategic entrepreneurship was effective in the performance of knowledge-based companies by applying new dimensions of a balanced scorecard. Therefore, managers of knowledge-based companies are advised to create a competitive advantage and not lose their ability to identify valuable entrepreneurial opportunities and to be able to maintain this advantage over time and try to find opportunities, and only It is in this state that wealth is created. The innovative learning component of strategic entrepreneurship was effective in the performance of knowledge-based companies by applying new dimensions of a balanced scorecard. Therefore, managers of knowledge-based companies are advised to properly know, acquire knowledge and awareness of environmental factors such as the needs and desires of customers, competitors, suppliers, and stakeholders, and by innovative learning, re-combining their knowledge and experiences to gain new knowledge in order to create for innovation. In order to achieve innovation, managers must pay attention not only to products, technologies, and processes but also to the organizational culture, norms, and values that govern the organization.

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