Explanation of the"Strategic Assessment Model" and verification of its impacts on the "Managerial Research Scientific Process" (Case Study: Iranian Research Institutions)

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Abstract

The variable "Research Scientific Process" (RSP) includes three levels such as Hypothesizing, Modeling, and Theorizing. These levels are affected by some stages such as the initial question, exploratory studying, hypothesizing, modeling, observing, analyzing, and concluding as it seems that the assessment of researchlevels and its stages, strategically improve, facilitate and accelerate the implications which are resulted by researchers at the Scientific Research Institutes. In the present study, the "explanation" of a "Strategic Assessment Model" (SAM)is the primary objective to "explain" the role of strategic components in evaluating the "Managerial Research Scientific Process" levels, in which the SAM's components include Compatibility, Coordination, Competitive advantage and Conceivability (strategic mixed as 4Cs),while the "verification" of the SAM's impacts on the "Managerial Scientific Research Process" is the secondary objective. In these reasons, the hypotheses and the model of the study have been explained by using the method of multivariate decision making called MADM and through the decision making models called G-AHP and ELECTRE to collect and combine the opinions of the experts, including three full-time faculty members of the universities and the higher education institutions of the country who are the reputed Iranian specialists in the field of strategic management. Also, to verify the impacts of this explained model on the research scientific process levels, the number of 384 people was randomly sampled by an unlimited community sampling formula. The explained model introduced as the conceptual model of the study and it was examined by the descriptive-correlative method, which uses the standard questionnaire in the form of statistical test of Chi-square, factor analysis, Kolmogorov–Smirnov, Structural Equation Model (SEM) and Bartlett's Sphericity. Finally, the verification of the study examined the impacts of the Strategic Assessment components on the Managerial Scientific Research Process levels, in which some structures verified according to the conceptual model of the study.

Keywords: Compatibility, Coordination, Competitive advantage, Conceivability, Hypothesizing Modelling, Theorizing.

Introduction

Different methods are to the extent in the scientific process of research which can be known as the most prominent characteristic of the studies in the present era. If hitherto the studying components have been considered as the additional value for researchers, today, these

elements become the foundation of the survival for the Scientific and Research Institutes (inspired by Mirsepassi, 2014).

These research institutes should be able to examine the situation, prerequisites, and mechanisms in their processes of orientation towards innovation and change, and on the other hand, provide the backgrounds for the success of presenting hypothesis and access to the concept of theory (inspired by Hutson & Lucas, 2014).

If we consider the definition of research as the review process of hypotheses; the research process (from the hypothesis recognition level to the theorizing level) could be known as the stages, including opportunity recognition, concept development, determination of resource requirements, achievement of requirements, implementation, management and finally utilization (inspired by Danaeifar et al., 2014).

To perform a research, the researcher describes the hypotheses, identifies and collects the required information and then explains the concepts relating to that research. After explaining the desired concepts of a research, it turns to make a decision to utilize the research hypotheses and finally, if the scientific & research institutes recognize that the performed research has reached to its desired goals, that time it can be said:"the research was successfully done" (inspired by Khalili, 2010).

On the other hand, the statements of experts and strategists in management and humanities represent the key role of strategic assessment on the effectiveness of studies and achieving their goals (inspired by Ohmae, 1992 and Ali'ahmadi et al., 2008).

If the influence of some evaluation components could be adequately explained, in this case, the scientific process would recognize a modern research for "separation", "creation", and "examination" of new and exquisite hypotheses and it would promise to achieve a higher rate of efficacy in the research and institutional activities (Quivy and Campenhoudt, 2006).

Therefore, an explanation of the research assessment model and verification of its impacts on the scientific process levels of a research, not also can play a significant role, but also can help the research institutions to find and use the optimum benefits to reach the positive consequences caused by the process.

The expression of the research problem

An applied research is a problem-oriented case which means that the process of a research should be revolved around a few issues or problem, from the step of observation to the step of the conclusion. Clarification of the problem or issue in scientific research is the most essential and functional subject which should be done in the first step of a research (inspired by Walker et al., 2004).

If the problem is not clear or in the other word is not explained, the whole next steps in a research, such as collecting the information, analysis, and conclusions, should suffer the bugs and defects which were not in its process and just are only caused by no clarification and lack of expression (inspired by Kotler et al., 2009).

Perhaps it is not an exaggeration that some researchers believe that a proper clarification of the issue/problem is equivalent to half of the research activity (Ahrandjani, 2014).So, this study is an applied problem-oriented review that seeks to solve one of the major issues in the scientific & research institutions of the country.

A scientific research is an inward research in an institutional process which is influenced by internal factors such as support and back up from the management, reward and strengthen mechanisms, studying culture, strategic assessment, and strategic planning. Therefore, the review of the role and impact of these factors in the scientific process of research, can improve, simplify, and expedite the implications of the scientific objectives of the research in research institutions (inspired by Poissant, 2010).

The organizational assessment components play a significant role in developing the studies of the Scientific Research Institutes which are inspired by researchers like Lorange (2006), Mintzberg (1994), Aaker (2014), David (2000), Clarke (2012), Kaplan (2008), and Walton (2005). If the relationship between these elements can be correctly explained during the process of hypothesizing, modeling and new/exquisite theorizing by recognizing new opportunities, so it will be promising to achieve a higher rate of efficacy in a research. Hence, on this basis and based on the given issue, the central questions of the present study can be summarized as follows:

1. How do the strategic assessment components have the significant and specific impact on the scientific research hypothesizing?
2. How do the strategic assessment components have the significant and specific impact on the scientific research modeling?
3. How do the strategic assessment components have the significant and specific impact on the scientific research theorizing?

The conceptual model (Figure-1) was applied after explanation, to review and respond to the questions mentioned above. In this study, the estimation'spath shows how the strategic assessment components impact on scientific process levels in which the levels include the hypothesizing, modeling, and theorizing.

The necessity and importance of the study

In a healthy system of studies, a reduction in theorizing is the primary factors of personification of market balance, and its result is surpassing the demand against the supply of researchable science theories and also against the increase of the studies' price. In our country, the unbalanced research-market occurred in cases in which theorizing indicators are weak, and in the case of importing some theories, we will face a rising cost. Using the external scientific resources and occasionally researchable resources are some of the reasons which prove this claim in recent decades (inspired by AyarRezaei, 2009).

Research issues experts know that the inefficiency in the investigation and development is one of the major factors for lack of health. It seems that studies'development system, unfortunately, has not any growth along with the other products and services sectors, so there is still a traditional effort in parallel to the improvements which come into action in producing the technology and also in the other service methods (inspired by Forouzandeh, 2009).

Although the "regulatory and control measures" intensified parallel working, but they balanced any disturbance in the research market/development in the first step of the executive authorities in which the scientific research trustees have appeared. Ofcourse the inefficient or low-effectiveness of such measures and also the determination of authorities determined in this belief if the correct and advanced assessment system replace to the current traditional assessment. The impacts of the other useful factors on balancing the research market/development gradually disappeared as well. In the philosophy of science and cognitive research methods, the health of researchers' system will be provided causes of imbalance in the R&D market (inspired by Ferench and Bell, 2014).

Also today, in most countries, either developed or developing, the category of the scientific process of research has been considered as the primary basis for the development so that the recent two decades in the West and some countries are pointed as the Golden decades of scientific research as well (inspired by Goldratt, 2015).Though many experts and management theorists outlined the scientific process of the research in scientific research institutions in the early seventies, but researchers did not seriously approve such measures until the beginning of the eighties (inspired by Goldratt, 2014). Management thinkers outlined the scientific investigation and the atmosphere on the Research Institutes' environment along with process approach. On the other hand,they prioritized the elimination of the items such as the structure of the research institutions and their intensive administrative bureaucracy, the terms of the remaining legacy in the government system, the significant obstacles in research and development of scientific research institutes and also the effort for moving towards the learner institutions (Alvani, 2009).

The orientation towards the philosophical frame and the necessity of considering the levels of analysis, activity, and also survive in research environments of the future caused to force the scientific research institutes of the country who faced with a massive flood of imported books to learn the new rules of the research methodology (Ahrandjani, 2014).

In fact, the research institutes can last in noisy environments while the research assessment can change their methods toward learning and institutionalizing the scientific research (Seyyed'javadein and Esfidani, 2014 and Salar, 2014).

This study analyzes all the primary factors of scientific research-evaluation through a systematic attitude which can be used even for the analysis of the other public or business institutions. Due to the importance of this issue and by considering the studies performed in the fields related to the scientific research along with the strategic assessments in research institutes of the different countries, unfortunately, there's not any study in this case in the scientific and research environment of Iranian institutes/universities. With regard to the rising importance of research & study in various research institutions ranging from industrial and academic, it seems so essential to do this review in the Iranian Research Institutes. The results of such research make awareness about the relationships between the "analysis levels" and "strategic assessment components" and give managers some advice to make decisions in the future.

An overview for the exploration of theoretical framework of the study

Review of literature and the history of the study considered in the three top sectors. Based on the conceptual model which has the dependent and independent variables, this arrangement adhered in the literature review as follows:

The variable "strategic assessment"

Perhaps no another construct movement has encompassed the organizational studies more than the term "strategic assessment". However, the inclusive nature of the phrase increases its misleading and difficulty to differentiate it from related terms, such as surveillance and control, as well as many concepts of the research area that share this ambiguity (inspired by Kotler et al., 2011).

Classic theorists who study in the management sciences have defined the assessment as:

The written documentation and discretion of the renewed review (Alvani and Sharifzadeh, 2012), the top flow of the message and encourage of researchers (Danaeifard and

Alvani, 2015), the horizontal movement of information (Zahedi, 2014), the observation and informal communication (Alvani, 2009), the circling behavior and feedback (Ahmadi and Selseleh, 2014) and the obligations resulting from the decision (inspired by Heady, 2006).A new field of research arose based on initial orientations of researchers related to strategic assessment in the middle of the twentieth century that includes:

1. The assessment path
2. The assessment content
3. The analysis of the research process
4. The assessment of the hypothesis-theory (the vertical direction) in are search scientific process (inspired by Quivy and Campenhoudt, 2006).

These orientations reflect research efforts for establishing the investigation of strategic assessment borders. Also, these fields mainly return to human relations movement in the 1940s, by which, social and managerial scientists started systematic observation of current assessment in research levels (inspired by Scott, 2008).

Features of research assessment can be studied by a review of variables compatibility, coordination, competitive advantage, and conceivability in scientific and research institutes (Rasouli and Salehi, 2014).A summary of the different components of scientific research assessment in rational, natural, and contingency approaches presented in Table-1.

Table-1: Assessment components in comparison with natural,rational, and contingency doctrines

Assessment Strategy	Rational	Natural	Contingency
Compatibility	Regular	Irregular	Semi-Regular
Coordination	Official	Unofficial	Semi-official
Competitive Advantage	Theorizing	Hypothesizing	Modeling
Conceivability	Structural	Nonstructural	Semi-structural

Source: *inspired by Scott W. (2008)*

The variable "research scientific process"

Through literature review in the scientific process of research, it indicated that this discussion in different periods had been an impressive evolution in which the new types of scientific methods of research in different eras have reached to emerging stage.

- In general, most researchers know the scientific research, as two broad types: individual and institutional research. In individual analysis, the individual researcher separately and independently acts to investigate, but in the institutional research, researcher as a person within a Research Institute, which was established in advance laws, acts to investigate and of course the functional differences between these two are considerable (Danaeifard and Alvani, 2014).

By the advancement of technology and the spread of assessment among researchers, other types of research make researchers interested that briefly pointed to them:

- The independent research: The process that leads to creating satisfaction and new demand. A research is a process of creating value by forming a unique set of resources to take advantage of opportunities. Accordingly, the independent investigator is the person who has the primary responsibility to collect the necessary resources for starting the review and study, and the fundamental attribute of being its model (Khalili, 2010).
- The institutional research: Or research within the institution is a process in which the modeling stage takes action to emerge through inducing and creating a research-driven culture in a Research Institute which established in advance. It is a set of activities which has included institutional resources and supports to achieve the results of research model (AyarRezaei, 2009).
- The organizational analysis: It is the concept of organizational commitment in performing the study and examining the issues. The difference between institutional and corporate analyses is that: in the former, all members of the investigation institutions have the spirit of research and this activity places all over there, but in the latter, a person is the source of modeling, theorizing, and studies in an organization (inspired by Daft, 1999).
- The public research: The federal researchers are usually active in great organizations with public institutions (like as planning, budgeting, and managerial organizations) and create new waves in various sectors including legislation (AyarRezaei, 2009).
- The title research: The process by which the individual investigator without a physical presence in a location

and merely remotely engages in researching. For example, consider a person that writes in America, publish in Asia and then distribute in Europe through the distribution channels, without any presence in these places (inspired by Walton, 2005).

- The value/social research: Value (social) or non-profit research is a process in which benefits made for a large number of people in the community by creating a model. Some non-governmental organizations such as NGOs are doing such activities (inspired by Rezaeian, 2008).
- The informational research: The process in which the individual researcher works in the information industry and the information field proceeds to model. It is also called content-maker for these people. The discovery and exploitation of opportunities (what is said in Virtual Institute) are performed by the same informant researchers (inspired by Clarke, 2012).
- The couple research: The process that paired couple after marriage and being together, proceed to the joint investigation. This category in Australia has been facing a growth equivalent to 90 percent, while the research and development discussion is separated from the family business topics as well; because, in the family trade, each of the family members, including mother, father, wife and children has the possibility of presence (inspired by Robbins, 2008).
- The technological research: The process in which the individual researcher by creating advanced technologies proceeds to study (inspired by Takeda, 2010).
- The females' research: If women alone and by herself continue to investigate, the name of this action is women's research. During the recent years, a lot of researches have been taking place to compare the type of the study of women and men (inspired by Robbins, 2008).

The variable "strategic Assessment" and "scientific research"

After describing the patterns which provided in the field of scientific research and strategic assessment, in this section, we summarize and polarize these trends. The models referenced in table-2 are based on the issued year of the model. Table-2 presents a proper framework to compare the patterns and the specific features of the pattern according to the research territory.

Table 2: Comparative study of research and assessment patterns

Item	Theorist	Issued Year	Research Pattern	Assessment Pattern
1	**Scott, W. Richard**	2008	Rational, Natural, Contingency Doctrines	Paradigms& Doctrines
2	**Robbins, Stephen P.**	2008	Organizational Behavior& Theories	LeadershipStyles
3	**Lorange, Peter et al.**	2006	Strategic Control	Control Levels
4	**Mintzberg, Henry et al.**	1994	Strategic Management	Managerial Strategies
5	**Aaker, David A.**	2014	Strategic Market research	Strategic Components
6	**David, Fred R.**	2000	Strategic Management	Managerial Strategies
7	**Daft, Richard**	1999	Organizational Planning	Organizational Strategies
8	**Ferench, W. L. & Bell, C.**	2014	Transformational Management	Evolutionary Process
9	**Heady, Ferrel**	2007	Adaptive Management	AdaptationMethods
10	**Quivy, R. & Campenhoudt,**	2006	Social & Managerial Methodology	Research Scientific Levels
11	**Kaplan, R. & Norton, D.**	2008	Strategy-driven Organization	Balanced ScorecardAssessment
12	**Clarke, Steve**	2012	Strategic Information Management	Informational components
13	**Takeda, Hitoshi**	2010	Synchronized Production System	Synchronic control
14	**Walton, John**	2005	Strategic Human Resource Development	Psychological Roles
15	**Ahrandjani, Hassan M.**	2014	Methodological Ground	Analysis Levels
16	**Ahrandjani, Hassan M.**	2014	Philosophical Foundations	Philosophical Framework

Source: arranged by authors

Research Background

The explanation and verification of the Strategic Assessment Model for the managerial research at the research institutions are very pristine and undisturbed issues as in detailed reviews which conducted on previous records, no similar items have been found among inside or outside the country's studies. However, the expression "Strategic Assessment Model" though rarely, but in the other fields and approaches was discussed as follows:

Tavana and Banerjee (1995) were the first ones who expressed the idea of a Strategic Assessment Modeling (SAM) through a study entitled "Strategic Assessment Model (SAM): A Multiple Criteria Decision Support System for Evaluation of Strategic Alternatives". They believed that the process of assessment should be considered as a lot of relevant information from both internal and external environments of organizations and it should help to the decision makers to use large volumes of information on strategic assessment; although many of these models have their limitations.

Hastings (1996) during the study titled "Strategic Assessment Model for management" studied how to have a financial assessment, but of course ignored review of the key issues in the process of strategic assessment due to its strong qualitative and intangible aspects. He defined strategic evaluation model as a method for ranking strategy based on quantitative, qualitative and intangible criteria. Based on its prioritizing relationship with the company's mission and the purpose of planning, such model was known to use the specialty of strategic thinkers in the enterprise to harness problems.

Sullivan (2006) studied "Strategic Assessment" and presented a model containing four stages. Step 1: where are we? Step 2: where are we going to? Step 3: how are we going to go there? And the Step 4: do we reach there? He believed that it is a systematic method to focus on guiding principles, long-term programs and critical systems for the sustainable health and the future organizational growth.

Khosravi and Hassanpour (2010) during the study titled "Strategic Assessment of Investment Opportunities with the actual disposals analysis approach" introduced two assessment criteria, including the cost of changing technology and the nature of the competition; while emphasizingthat the reviews of strategic assessment models require different scenarios.

Rahimnia and Hassanzadeh (2012) in their study titled "Strategic Assessment of domestic tourism capabilities and communication of Khorasan Razavi province" reviewed the variables influencing the strategic assessment and they presented four variables as effective factors in the strategic assessment including the "policy", "outsourcing", "beneficiaries & geographic", and "cultural/social conditions".

Explanation of hypotheses and model of the study

The multivariate decision making (MCDM) is used to achieve and explain an appropriate pattern in the model and hypotheses of the present study, which is one of the most prominent and considerable methods among the researchers for complex decisions in the recent decades. Several variables are considered in this kind of decision making including two categories as Multiple Objective Decision Making (MODM) and Multiple Attribute Decision Making (MADM) (Azar and Rajabzadeh, 2008).

The MADM models are used to explain appropriate hypotheses and model of the study. Also, the decision-making criteria for the present study through this method includes the study variables by which planned 36 questions to receive Expert's opinions consisting three full-time faculty members of Iranian universities and higher education institutions dominating in the fields of strategic management and social sciences.

Methods of multivariate decision making as the MADM are used in grouped decision making very much. In group decision making based on MADM, there's no need to gather the members of experts together for a decision making at a meeting to discuss about the structure of the problem, while in the Delphi method, the experts are asked through individual interviews and questionnaires, in which the final decision depends on the group meetings formation. But as an advantage, when a debate opportunity among members of the expert group is not provided to achieve consensus; using the Grouped AHP and multivariate decision making through the MADM is very useful which shows the field and relevant necessity for presenting the opinions as more specialized, therefore, this way even allows the experts to review the structure of the category, and analyze the existing issue through different levels. However, in the Delphi method, the researcher sets up the structure of matter in which the same thing itself can manipulate and even cause to make an error in the experts' opinions presentation. Though in some cases, the paired comparisons of the Experts-Delphi's response as a non-linear form which show the reaction of some entities regarding to a stimulus are more consistent with a psychological function, but in this study, it was trying to present embedded comments in the form of linear to simplify better understanding of the issue (Asgharpour, 2008).To examine the relationships between variables and the effects between research variables; the straight variables including" compatibility", "coordination", "competitive advantage", "conceivability", "hypothesizing", "modeling" and "theorizing" along with planning the specific questions, such as "whether the variable V has a positive and significant impact on variable V′ directly?" were sent to the experts and after receiving their opinions in a spectrum 0 and 1 (where 0 means the absence of a direct and specific impact and 1 means the existence of a direct and specific impact), relevant process

continued to form a decision matrix separately for each of the experts as below:

V1 = Variable "compatibility"

V2 = Variable "coordination"

V3 = Variable "competitive advantage"

V4 = Variable "conceivability"

V5 = Variable "hypothesizing."

V6 = Variable "modeling"

V7 = Variable "theorizing."

Table-3: First expert decision matrix

Expert No.1 (D1)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	1	1	0	0	1	1	1
Variable 2 (V2)	0	1	0	0	1	1	0
Variable 3 (V3)	0	0	1	0	1	0	1
Variable 4 (V4)	0	0	0	1	1	1	1
Variable 5 (V5)	1	0	0	0	1	1	0
Variable 6 (V6)	0	0	0	0	0	1	1
Variable 7 (V7)	0	0	0	0	1	1	1

Source: *arranged by authors*

Table-4: Second expert decision matrix

Expert No.2 (D2)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	1	0	0	0	1	1	1
Variable 2 (V2)	0	1	1	0	0	1	1
Variable 3 (V3)	0	0	1	0	1	1	1
Variable 4 (V4)	0	0	0	1	1	1	1
Variable 5 (V5)	0	0	0	0	1	1	0
Variable 6 (V6)	0	1	0	0	0	1	1
Variable 7 (V7)	0	0	0	0	1	1	1

Source: *arranged by authors*

Table-5: Third expert decision matrix

Expert No.3 (D3)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	1	0	0	0	1	1	1
Variable 2 (V2)	0	1	0	0	0	1	0
Variable 3 (V3)	0	0	1	1	1	0	1
Variable 4 (V4)	0	0	0	1	1	1	1
Variable 5 (V5)	0	0	0	0	1	1	0
Variable 6 (V6)	0	0	0	0	0	1	1
Variable 7 (V7)	0	0	1	0	1	1	1

Source: *arranged by authors*

To make the components as no-scale parameters which resulted by collecting the received comments; each of the decision matrices was normalized by using the Euclidean Norm as follows:

Table-6: First expert normalized decision matrix

Expert No.1 (ND1)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	0.5	0.5	0	0	0.17	0.17	0.2
Variable 2 (V2)	0	0.5	0	0	0.17	0.17	0
Variable 3 (V3)	0	0	1	0.5	0.17	0	0.2
Variable 4 (V4)	0	0	0	0.5	0.17	0.17	0.2
Variable 5 (V5)	0.5	0	0	0	0.17	0.17	0
Variable 6 (V6)	0	0	0	0	0	0.17	0.2
Variable 7 (V7)	0	0	0	0	0.17	0.17	0.2

Source: *arranged by authors*

Table-7: Second expert normalized decision matrix

Expert No.2 (ND2)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	1	0	0	0	0.2	0.14	0.17
Variable 2 (V2)	0	0.5	0.5	0	0	0.14	0.17
Variable 3 (V3)	0	0	0.5	0	0.2	0.14	0.17
Variable 4 (V4)	0	0	0	1	0.2	0.14	0.17
Variable 5 (V5)	0	0	0	0	0.2	0.14	0
Variable 6 (V6)	0	0.5	0	0	0	0.14	0.17
Variable 7 (V7)	0	0	0	0	0.2	0.14	0.17

Source: *arranged by authors*

Table-8: Third expert normalized decision matrix

Expert No.3 (ND3)	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	1	0	0	0	0.2	0.17	0.2
Variable 2 (V2)	0	1	0	0	0	0.17	0
Variable 3 (V3)	0	0	0.5	0.5	0.2	0	0.2
Variable 4 (V4)	0	0	0	0.5	0.2	0.17	0.2
Variable 5 (V5)	0	0	0	0	0.2	0.17	0
Variable 6 (V6)	0	0	0	0	0	0.17	0.2
Variable 7 (V7)	0	0	0.5	0	0.2	0.17	0.2

Source: *arranged by authors*

In order to avoid manipulating the responses which arrived from the experts and the possibility to enjoy the pristine views and to avoid the errors which occur in assessment while responding, it was trying to synthesize the comments of these specialists in a grouped decision-making matrix by a math method in which this combination can be called as a type of "quantitative consensus". In order to avoid interference of researchers in setting and regulating the structure of the research issue, the Delphi method was not used (inspired by Asgharpour, 2008).

A critical element in the group decision making is the importance terms of each member of the experts. In this regard, the comments of each member may have a special significance. This feature considered in accordance with the academic rank of the members as the significance for the first person with the academic rank of Full Professor was considered 3;for the second person with the academic rank of Associate Professor was considered 2; and for the third person with the academic rank of Assistant Professor was considered 1.Finally, to combine/synthesize the comments (quantitative consensus), the expert's decision-making group matrix calculated as follows by using the geometric mean and the GAHP method(inspired by Azar and Rajabzadeh, 2008):

Table-9: Experts decision making combined group matrix
(Synthesizing the comments)

Consensus	V1	V2	V3	V4	V5	V6	V7
Variable 1 (V1)	0.707	0	0	0	0.184	0.159	0.189
Variable 2 (V2)	0	0.630	0	0	0	0.159	0
Variable 3 (V3)	0	0	0.707	0	0.184	0	0.189
Variable 4 (V4)	0	0	0	0.630	0 .184	0.159	0.189
Variable 5 (V5)	0	0	0	0	0.184	0.159	0
Variable 6 (V6)	0	0	0	0	0	0.159	0.189
Variable 7 (V7)	0	0	0	0	0.184	0.159	0.189

Source: *arranged by authors*

In the present study, the ELECTRE (Elimination Et Choice Translation Reality) method as a model of MADM was used to combine the experts' comments. The application of this approach is based on the discovery concept of the relationships and the impacts through ranking p? q between study variables.

ELECTRE method is the same combination of experts ' comments on the particular issue .This method is used to make the best possible decision when the opinions of the experts are necessary ,or the complexity of the matter causes to make it unsolved through the usual methods .ELECTRE methods are based on collected opinions of experts .In this way ,the researchers prepared a questionnaire to send the experts and ask them to respond to the questions in the time period specified .The advantage of this approach is that the experts are not under the influence of each other 's beliefs as a group while presenting their own proposed response ; expressing their own opinions freely ,and keeping away from the anxiety in attendance .Also ,the review of the experts ' comments in the meeting may cause to destruct some useful suggestions .This method is one of the possible approaches for the explanation of the grouped judgment and is based on a structured process for collecting comments on a group of experts and integration of experts ' decision matrixes and also the mathematical method .The matter is how to use these opinions .In particular ,how can the experts ' opinions achieve a common useful opinion or a combined unit ?It is interesting that this problem can be solved by the ELECTRE method .The purpose of applying the ELECTRE method is the combination of the experts 'comments through the GAHP but without any error engagement which caught by means of face to face .These errors are existed by penetration of the dominant individuals ,spiritual turbulence (he imposition of personal interests that conduct to be disappointed about the opinions or votes)nd group pressure for the creation of conformity .Therefore ,three properties are recommended in ELECTRE method to avoid the disadvantages of face to face approach which gets the most

efficient process in gathering and combining the opinions of experts (nspired by Shi ,Yong et al .2009) .

These properties are as follows :

Anonymity : It means that none of the experts do know whose opinion asked or which idea is related to which person .

The use of the questionnaire or computer communication is one of the ways for reducing the effects of prominent people .

Virginity : It means that no control and no repeat are proper to reduce the spiritual turbulence in questions and polls .

Mathematically : It means that the use of a mathematical definition in a combination of the experts 'opinions and the reduction of group pressure for conformity is very suitable (bid) .

There are also several properties for the ELECTRE process as follows (nspired by Azar and Rajabzadeh ,2008) :

1) The proper design of the questionnaire to facilitate comments from experts .

2) No need to carry out the coordination meetings for the Group and apply pressure to achieve a consensus .

3) Using the systematic process , unbiased and reliable .

4) Experts anonymity and composition of their comments and decisions (bid) .

The prerequisites for the implementation of ELECTRE process are as follows (nspired by Asgharpour ,2008) :

First Search and find experts in the field of the study to poll ,

Second Planning and testing the questionnaire for proper word processing and removing possible ambiguities ,

Third . Sending the questionnaires to the experts and receiving the comments ,

Fourth . Making a decision matrix for each of the experts and combining them together (bid)

In the present study ,the implementation process initially identified concordance and discordance collection through the ELECTRE method (Table 11) and then the relevant concordance and discordance matrixes have formed .Since the formation of concordance matrix needs to assess the weights of research 's variables ;therefore ;based on the table - 9 ,the Shannon Entropy method was used to calculate weights that are as Table -10 :

Table-10: Calculating the weights of study variables by the Shannon Entropy method

Consensus	V1	V2	V3	V4	V5	V6	V7
V1	0.707 / -0.347	0 / --	0 / --	0 / --	0.184 / -1.693	0.159 / -1.839	0.189 / -1.666
V2	0 / --	0.630 / -0.462	0 / --	0 / --	0 / --	0.159 / -1.839	0 / --
V3	0 / --	0 / --	0.707 / -0.347	0 / --	0.184 / -1.693	0 / --	0.189 / -1.666
V4	0 / --	0 / --	0 / --	0.630 / -0.462	0.184 / -1.693	0.159 / -1.839	0.189 / -1.666
V5	0 / --	0 / --	0 / --	0 / --	0.184 / -1.693	0.159 / -1.839	0 / --
V6	0 / --	0 / --	0 / --	0 / --	0 / --	0.159 / -1.839	0.189 / -1.666
V7	0 / --	0 / --	0 / --	0 / --	0.184 / -1.693	0.159 / -1.839	0.189 / -1.666
-K	-0.514	-0.514	-0.514	-0.514	-0.514	-0.514	-0.514
E_j	0.126	0.150	0.126	0.150	0.800	0.900	0.809
$d_j = 1-E_j$	0.874	0.850	0.874	0.850	0.200	0.100	0.191
$W_j=d_j/\ d_j$	0.22	0.22	0.22	0.22	0.05	0.02	0.05

Source: *arranged by authors*

Table-11: Specifying the collections of Concordance and Discordance

Concordance Collection		Discordance Collection	
S_{KL}	j	D_{KL}	J
S_{12}	1,3,4,5,6,7	D_{12}	**2**
S_{13}	1,2,4,5,6,7	D_{13}	**3**
S_{14}	1,2,3,5,6,7	D_{14}	**4**
S_{15}	1,2,3,4,5,6,7	D_{15}	-
S_{16}	1,2,3,4,5,6,7	D_{16}	-
S_{17}	1,2,3,4,5,6,7	D_{17}	-
S_{21}	2,3,4,6	D_{21}	**1,5,7**
S_{23}	1,2,4,6	D_{23}	**3,5,7**
S_{24}	1,2,3,6	D_{24}	**4,5,7**
S_{25}	1,2,3,4,6,7	D_{25}	**5**
S_{26}	1,2,3,4,5,6	D_{26}	**7**
S_{27}	1,2,3,4,6	D_{27}	**5,7**
S_{31}	2,3,4,5,7	D_{31}	**1,6**
S_{32}	1,3,4,5,7	D_{32}	**2,6**
S_{34}	1,2,3,5,7	D_{34}	**4,6**
S_{35}	1,2,3,4,5,7	D_{35}	**6**
S_{36}	1,2,3,4,5,7	D_{36}	**6**
S_{37}	1,2,3,4,5,7	D_{37}	**6**
S_{41}	2,3,4,5,6,7	D_{41}	**1**
S_{42}	1,3,4,5,6,7	D_{42}	**2**
S_{43}	1,2,4,5,6,7	D_{43}	**3**
S_{45}	1,2,3,4,5,6,7	D_{45}	-
S_{46}	1,2,3,4,5,6,7	D_{46}	-
S_{47}	1,2,3,4,5,6,7	D_{47}	-
S_{51}	2,3,4,5,6	D_{51}	**1,7**
S_{52}	1,3,4,5,6,7	D_{52}	**2**
S_{53}	1,2,4,5,6	D_{53}	**3,7**
S_{54}	1,2,3,5,6	D_{54}	**4,7**
S_{56}	1,2,3,4,5,6	D_{56}	**7**
S_{57}	1,2,3,4,5,6	D_{57}	**7**
S_{61}	2,3,4,6,7	D_{61}	**1,5**
S_{62}	1,3,4,5,6,7	D_{62}	**2**
S_{63}	1,2,4,6,7	D_{63}	**3,5**
S_{64}	1,2,3,6,7	D_{64}	**4,5**
S_{65}	**1,2,3,4,6,7**	**D_{65}**	**5**
S_{67}	1,2,3,4,6,7	D_{67}	**5**
S_{71}	2,3,4,5,6,7	D_{71}	**1**
S_{72}	1,3,4,5,6,7	D_{72}	**2**
S_{73}	1,2,4,5,6,7	D_{73}	**3**
S_{74}	1,2,3,5,6,7	D_{74}	**4**
S_{75}	1,2,3,4,5,6,7	D_{75}	-
S_{76}	1,2,3,4,5,6,7	D_{76}	-

Source: *arranged by authors*

Formation of the concordance matrix is possible through the weights of the variables, as shown in Table-12:

Table-12: Formation of Concordance matrix

Concordance Matrix (I)	V1	V2	V3	V4	V5	V6	V7
V1		0.78	0.78	0.78	1	1	1
V2	0.68	—	0.68	0.68	0.95	0.95	0.90
V3	0.76	0.76	—	0.76	0.98	0.98	0.98
V4	0.78	0.78	0.78	—	1	1	1
V5	0.73	0.78	0.73	0.73	—	0.95	0.95
V6	0.73	0.78	0.73	0.73	0.95	—	0.95
V7	0.78	0.78	0.78	0.78	1	1	—
35.55	4.46	4.66	4.43	4.46	5.88	5.88	5.78

Source: *arranged by authors*

To determine the Effective Concordance matrix, threshold Ī was calculated through the following formula:

Ī = KL/m(m-1) = 0.85 (If any member of concordance matrix is greater than or equal to the threshold, the relevant component in the matrix G is 1 and otherwise is zero).

Table-13: Formation of Effective Concordance matrix

Effective Concordance (G)	V1	V2	V3	V4	V5	V6	V7
V1		0	0	0	1	1	1
V2	0	—	0	0	1	1	1
V3	0	0	—	0	1	1	1
V4	0	0	0	—	1	1	1
V5	0	0	0	0	—	1	1
V6	0	0	0	0	1	—	1
V7	0	0	0	0	1	1	—

Source: *arranged by authors*

Also by using the group decision-making matrix of experts (table-9), Discordance matrix was formed as table-14:

Table-14: Formation of Discordance matrix

Discordance Matrix (NI)	V1	V2	V3	V4	V5	V6	V7
V1		0.89	1	0.89	0	0	0
V2	1	—	1	1	0.29	0.30	0.30
V3	1	1	—	0.89	0.22	0.22	0.22
V4	1	1	1	—	0	0	0
V5	1	1	1	1	—	1	1
V6	1	1	1	1	0.97	—	1
V7	1	1	1	1	0	0	—
29.19	6	5.89	6	5.78	1.48	1.52	2.52

Source: *arranged by authors*

To determine the Effective Discordance matrix, threshold NI was calculated through the following formula:

NI = ? ? NIKL/m(m-1) = 0.69 (If any member of discordance matrix, is smaller than the threshold, the relevant component in the matrix H is 1 and otherwise is zero).

Table-15: Formation of Effective Discordance matrix

Effective Discordance (H)	V1	V2	V3	V4	V5	V6	V7
V1		0	0	0	1	1	1
V2	0	—	0	0	1	1	1
V3	0	0	—	0	1	1	1
V4	0	0	0	—	1	1	1
V5	0	0	0	0	—	0	0
V6	0	0	0	0	0	—	0
V7	0	0	0	0	1	1	—

Source: *arranged by authors*

The matrixes G and H have been combined with each other and the overall efficient and comprehensive model has been given and specified in table-16:

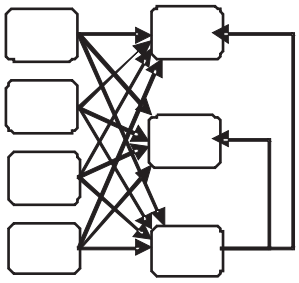
Table-16: Formation of the Overall Effective matrix

Total Effective Matrix (F)	V1	V2	V3	V4	V5	V6	V7
V1	—	0	0	0	1	1	1
V2	0	—	0	0	1	1	1
V3	0	0	—	0	1	1	1
V4	0	0	0	—	1	1	1
V5	0	0	0	0	—	0	0
V6	0	0	0	0	0	—	0
V7	0	0	0	0	1	1	—

Source: *arranged by authors*

The matrix of the table-16 shows the ranking as below which means a description of the hypotheses and explanation of the model of the study:

Figure-1: The effective relationship between the study variables

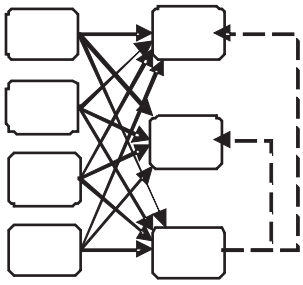


Source: *resulted by table-16*

Through a combination of experts' opinions

After discovering the applicable relationships between study variables through consensus of experts' opinions and through the use of ELECTRE method as a model of applied decision-making in MADM; the hypotheses and the pattern of the study pattern are developable as follows. The relationship which is shown as dotted in figure-2, are suggested for future study:

Figure-2: Explanation of the study model based on the experts' opinions combination



Source: *resulted by table-16*

Description of the hypotheses of the study

The hypotheses of this study are described due to the explanation of the conceptual model which has composed three main hypotheses and twelve subsidiary hypotheses as follows:

H1: Strategic assessment components have the significant and positive impacts on the "hypothesizing" level of a research.

H1-1: Component "compatibility" has the significant and positive impact on the "hypothesizing" level of a research.'

H1-2: Component "coordination" has the significant and positive impact on the "hypothesizing" level of a research.

H1-3: Component "competitive advantage" has the significant and positive impact on the "hypothesizing" level of a research.

H1-4: Component "conceivability" has the significant and positive impact on the "hypothesizing" level of a research.

H2: Strategic assessment components have the significant and positive impacts on the "modeling" level of a research.

H2-1: Component "compatibility" has the significant and positive impact on the "modeling" level of a research.

H2-2: Component "coordination" has the significant and positive impact on the "modeling" level of a research.

H2-3: Component "competitive advantage" has the significant and positive impact on the "modeling" level of a research.

H2-4: Component "conceivability" has the significant and positive impact on the "modeling" level of a research.

H3: Strategic assessment components have the significant and positive impacts on the "theorizing" level of a research.

H3-1: Component "compatibility" has the significant and positive impact on the "theorizing" level of a research.

H3-2: Component "coordination" has the significant and positive impact on the "theorizing" level of a research.

H3-3: Component "competitive advantage" has the significant and positive impact on the "theorizing" level of a research.

H3-4: Component "conceivability" has the significant and positive impact on the "theorizing" level of a research.

Presentation of the explained conceptual model of the study

The conceptual model of the study in accordance to the hypotheses and relevant objective paths is presented as below through expressing the "research levels" which may be impressed by components of the variable "strategic assessment" (Ofcourse, the study firstly examines relationships between the variables and their components and then investigate their impacts):

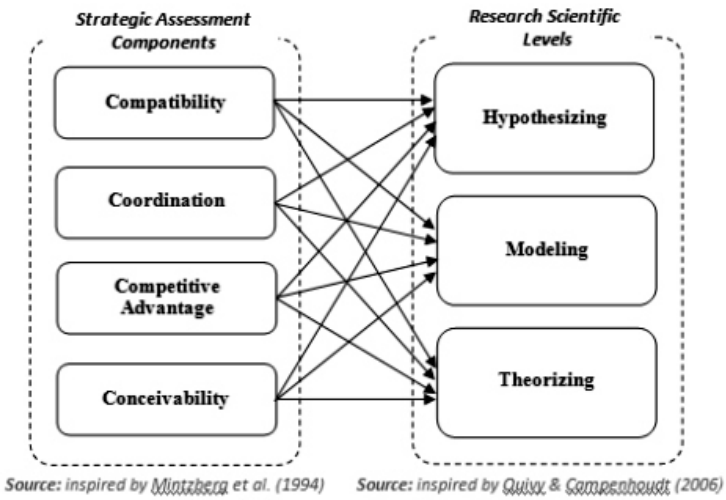


Figure-3: Conceptual model of the study

Methodology for the verification of the study

The present study is a practical review with regard to the categories based on the objective. The study looks for practical application of the strategic assessment in the field of scientific research. With regard to the categories based on how to collect data, this study is deemed descriptive. Therefore, the method of this study is descriptive and according to its nature, the descriptive method and correlation technique are carried out by survey branch. A descriptive study includes a collection of methods so that its aim is verification of the conditions or the phenomenon which are investigated. In a detailed analysis, the relationships between the variables are analyzed by using the correlation techniques, so that the status of the relationships between variables is investigated and analyzed by collecting the information through the field studies (Azar and Momeni, 2012).In the present study, the analysis of correlation matrix or covariance was used. Also, the structural equations and path analysis were used through the LISREL software to approve (or disapprove) the conceptual model of the study or in the other word to confirm the significant impacts between the components of the hypotheses.

Statistical society and sample

The statistical society of the study includes the researchers whose education are at least a masters in Research Institutes. The community has the following features:

First. They have the organization and organizational structure

Second. They scattered in all of the provinces

Third. They are active in one of the fields such as food, cosmetics, health, pharmaceutical, power, oil industries, or a combination of them. Of course, some of the research institutes in the field of automotive, etc. are active along with the applied scientific universities.

An unlimited number of people were accordingly assumed who create the society of the study at different organizational levels of research institutions; the random classification sampling method was used to define several classifications due to the existence of the research institutes in different provinces of the country. The sample size is equal to 384 people with a confidence level of 95%.

Validity and reliability of the study's tool

The present study's tool is the standard questionnaire/ interview as well as the complementary tool. The reliability of critical tool was calculated to ensure there liability of the tool. The survey assessed through the formula Cronbach's alpha to compile the final questionnaires after performing the pre-test. The amount of obtained alpha was equal to 0.87 which represents favorable reliability in the study. In addition to the determination of the indicators' reliability, which used to assess the variables, the Cronbach's Alpha for each of the variables was separately calculated that relevant results are provided in table-17.

Table-17: Cronbach's Alpha for the questionnaire variables

Variable	Hypothesizing	Modeling	Theorizing	Compatibility	Coordination	Competitive	Conceivability
r_α	0.8917	0.812	0.9015	0.7874	0.8011	0.8201	0.7602

Source: *arranged by authors*

The Chief Components study method used to answer the question whether questionnaires have the necessary validity. In this process, the number of 1 is put in each of the diagonal houses, until the subscription rate as the total common variance between variables and the specific variance and also the error variance have been obtained. Therefore, this method is searching for the factors which explain the total variance of the variables (inspired by Bowker & Lieberman, 1996). The Varimax rotation was used to identify the factors and determine the underlying structure. Orthogonal rotation method was used by assuming the independence of factors. In analyzing the data, one of the first outputs is the correlation matrix with the covariance among the questions as it is not possible to display this form here because of its large scale; (Khalili Sh., 2010). In this regard, it is necessary to consider two issues before the implementation of factor analysis: (1) the adequacy of sampling (Olkin) (2) to ensure that the correlation matrix is not the infrastructure of the factor analysis in society equal to zero (Azar and Momeni, 2012). The size of the KMO (Kaiser-Mayer Olkin) indicating the sampling adequacy which means that the other variables can explain the correlation between paired variables. If the KMO value is above 0.7, the factor analysis can be done, and if this value is, even more, the adequate sampling is more. The size of KMO in the survey questionnaire is 0.807 which shows the adequacy of the sampling in the study. Bartlett's Sphericity test used to check whether the correlation matrix of the data in the society is not zero. The purpose of implementing this test in the zero hypothesis (H0) means that the identity matrix is correct in the society. Bartlett test examines the hypothesis in which the observed correlation matrix belongs to an organization with the independent variable. To be a useful factor analysis model, some variables are required which have a correlation with each other. Otherwise, there is no reason for verifying the element model (Ibid). In this study, Sphericity Bartlett's test of the statistical characteristics is equal to 3442.423 and its significance is smaller than 0.0001. Therefore, in addition to the adequacy of sampling, implementation of the factor analysis is significant.

Statistical data analysis methods

The primary method of the analysis used in this study is a model of path analysis. To be a better explanation, we proceed to explain about the study but to use path analysis model, the analysis of covariance matrix or the correlation matrix is required. With Regard to the study objective and the analysis which performed on this different model, some names are used in these investigations. Here are the two main types of analysis which are associated with this study as follows:

- Factor Analysis
- Structural Equation Model (SEM) or Causal Models

Research findings

Factor analysis through the studying variables in path analysis

Factor analysis was used to create the required grades for path analysis, verification of the studying variables' structures and the analysis of the main components of the studying variables based on questionnaire questions. At this point, after review and analysis of the study's structures and accordingly approve of them; the relevant scores are stored which were used for path analysis. It is necessary to be consecutive over five steps which approve the tables which relate to any level; which use investigating structures for the next steps; and which perform the factor analysis of each structure of the study. These five steps are as follows:

i. Table of descriptive statistics
ii. KMO test and Bartlett's test
iii. Table of subscription rate
iv. The explained total variance
v. Matrix table of the components

Table of descriptive statistics

Strategic assessment components (as mentioned in Table-18) have the different measurement indicators. The mean value, standard deviation and the number of using observations are the examining topics in the descriptive statistics table of the structures. Indicators, which measure the structures, are included as below:

Table-18: Descriptive statistics of the strategic assessment component structures

Measurement Indicator	Mean	Standard Deviation	No. of Observations
"Conceivability" assessment component	0.321957	1.052228	320
"Compatibility" assessment component	0.610234	0.978074	320
"Coordination" assessment component	0.542830	0.913412	320
"Competitive advantages" assessment component	0.428571	1.044107	320

Source: arranged by authors

Among the measurement indicators in the above table, the maximum number of the mean relates to the compatibility index and the minimum relates to the conceivability index.On the other hand, the maximum amount of standard deviation among the indicators relates to the conceivability index while the minimum amount relates to the coordination index. The number of observations which used in the structures is also equal to 320.

KMO test and Sphericity Bartlett's test

As it can be seen in Table -19, the KMO value in Bartlett's test for the structure of strategic assessment components is equal to 0.664as the values close to 1 show the optimal sampling mode; so this value indicates that the sample values which are applied to analyze the relevant structure, are accepted. The approximate value of Chi-square in Sphericity Bartlett's test is equal to 694.764 including freedom degrees of 320 and also the significance level of 0.0005 in the present structural analysis which indicate that there is a meaningful relationship between the above-mentioned structural variables, so the relevant analysis of the structure is appropriate.

Table-19: KMO and Bartlett tests for the strategic assessment of structural components

Structure	valueKMO	Chi-square	Freedom	Sig.	Test result
Strategic assessment component	0.664	694.764	320	0.0005	Structure confirmed

Source: arranged by authors

Table of the subscription rate

As shown in table-20, all of the indicators which measure the structure of strategic assessment components were reviewed and compared based on subscription including the initial and the extracted values. The minimum amount of the subscription rate relates to the coordination index, and its maximum amount relates to the competitive advantage index. Proceeding the factor analysis also confirmed at this stage based on the subscription rate of obtaining values for structural indicators of strategic assessment.

Table-20: The subscription rate of the strategic assessment structure

Index Subscription rate	Conceivability	Compatibility	Coordination	Competitive advantage
Initial	1.00	1.00	1.00	1.00
Extracted	0.881	0.879	0.848	0.953

Source: arranged by authors

The explained total variance

At this point, based on the analysis method of the main components, we went on to verify the structure of strategic assessment components through the indicators' components which exist in the relevant structure. Table-21 indicates that the amount of particular value which was calculated for the above component is 3.561 and the value indicates the variance amount of observed variables which is verified by a factor (structure) of strategic assessment components.On the other hand, this amount can be forecasted 89.035% of the variable changes of this structure. Also, to analyze the main component mentioned above, the sum of squares of extracted values in this structure is equal to specific values of initialization.

Table-21: The total variance verifying the Strategic assessment structure

Main component	Specific values of initialization			Sum of squares of extracted values		
	Total	Variance percentage	Cumulative percentage	Total	Variance percentage	Cumulative percentage
Structure of strategic assessment component	3.561	89.035	89.35	3.561	89.035	89.35

Source: arranged by authors

Table of the components' matrix

Components' matrix of the structure is shown in table-8. The changes' percentage of measurement indicators can be anticipated and explained by verification of the principal part of the strategic assessment. It means that the correlation between the original component and the indicators has a few percent. The maximum correlation relates to the competitive advantage index, and its minimum relates to the coordination index which is higher than 0.44.

The final analysis

Based on the five steps process of factor analysis, the strategic assessment components as a structure or an element (part) were verified by the path analysis. With regard to the study variables, including hypothesizing, modeling, theorizing, associated structures were also verified.

Tables 22-25 give the statistical tests which relate to the factor analysis of research scientific process levels in the research institutes.

Table-22: Components matrix of strategic assessment structure

Index	Conceivability	Compatibility	Coordination	Competitive Advantage
Correlation with strategic assessment structure	0.938	0.948	0.921	0.976

Source: *arranged by authors*

Table-23:KMO and Bartlett test of hypothesizing structure

Structure	KMO value	Chi-square	Freedom degree	Sig.	Test result
Hypothesizing	0.889	2805.526	336	0.0005	Structure confirmed

Source: *arranged by authors*

Table-24:KMO and Bartlett test of modeling structure

Structure	KMO value	Chi-square	Freedom degree	Sig.	Test result
Modeling	0.913	1914.387	371	0.0005	Structure confirmed

Source: *arranged by authors*

Table-25:KMO and Bartlett test of theorizing structure

Structure	KMO value	Chi-square	Freedom degree	Sig.	Test result
Theorizing	0.873	1970.102	384	0.0005	Structure confirmed

Source: *arranged by authors*

There are some defaults, including normalized or standard variables through distributing the measured variables in a society which obtain the sample. If it is established such an assumption that any variable(regardless of other variables) has a normal distribution, and any variable in any combination with the other variables' values is also standard, so the assumption of normality is frequently instituted, and the only existing relationship between the variables is the linear relationship.

If many normality assumptions are correct, then the only relationship between variables is linear. Based on the premise normality test in seven structures of the study, no significant difference observed between studying structure data with distribution normality as their normality was confirmed. It means that all structures normally distributed. Table-26 shows a summary of the test results:

Table-26: Kolmogorov-Smirnov test results for the structures

Research structure	No. of observations	Kolmogorov-Smirnov statistic	Sig.	Test results
Hypothesizing	348	1.575	0.239	Zero-Assumption confirmed
Modeling	357	1.163	0.138	Zero-Assumption confirmed
Theorizing	361	0.823	0.518	Zero-Assumptionconfirmed
Compatibility Assessment	372	1.027	0.243	Zero-Assumption confirmed
Competitive Advantage Assessment	359	1.321	0.061	Zero-Assumption confirmed
Conceivability Assessment	362	1.238	0.093	Zero-Assumption confirmed
Coordination Assessment	343	1.009	0.261	Zero-Assumption confirmed

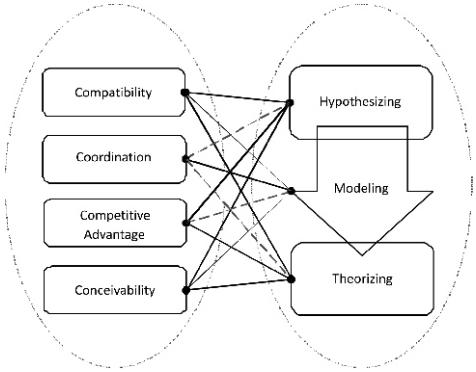
Source: *arranged by authors*

Conclusions and suggestions

Some suggestions were offered to improve and to facilitate the assessment of the scientific research process in the research institutes which were reviewed in the statistical society:

Table-27: Test results of hypotheses of the study

Hypothesis	Independent Variable	Dependent Variable	T_0	Path Coefficient	Sig.	Test result
H1-1	Compatibility	Hypothesizing	16.03	0.486	P<0.01	Zero-Assumption rejected
H1-2	Coordination	Hypothesizing	0.172	0.076	p>0.01	Zero-Assumption confirmed
H1-3	Competitive Advantage	Hypothesizing	11.28	0.43	P<0.01	Zero-Assumption rejected
H1-4	Conceivability	Hypothesizing	12.78	0.456	P<0.01	Zero-Assumption rejected
H1	Strategic Assessment	Hypothesizing	3.99	0.212	P<0.01	Zero-Assumption rejected
H2-1	Compatibility	Modeling	10.21	0.402	P<0.01	Zero-Assumption rejected
H2-2	Coordination	Modeling	6.32	0.27	P<0.01	Zero-Assumption rejected
H2-3	Competitive Advantage	Modeling	1.093	0.062	p>0.01	Zero-Assumption confirmed
H2-4	Conceivability	Modeling	3.85	0.43	P<0.01	Zero-Assumption rejected
H2	Strategic Assessment	Modeling	15.07	0.285	P<0.01	Zero-Assumption rejected
H3-1	Compatibility	Theorizing	11.69	0.457	P<0.01	Zero-Assumption rejected
H3-2	Coordination	Theorizing	1.835	0.078	p>0.01	Zero-Assumption confirmed
H3-3	Competitive Advantage	Theorizing	7.32	0.282	P<0.01	Zero-Assumption rejected
H3-4	Conceivability	Theorizing	11.21	0.418	P<0.01	Zero-Assumption rejected
H3	Strategic Assessment	Theorizing	6.17	0.266	P<0.01	Zero-Assumption rejected



Source: inspired by Mintzberg et al. (1994) and Quivy & Campenhoudt (2006)

Variable "Research Scientific Levels"

1. Test of 15 hypotheses (table-27) indicates that in the first category, there is a significant relationship between the hypothesizing with the compatibility, competitive advantage, and conceivability. In the second category, there is a significant association between the modeling with compatibility, coordination, and conceivability; and in the third category, there is a significant relationship between theorizing with compatibility, competitive advantage, and conceivability, and in other cases, there's no great connection. The test totally indicates a hidden priority which should be considered in relation to the model of the study.

2. The results of the statistical tests show that there is a significant and meaningful relationship between independent and dependent variables. For example, the path coefficients (correlation coefficients) which are equivalent to 0.285, 0.266 0.212 show that there are the positive and significant relationships between the variable "strategic assessment" with the research scientific process components such as hypothesizing, modeling and theorizing in which the maximum amount of relationship relates to the modeling.

   The structural equation of the conceptual model was calculated as follows:

   R2 = 0.735 and the error variance = 0.14 (hypothesizing) 0.212 = strategic assessment component

   R2 = 0.910 and the error variance = 0.06 (modeling) 0.285 = strategic assessment component

   R2 = 0.880 and the error variance = 0.07 (theorizing) 0.266 = strategic assessment component

   One of the factors which affects and plays an important role in developing the scientific research is recognition of the strategic assessment system within the Scientific Institutes and accordingly the relevant facilitation. Also a "common vision" among the employed members of the Scientific Research Institutions includes the most valuable items in the country which increase the studies within the enterprises and organizations.

Variable "Strategic Assessment"

3. Process study has the highest average rate among the different speculation methods in the research institutes and scientific institutions of the statistical society. Therefore, to hypothesize in a scientific research process, it is recommended that relevant senior managers systematically make the possibility for the experts and researchers to have an access to the research activities and values which could be served more desirable in hypothesizing, while simultaneously create the databases in this regard as well. Also, it periodically (weekly, monthly, bimonthly, seasonally, quarterly, half-yearly, yearly) takes some steps to study and to boost the hypothesizing through the release notes from various research units. To attract researchers to create new hypotheses, there are some other tactics such as a familiarity with the various sampling techniques, a similar comparison with leading companies and an establishment of on-the-job training courses for the staffs.

4. A consideration in the statistics shows that the new hypotheses for the units and individuals who relates to a researchhave the highest average among the requisitions. Therefore, by strengthening and facilitating strategic assessment to make an access possibility for researchers and to provide a hypothesis and to avoid engaging in complex administrative bureaucracy, it is necessary to make an easy possible information circulation (receive, send and track) in which the researchers do not involve the formal processes and administrative rigid rules.

5. The opinion which is provided through internal professionals in a research institutes about new hypothesis has the highest degree of importance, therefore it is recommended to obtain diverse perspectives and opinions, the scientists and researchers should access the internal professionals successfully.

6. The results of this examination confirm that among the concepts associated with the occurrence of serious hypotheses in Research Institutes and Scientific Institutions, the change of the research and development methods has the highest average. Therefore, it is recommended to study and carry out professional research in order to identify new and optimal methods of research & development of the necessary fields, including their access to information, reports, and the other relevant members by creating specialized committees which are composed of scientific research institutes' specialists, so that they can benefit the information inside the Research Institute while study the comparative review of external research institutes.

7. In order to review the primary hypotheses, there are several ways. Among these methods, review of the effectiveness rate of new hypotheses is higher than the other indicators such as estimating the rate of return and adapting the hypotheses to the goals and policies. Therefore, it is recommended to carry out a detailed review in which an organized system of assessment would be created so that relevant individuals and professionals in research institutes would be able to

exchange the information and the strategic assessment facilitates the information circulation among the individuals within the Research Institutes and Scientific Institutions. So whatever it can be carried out the process of information circulation among the various institutional layers and levels more fluently in order to determine the effectiveness rate of the new hypotheses, but it is expected to proceed the modeling in the research institutions and scientific institutions more speedily.

8. The possibility of access to the necessary and appropriate information resources in scientific research and research institutes for the modeling based on the findings of the investigation is the largest and most efficient support for other types of organizational resources. Availability and use of the various and sufficient compatibility in research institutes along with conceivability to access and to obtain the necessary information have a significant role in this access. Also by strengthening the role of managers and their human skills, in this case, it can also cause the researchers of Scientific Institutions and research institutes to communicate more with other institutional people and finally collect and obtain information which relates to the necessary resources for modeling.

9. For preliminary and trial modeling (initial test) at the Scientific Institutions and Research Institutes, a variety of methods can be benefited. The findings of the study show that the right choice among different research units for new trial modeling and hypotheses has the most importance and effectiveness of the seven factors. Therefore, it is suggested to provide the process of explanation, verification and the utilization of the knowledge and the practice of the right people by creating specific assessment mechanism. In this regard, the explanation of the criteria and the standards for selection, and also the selection of researchers along with the circumstance to inform the underlying layers of the research institutes and scientific institutions by their management are the most important matters.

10. The statistical results of the present investigation indicate that the assessment of the profitability rate in the modeling and planning a comprehensive program for final modeling commonly assign a larger share of the available factors. Therefore, it is suggested to carry out the study based on the real and correct data from reliable sources to enhance the effectiveness and success of modeling in research institutes of the country. Otherwise, the information circulation will also face the lags because of receiving the incorrect information about the research conceivability assessment.

11. In order to assess the effectiveness of the models which are made in research institutes of the country and due to the nature of their work, it is necessary to receive the views of the associated people to review.

12. In order to raise the effectiveness level of the process assessment of the made models, it is firstly suggested that individuals who are qualified with the necessary competencies across the organization would be selected by creating a correct system at the Scientific Institutions and Research Institutes and then the access would be provided for all the information related to the built models around the institutions by strengthening and supporting them. The use of multiple conceivabilities, the action freedom and the authority have the specific importance in raising the success rate of the assessment process of the effectiveness of hypotheses by communicating with all research scientific levels as well as providing the necessary facilities such as information assessment systems for assessors.

11- Verification of the SAM'simpacts on the RSP's components

In this section, the structural equations modeling techniques were used by the software LISREL to verify the correctness and accuracy of the hypotheses. The output of this software is visible in the followings:

Figure-5: Standardized coefficients

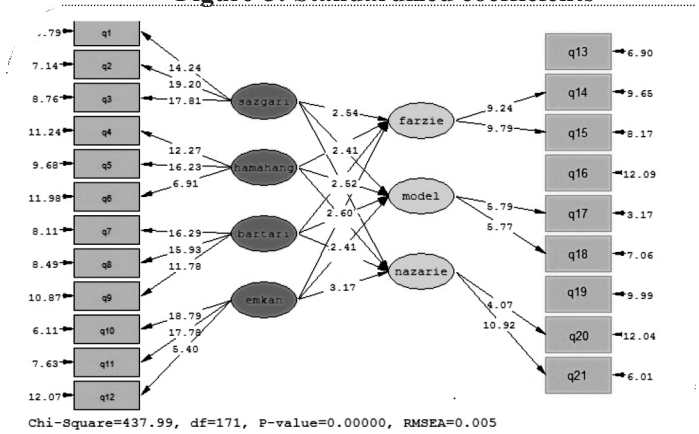
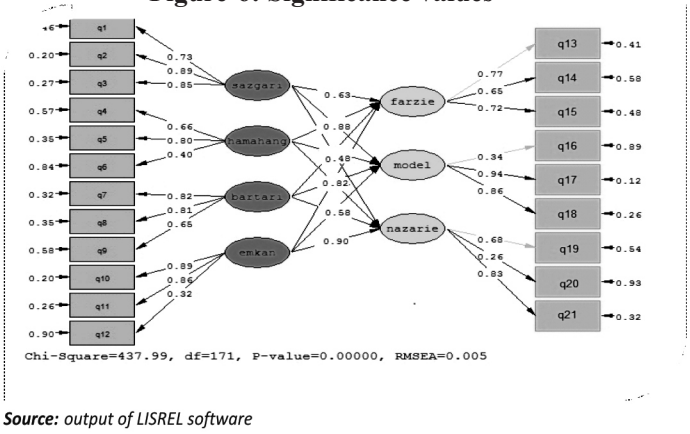


Figure-6: Significance values



Source: *output of LISREL software*

In the table-28 of standard coefficients and significance values for the each of relationships in the research, the model is observable in which the items that have been highlighted in red are not significant. According to this table it is ultimately determined that:

- Variable "compatibility" impacts on "hypothesizing" as the size of 63 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and important values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "compatibility" impacts on "modeling" as the size of 88 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and large values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "compatibility" impacts on "theorizing" as the size of 43 percent. Given that, a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and important values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "coordination" changes on "hypothesizing" as the size of 9 percent. Given that a significant amount of this relationship is less than 1.96, so this result obtained that the impact has not been significant. Therefore, this result achieved that this hypothesis of the study rejected.
- Variable "coordination" changes on "modeling" as the size of 48 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and important values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "coordination" changes on "theorizing" as the size of 10 percent. Given that a significant amount of this relationship is less than 1.96, so this result obtained that the impact has not been significant. Therefore, this result achieved that this hypothesis of the study rejected.
- Variable "competitive advantage" impacts on "hypothesizing" as the size of 5 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and excellent values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "competitive advantage" impacts on "modeling" as the size of 12 percent. Given that a significant amount of this relationship is less than 1.96, so this result obtained that the impact has not been significant. Therefore, this result achieved that this hypothesis of the study rejected.
- Variable "competitive advantage" impacts on "theorizing" as the size of 58 percent. Given that, a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and exact values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "conceivability" impacts on "hypothesizing" as the size of 82 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and meaningful values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.
- Variable "conceivability" impacts on "modeling" as the size of 37 percent. Given that a significant amount of this relationship is less than 1.96, so this result obtained that the impact has not been significant. Therefore, this result achieved that this hypothesis of the study is rejected.
- Variable "conceivability" impacts on "theorizing" as the size of 90 percent. Given that a significant amount of this relationship is more than 1.96, so this result obtained that the impact has been considerable. Regarding positivity of standard coefficient and important values, it can be said the impact is positive. Therefore, this result achieved that this hypothesis of the study is confirmed.

Table-28: Standardized coefficient

Relationship between variables			Standardized coefficients	Significance Values (T VALUE)
Compatibility	→	**Hypothesizing**	0.63	2.54
Compatibility	→	**Modeling**	0.88	2.41
Compatibility	→	**Theorizing**	0.43	2.11
Coordination	→	**Hypothesizing**	0.09	1.37
Coordination	→	**Modeling**	0.48	2.52
Coordination	→	**Theorizing**	0.10	0.98
Competitive Advantage	→	**Hypothesizing**	0.58	2.38
Competitive Advantage	→	**Modeling**	0.12	1.21
Competitive Advantage		**Theorizing**	0.58	2.41
Conceivability		**Hypothesizing**	0.82	2.60
Conceivability		**Modeling**	0.37	2.26
Conceivability		**Theorizing**	0.90	3.17

Source: *output of LISREL software which arranged by the corresponding author*

Fit goodness of research model

The fitness indexes show the claimed conceptual model of the study somewhat is fitted to the empirical data which are provided by applying the modeling test through the structural equation of LISREL software. Unlike current statistical tests which are confirmed or rejected by a statistic; a bunch of indicators is introduced in the structural equation modeling. State of fitness indexes for a conceptual model of the study are on the table-29:

Table-29: Outputs of preliminary model of the research

Index Classification	Name of index	Primary model	Acceptable fitness
Absolute Fitness Index	The level covered by K square	0.000	P>5%
	Fit goodness index	0.923	GFI>90%
	Modified fit goodness index	0.911	AGFI>90%
Comparative Fitness Index	Normalized fit index	0.908	NFI>90%
	Comparative fit index	0.934	CFI>90%
	Relative fit index	0.955	RFI>90%
	Additive fit index	0.943	IFI>90%
Thrifty fitness index	Normalized Thrifty fit index	0.623	PNFI>50%
	Mean root of square estimation error	0.005	RMSEA<10%
	Normalized K square for degree of freedom	2.56	The value between 1-8

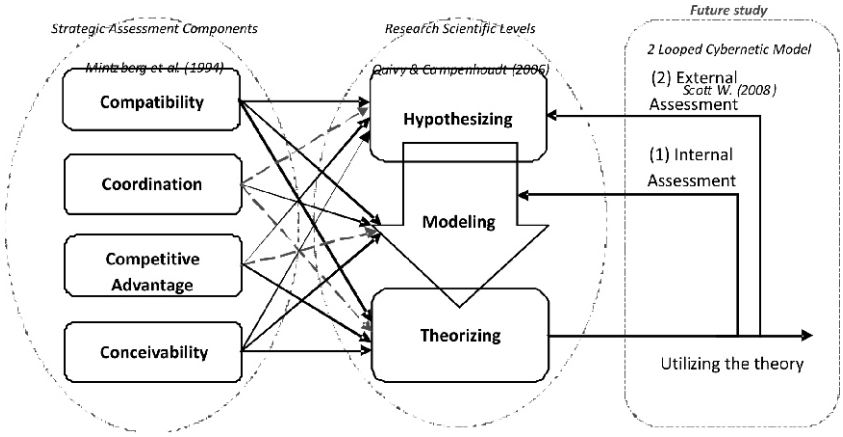
Source: *output of LISREL software which arranged by the corresponding author*

All fitness indicators of the model have a proper state as specified in table-29. For example, a significant chi-square level of the standard is lower 5%, which indicates that the empirical data appropriately support the conceptual model of the study. Also, the mean root of the estimation error square is also less than 10%, and this index also confirms fitness of the model. Ofcourse a general confirmation of the model is not a conceptual model in which all relationships in the model have been verified as the existing relationships in the model, therefore it should be investigated individually as in this reason, component fitness indicators are under study. In the other words, after total fitting, the model should also test the component relationships of the model; whether the component relationships defined in the model have any suitable fitness or not. The significance of the component fitness indexes is shown in the table-29.

Suggestions for future study

Regarding to the researcher's experience during the present study and based on theories related to scientific research and the strategic assessment as well asthe growing stream of researchers and research institutional studies in the statistical society on the one hand, and the lack of clear application patterns due to no performance of scientific research in the field on the other hand; the background of researchers on the ground of this sector are very varied and exciting.

Therefore, the present study that comprehensively examined the strategic assessment model and its impacts on theresearch scientific process, has been specified some of the relevant operational and managerial deficiencies which carry out the additional and broad studies in the different subjects to make the growth and any expansion in these two concepts as the SAM (Strategic Assessment Model) and the RSP (Research Scientific Process).



Source: *inspired by Mintzberg et al (1994) and Quivy & Campenhoudt (2006) and Scott W. (2008)*

Figure-7: Final Conceptual Model of the Research

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