JOURNAL OF MECHANICS OF CONTINUA AND MATHEMATICAL SCIENCES
www.journalimcms.org

ISSN (Online) : 2454 -7190 Vol.-15, No.-4, April (2020) pp 365-388 ISSN (Print) 0973-8975

IDENTIFYING, CLASSIFYING, AND PRIORITIZING THE RESEARCHERS' STRATEGIC COMPETENCIES IN OIL INDUSTRY RESEARCH CENTERS

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https://doi.org/10.26782/jmcms.2020.04.00029

Abstract

Changes caused by the knowledge economy, including the emergence of new idea flows in management, methods and structure of organizations, have led to a change in the roles and skills needed for researchers in organizations. As new age organizations focus on intellectual property, organizational aspirations and organizational change, the researchers, as the wealth creators, in order to quickly adapt to new situations and develop their competencies in the\ competitive market, need to constantly change and develop a new identity for themselves. Since competencies have a prudential feature through describing skills and behavioral approaches, identifying and explaining researchers' competencies in oil industry research institutes is of particular importance. Accordingly, the present paper seeks to identify the factors and indicators of researchers' competencies in oil industry research centers using scientific methods and surveys and then identify, classify, and prioritize researchers' strategic competencies using statistical methods. According to the results obtained from the present study, creativity and innovation, integration, accountability and customer orientation competencies have higher priorities; however, all identified strategic competencies have a significant positive distance to mean. With the help of the results of this study, researchers and managers can clarify expectations about each other

Keywords : Researchers' Competencies Prioritization, Industrial Research Centers, Strategic Competencies, Oil Industry

I. Introduction

Because competencies have a prudential feature, and describe the skills and behaviors that researchers and research managers in the oil industry research centers needed to create a new culture and skills to meet future challenges, defining and explaining the researchers' competencies is of particular importance both for research institutes and researchers in oil industry research centers.Clarifying the expectations of research centers and explaining the oil industry research activities requirements to assist the future development of oil industry research centers regarding researchers' engagement and developmental projects are among the benefits of identifying competencies and determining their importance in this industry.

The researchers' strategic competences in the oil industry research centers can be seen as a robust basis for establishing consistent performance standards which are formed by a common language about what is needed and expected by oil industry research centers.Because of applying the results of its findings to specific and intra-organizational problems, and also for addressing the researchers' strategic competencies (including the components and dimensions of competencies), the present study is considered as an applied research. The research is also considered as a descriptive-survey in terms of the data collecting approach.

Also, since the mission of the Institute for International Energy Studies is to conduct non-managerial research in the oil industry, and the present study also considers the research competencies, not the management ones, and other non-executive competencies, not technical and specialized ones, so this institute is selected as the statistical population.Library studies and surveys, interviewing relevant academic and oil industry research experts, Delphi method, examining related models, questionnaires, analyzing findings based on mathematical models, and statistics, competency software, SPSS, Excel and Lisrel software and other future studies methods have been used in the present study and in accordance with the procedure shown in the figure 1.

Figure 1.the research procedure

Definitions

Competence

The ability to utilize or apply a set of relevant knowledge, skills, and abilities needed to successfully execute "critical aspects of work" or tasks defined in a work environment. This should not be confused with qualification, but competence describes a behavior rather than trying to describe the performance level.

Competencies often considers as a basis for skill standards that provide a "level" of knowledge, skills, and competence needed to succeed in the workplace as well as a potential indicator to evaluate the competence achievement.

Competency model

One of the challenges facing enabling an organization to compete effectively is adapting employees to their job needs. Using job analysis is a traditional approach to formulating job performance models, in which different procedures are used to identify and describe the job critical requirements and differentiate the high and low performance [XIV].Job analysis focuses on issues such as what employees are really doing in their jobs, perceptions of what people are doing and what should be done in the future. Two problems may arise when using job analysis to describe and describe jobs. Firstly, the description of traditional written jobs is only for describing the activity and may not clearly explain the outcomes needed for the organization to succeed; and the second is to describe traditional jobs rapidly in today's fast-changing and dynamic environment [IX]. Criticism of job analysis indicates that performance models are very specific to jobs and are more focused on the job rather than the individuals and values and goals of the organization. Hence, a relatively new approach is proposed to define and determine the performance called the competence model [I], [II].

Competency models often contain a brief description of jobs, values, and key organizational goals for preparing a list or selecting from an existing list of the most important competencies required for performance that align with organizational values [I]. The competency model is based on the approach that competencies are defined as effective and visible behaviors that are tied to organizational outputs [V]. 'Introducing the competencies needed for senior executives in key positions in the organization', 'trying to eliminate any gap from competence through effective selection', 'training and development', 'ensuring recognition and reward for good performance' are among the goals of the competency-based approach [XIII].

According to Lawler (1994), by identifying and emphasizing employees' skills that coordinate and support core strategies and competencies, the competency model approach can equip organizations to the competitive advantage [V]. A complete picture of job requirements is provided in competency models that will increase the chances of those who will be hired, and ensure about a systematic and orderly interview process. It can also help to distinguish between competencies that improve with training and those that are more difficult to improve [XII].A set of competencies is also defined in the competence model, by definitions and descriptions of behavior for a particular or a group of jobs [XI].and it is a narrative description of the competencies needed for a job or the job category that results from observing the employees' satisfying or phenomenal performance. A competency model identifies a set of competencies and behaviors, directly related to the work to be done, and the skill levels for each behavior (Treasury Board of Canada Secretariat [X].As the ability to perform activities within the work domain according to established standards, the competency model is in fact a measurable model of the abilities and behaviors needed to perform the job successfully [VII].

The competency model is at the heart of organizational performance because it guides learning and training processes and strategies, content development, and performance evaluation ([III], [VI], [XX], [X]). In order to develop competencies, individuals need to know both the knowledge and opportunities for learning skills in practice [IV].The competency model is a certain behavioral description of skills and features needed by employees to be effective in a given job [VIII]. and it is also useful to determine the required abilities and features to meet current and future employees' requirements and focus on employees' development efforts to eliminate the gap between the available and needed capabilities([III]).The competency model is a detailed description of the competencies needed for the full success or an exemplary performance in a job, role, or organization [VIII]. and a decision-making tool in the human resource management system in the processes of recruitment, selection, training and development, performance management and succession planning in order to meet the organizational requirements including a list of competencies, definitions, and behavioral indicators [II].Also, as it translates business requirements to training and operational needs for HR professionals, the competency model in many organizations helps leaders to develop within the organization to enhance the organization's performance from good to excellent and to provide a clear picture of what managers need to be successful in their careers. For many researchers, the competency model is the basis of any human resource system [I], [II].According to Herlin [VIII]. formulating a competency model has a positive relationship with individual and organizational performance. The competencies required for each managerial position are identified when formulating the competency model, and consequently, the organization can appoint managers who are more likely to have optimal performance.

Reviewing Competency Models

The competency models are discussed in two parts in the following: the general models and the models designed and used for oil companies.

General Models

Boyatzis model

The Management Association in the US delegated a competency modeling research to Mac Company. The research was resulted to a model presented by Boyatzis in 1982 as follows. He has divided management competencies into six dimensions, including goal and operations management, leadership, human resource management, marketing leadership, focus on others, and specialized knowledge which indicators are presented in Table 1 [VIII].

Table 1. Boyatzis model

Dimensions	Index	Dimensions	Index
Objective and Operation Management	Efficiency-orientation	Staff management	Using the power of command
	Being passive		Developing people
	Diagnostic use of concepts	Focus on others	Perception of reality
	Aware of the consequences of		Self-control

Dimensions	Index	Dimensions	Index
	achieving the goal		
leadership	Self Confidence		Endurance
	Verbal presentation		adaptation
	Perception	Specialized knowledge	Specialized knowledge
Human Resource Management	Social power		
	Group management process		

Reference: Cochrane, 2009: 56.[VIII].

Stone's Management Competency Model

This model, which is presented in Table 2, was formulated in 2001 and categorizes competencies into six dimensions: communication, development and partnership, core practice, technical expertise, organizational effectiveness, and personal effectiveness.

Table 2. Stone's Management Competency Model

index	Dimension	index	Dimension
Verbal communication	Communications	Building relationships	Organizational effectiveness
written communication		Public Relations	
Conflict management		Evaluation and Accountability	
introversion		Organizational review	
Educational Skills		Resource Management	
Presentation skills		Balancing work and personal life	Personal effectiveness
Teamwork& partnership	People Development and participation	flexibility	
Facilitate teamwork		Individual education and personal learning	
Volunteerdevelopment and management		Job Management	
Control and coaching		Result-orientation	Action - orientation
Delegation of power		Change implementation	
Customer-orientation		innovation	
Technical expertise	Technical expertise		
Technology integration			
Problem solving			

Beyham's et al model

Introduced in 2002, this model has four dimensions interpersonal skills, leadership skills, management or business skills, and personality traits. The characteristics of this model are listed in Table 3 [VIII].

Table 3. Beyham's et al model

index	Dimension	index	Dimension
Entrepreneurship	Business management	Effective communication	Interpersonal skills
Business Frost		Effectiveness of Interpersonal Culture	
Strategic orientation		Customer-orientation	
Global intelligence		Developing strategic relationships	
Job handling		Persuasiveness	
Equipping Resources		Creating organizational talent	Leadership
Operational decision making		Leadership for Change	
Proper self-control	Personality features	Coaching and Delegation	
adaptation		Influencing others	
Result-orientation		Team development	
energy		Expert	
Learning-orientation			
optimist			
Performance oriented			
Understanding the environment			
Value for diversity			

Zenger & Folkman model

The leadership competencies are classified in five dimensions in Zenger and Folkman (2002) that to differentiate the organization: personality, personality capacity, result-orientation, interpersonal skills, and organizational change leadership. The model characteristics are listed in Table 4 [VIII].

Table 4. Zenger & Folkman model

Index	Dimension	Index	Dimension
communications	Inter-personal skills	high integrity and loyalty	personality
Motivating others to perform well		Technical and professional expertise	Personality capacity
Building relationships		Problem analysis and solution	
Being a team and working as a team		Innovation	
Partnership and Collaboration		Pay attention to own development	
Developing strategic vision and vision	organizational change leadership	Result-orientation	Results-orientation
Champion of Change		Formulating flexible goals	
creating internal group contacts with the organization's external environment		Responsiveness about results	

Kript & Mansefield Management Competency Model

Introduced in 2003, this model states the manager's competencies in three areas: employees with two competencies, leadership, communication and influence, job domain with two competencies of achieving the results and follow-up and problem solving and self-management domain. The model indicators are presented in Table 5.

Table 5. Kript & Mansefield Management Competency Model

Dimension	Item	Index
Employees	Communication and influence	Paying attention to communication
		Verbal communication
		Written communication
		persuasiveness
		Interpersonal awareness
		Penetration skills
		Establishing collaborative relationships
		customer orientation

Dimension	Item	Index
	others direction	Empowering others
		Change Management
		Development of others
		Performance Management
		Create a focus of attention
		Motivational support
		Teamwork nurturing
Job	Achieving results	innovation
		Entrepreneurial orientation
		nurturing innovation
		Result-orientation
		Precise and scrutiny
		Decisiveness
	Problem follow-up and solving	Gathering diagnostic information
		Analytical thinking
		Leading thinking
		Conceptual thinking
		Strategic thinking
		Technical expertise
	Self-management	Self Confidence
		Stress Management
		Individual trustworthiness
		flexibility

Ounz et al Model

The management competencies triangular with four dimensions are provided by Owens et al (2003) which includes strategic business skills, individual capability, cultural processes skills, and change and human resources skills. The model indicators are listed in Table 6 [VIII].

Table 6. Ounz et al. Model

index	dimension	index	dimension
Change and Culture Management	cultural processes and change skills	Strategic thinking and planning	Strategic Business Skills
Organizational Design		Customer-orientation	
Consultation		leadership	
Facilitator		Strategic Sector Analysis	
project management		communications	Personal capability
HR planning	HR skills	Coaching	
Recruitment, training and development		Self-awareness	
Performance management, rights and benefits		Professional training	
Labor relations, conflict management		participation	
		Integrity	

Managerial Assessment of proficiency Tool (MAP)

The dimensions of this tool include executive skills, communication, monitoring and diagnosis. The model components and indicators are listed in Table 7 [III].

Table 7. Managerial Assessment of proficiency Tool (MAP)

Dimension	Item	Index
Executive	Time management and prioritization	Prioritizing
		Practicing self-discipline
		Controlling interruptions
		Doing important things instead of everything
	Setting standards and goal-setting	Support activities, goals, standards
		Reducing barriers
		Results evaluation
	Work planning and scheduling	Complex task analysis
		Source selection
		Work planning and scheduling
		Setting up inspection and control points to monitor the process
Communication	Listening and organizing	Identify and test assumptions and inferences
		Overcoming the obstacles to listening and organizing
		Refining and rearranging a message for reminder
		Detection and control of assumptions and inferences
	providing clear	Overcoming barriers to information clarity

	information	Goals confirmation
		Maintaining a climate of mutual benefit and trust
	Getting undistorted information	Using guiding, non-guiding, reflective, and reasoning questions
		Understanding confirmation
		Get agreement
Monitoring	Training, guidance and delegation	Choosing the Right People
		Reaching agreement on plans to perform
		Maintaining balance between input and output
		Assignment of responsibility
		Providing effective feedback
		Providing appropriate rewards
	Individual and performance evaluation	Maintaining evaluations
		Focus on performance, not personality
		Reaching agreement on future expectations
		Following the executive plans
	Discipline and consolation	Maintaining performance
		Determining the scope of individual responsibility
		Enhanced performance enhancement
Diagnosis	Problem identification and solving	Diagnosing and distinguishing between symptoms
		Data collection
		Identifying the root cause
		Weighting options
		Take appropriate action
	Decision making and risk weighting	Identifying the constraints and risks considered
		Assigning weight to each option
		Selecting the best option to achieve the desired goal
	Explicit and analytical thinking	Identifying valid assumptions
		Drawing logical results
		Recognizing misconceptions, false assumptions and overview without evidence

Reference: Chang, 2008: 198

American Society for Training and Development (ASTD) Model

The American Society for Training and Development has considered three dimensions of competence, interpersonal competencies, management competencies and personal skills into its model. The model indicators are provided in Table 8 [VIII].

Table 8. American Society for Training and Development (ASTD) Model

dimensions	Index
Inter-personal skills	Trust
	Effective communication
	Influencing stakeholders
	Leveraging diversity
	Networking and Partnerships
Managerial skills	Needs analysis and solutions
	Business intelligence
	Result-orientation
	Scheduling and executing assignments
	Strategic thinking
Personal skills	Modeling personal development
	Adaptation

Reference: Cochrane, 2009: 55

Reviewing the models used by Oil sector companies and organizations

Some of the models developed and implemented in oil companies and organizations are described in this section.

Managerial Competences Model of British Oil Company

Four dimensions of result-orientation, people-orientation, judgment and flexibility and eleven communication competencies, organizational propulsion, personal propensity - effect of managerial decisions, awareness about others, team management, persuasiveness power, analytical power, strategic thinking, business judgment, the ability to adapt [IX]. are introduced in this model as the managers' key competencies.

French Shell Oil Company Model (Shell Competencies for Global Managers)

This model include twelve competencies of professional skills, visioning, maximizing business opportunities, decision making, problem solving, analytics, communicating, motivating, coaching, conflict management, customer orientation and considering a variety of values [I].

Competency System at National Iranian Gas Company

The dimensions of the competence system in the National Iranian Gas Company include operational competence, strategic competence, and managerial competence. The model indicators are provided in Table 9 [IX].

Table 9. Competency System at National Iranian Gas Company

Dimension	Index
Operational	Technical and specialized
	Processing
Strategic	leadership
	Judging
Managerial	Attitude and personality traits
	Written and verbal communication
	Interpersonal Communication
	Planning and control

Figure 2. Model of competencies of National Iranian Oil Company

Application of competency models

As a set of applicable standards of skill in recruiting, leading jobs, evaluating employees, designing scientific programs and issuing industry certifications, competency models are a bridge between coaches, the business sectors and other stakeholders to prepare students and workers to deal with the challenges of the business environment where they have invested.Competency models can also be used by employees as an effective option and a tool for career development. These models are also able to assist human resources staff to adapt specific professional and work needs to different jobs in recruitment, promotion and career development while developing training programs.

The competency models can be used to evaluate individuals' job performance, as well as the role of managers, reporting, customer and team members, and as a means of conveying performance expectations to employees in business environments.

These models can also be used to measure the gap between staff requirements and current training programs, and the system for providing training, reviewing existing courses, and designing competencies, and also as a path to identify gaps.The competency model can be seen as a benchmark when evaluating existing education and training programs or when designing new programs by program providers, resulting in courses that meet workplace needs and trends.These models can be utilized by training program providers to obtain valid industry certificates. Such certificates prove that the graduates of a particular curriculum have earned the necessary competencies and dominance in a given field.As a guide to investment boards and professional centers, competency models can match job requirements with the skill sets that employers determine for potential candidates. These services can even be offered to larger groups such as high school, non-high school youth, workers transfer from one unit to another and current workers, as well as groups with special needs, and consequently, causes increasing the range of available workforce talent. Since all of these main partners work together through sharing assets and resources, the competency model plays an effective guiding and strategic role for government investment in the preparation of workforce strategies in an area or province.

II. Research Method

The present study is an applied research in terms of the purpose which uses a combined research strategy that can have multiple applications in industry and organization. The study aimed to identify and prioritize the researchers' strategic competencies in oil industry research centers. The Delphi method (qualitative) method and the structural equation modeling (SEM) are used in this research to discover the most important researchers' strategic competencies and prioritize strategic competencies, respectively. The Delphi method can be used in qualitative research with exploratory dimensions to identify the nature and fundamental elements of a phenomenon. In this regard, Delphi method is utilized to "identify" and "screen" the most important decision-making indicators. The use of the professional knowledge and expertise of a set of experts is very helpful in making decisions about problems with a qualitative nature. Generally, Delphi method is defined as a research approach to reach consensus using a series of questionnaires and providing feedback to participants who have the related expertise. There is no standard statistical methods in Delphi method and expert opinion survey. However, data analysis methods depend on the research purpose, the type of questions, and the number of respondents. The data collection tool in this study are interviews and questionnaires.

People participating in the Delphi method must be knowledgeable about the subject matter of the study and are referred to as "panelists" or "experts". Non-probabilistic sampling with the purposeful sampling and snowball sampling methods are used to select the experts. The study population was selected among the faculty members in the field of management and human resources, and the managers and researchers in the field of research and technology to reach the valid results. About the sample size, a sample of 10 to 20 qualified professionals have been estimated as a valid sample. In this regard, a list of individuals with high research, knowledge and expertise was selected to participate in the study who included faculty members and

senior managers in the field of research and technology. The other experts were introduced during the interview by experts in the early stages of the interviews. Interviews continued until the content saturated that is, new components or dimensions were not mentioned by the interviewees. Finally, the interview would continue for 20 people. The participants' profile are presented in the table 1.

Table 1. the expert panel profile

variable	Group	Frequency	Percentage
gender	male	14	70
	Female	6	30
education	Ph.D.	12	60
	Master degree	8	40
Experience	Lower 10 years	5	25
	10-20	8	40
	Over 20 years	7	35
position	Faculty member	11	55
	researcher	9	45
total		20	100

Firstly, the components of researchers' strategic competencies were extracted through the exploratory phase by interviews. Then, a semi-structured questionnaire was used in the first Delphi round to limit the competencies, and a closed questionnaire was used in the second and third Delphi round to converge the findings and discover the valid consensus.

The expert agreement is reached in the present research when the average expert opinion on each item is above 4 (agreement). Kendall's coefficient was used to control the validity of the research instrument which was estimated at 0.763 in Delphi final stage which indicates appropriate validity. Generally, it should also be said that the content validity is guaranteed if the panel members have the needed expertise and quality as a qualified representative in the related field of knowledge. On the other hand, confirmatory factor analysis and construct validity are used to prioritize competencies and Cronbach's alpha was used to determine the questionnaire reliability which was estimated at 0.77 indicating acceptable instrument reliability.

Research Findings

Qualitative stage (Delphi)

The most important researchers' strategic competencies was provided to the experts in the first phase. The question is raised in the presence of most members and through open-ended interviews. Next, they were asked to suggest the components that were not considered by communicating with each of the members and explaining some of the elements extracted in the theoretical bases. After receiving the responses and examining the experts' views, similar items were merged and a number of non-relevant components were removed from the present study.The list of researchers' strategic competencies factors was compiled and analyzed in the first phase of Delphi

with the help of panel members and advisor and consultants. Finally, the initial questionnaire form, which was developed based on the literature using survey methods from experts and professors and initial analysis, was revised and modified according to the experts' suggestions and the final questionnaire was confirmed after two rounds of the Delphi method.The final questionnaire with 59 competency components was developed in the second phase and provided to the panel members to determine the importance of each component. The results were presented to the members in the next stage and the members were asked to review their responses and revise them if needed and state their reasons for disagreement. Finally, the consensus was achieved regarding 48 components of competence according to the following table and the final model was obtained.

Table 2. the Delphi final results on the components of the researchers' strategic competence

Empowerment and competence	Average comments	Kendall coefficient	rank	The level of capacity and competence	Average comments	Kendall coefficient	rank
Professional scientific knowledge	4/76	0/768	1	Analysis and use of ICT	4/44	0/760	17
The desire for continuous learning	4/56	0/762	2	Leadership	4/43	0/764	18
Ability to teamwork	4/56	0/762	3	Adaptability / compatibility	4/43	0/750	19
Innovation creativity	4/56	0/763	4	Networking development capacity	4/43	0/762	20
Analytical thinking	4/55	0/762	5	Effective negotiation and communication skills	4/42	0/748	21
Critical Thinking	4/53	0/760	6	Project Management	4/42	0/750	22
Decision making	4/51	0/764	7	Strategic thinking	4/41	0/739	23
Partners' passion / motivation	4/51	0/750	8	risk management	4/39	0/751	24
Integration	4/50	0/751	9	Communication skills	4/38	0/748	25
Formulating a research topic / problem solving	4/49	0/762	10	business intelligence and entrepreneurial spirit	4/36	0/760	26
Moral competency	4/48	0/760	11	Developing people	4/36	0/739	27
Time Management	4/48	0/764	12	An open minded	4/36	0/751	28

Empowerment and competence	Average comments	Kendall coefficient	rank	The level of capacity and competence	Average comments	Kendall coefficient	rank
				approach / horizonology			
Result-orientation	4/47	0/750	13	Challenge decision-making capacity	4/36	0/748	29
Systematic thinking and planning skills	4/45	0/762	14	Challenge	4/36	0/750	30
Knowledge of management and organization	4/44	0/748	15	Accountability and customer orientation	4/35	0/739	31
Foreign Language Skills	4/44	0/750	16	Resource management	4/35	0/751	32
Developmental learning/ Future studies in learning	4/33	0/739	33	Capacity of evaluating others	4/29	0/748	41
Water crisis	4/33	0/751	34	Conflict Management	4/24	0/739	42
Crisis Management	4/32	0/748	35	Financial Management	4/21	0/751	43
Sustainable Development and Climate Change	4/32	0/750	36	Globalization	4/20	0/748	44
Stress management	4/32	0/739	37	Science and Technology Policies	4/19	0/753	45
Self-confidence	4/31	0/751	38	Changes	4/18	0/739	46
Listening skills	4/30	0/748	39	Regional turbulence	4/18	0/751	47
the art of Influence	4/30	0/752	40	Transnational market	4/14	0/748	48

Figure 1. the final model of researchers' strategic competences

Quantitative Stage (Structural Equation Modeling)

The validity of the model construct is tested in this section using structural equation modeling techniques by LISREL software.

Confirmatory factor analysis

The confirmatory factor analysis is mainly aimed to determine the power of a pre-defined factor model with a set of observed data. That is, confirmatory factor analysis aimed to determine whether the number of factors and variables measured on these factors correspond to what was expected by theory and theoretical model. In other words, this type of factor analysis tests the degree of conformity between the theoretical and empirical construct. Hence, validating the model is one of the functions of confirmatory factor analysis.

The standardized loads are of particular importance in confirmatory factor analysis when interpreting factor analysis results. These loads indicate the correlation between each observed variable and its associated factor. The strength of the relationship between the factor (hidden variable) and the observable variable is represented by the factor load. The higher the factor loadings of an index in relation to a particular construct, the greater its contribution in explaining that construct. Also, if an index factor loading is negative, it indicates its negative impact on the explanation of the relevant construct. That is, the relevant question is designed inversely. The factor loading is a value between zero and one that if it is less than .3, the relationship is weak and it can be ignored. A factor loading between .3 and .6 is acceptable, and it is highly acceptable if it is greater than .6 [IX].

Factor analysis of knowledge construct

The factor loading of all the competencies of the knowledge construct is at the least acceptable status and the highest factor loading is related to the financial management variable (q3) with .83 according to Figure 2.

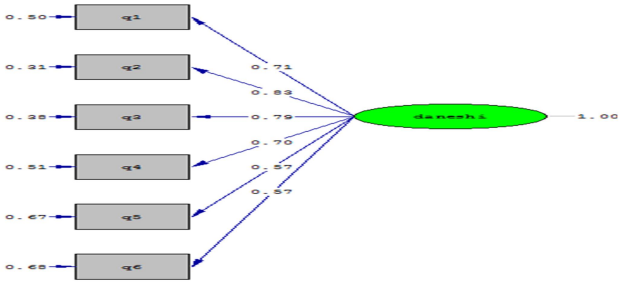

Figure 3. Factor Analysis of Knowledge construct (Standard Estimation Model)

In order to examine the significance of the relationship between variables, the T-test or t-value is used and since it is significant at the 0.05 level of error, so if the factor loadings observed by the t-value test are lower than 1.96, the relationship is not significant and if it is greater than 1.96 the relationship is significant and the model validity is confirmed.

Since all relationships between variables and constructs (knowledge competence) were greater than 1.96 according to Figure 3, all relationships are significant and confirmed.

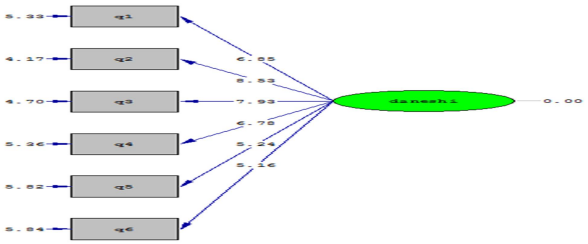

Figure 4. Factor Analysis of Knowledge construct (significance model)

Factor Analysis of perceptual construct

The factor loading of all the perceptual construct competencies in in optimal status according to Figure 4. As can be seen, the highest factor load is related to the problem solving variable (q13) with 0.77.

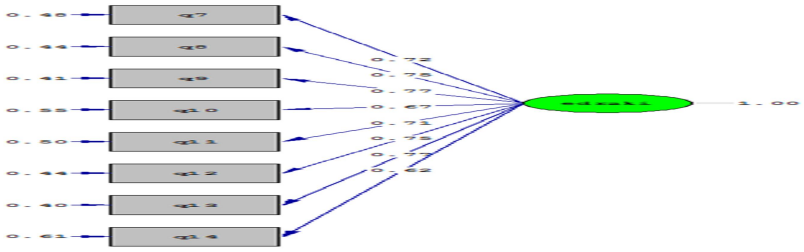

Figure 5. Factor Analysis of perceptual construct (significance model)

Since all relationships between variables and constructs (perceptual competence) were greater than 1.96 according to Figure 5, all relationships were significant and confirmed.

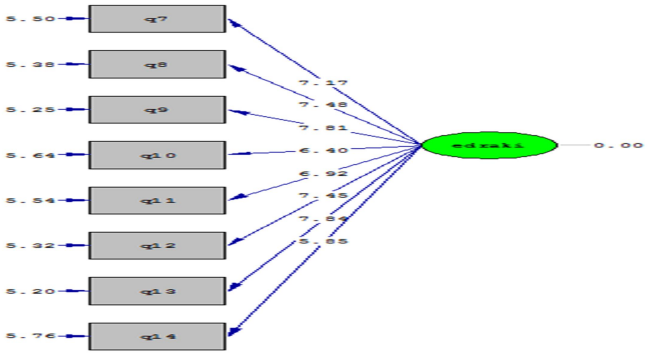

Figure 6. Factor Analysis of perceptual construct (Standard Estimation Model)

Factor analysis of skill construct

The factor loading of all the competencies of the skill construct is in optimal status according to the Figure 6. The highest factor loading is related to the resource management variable (q17) with 0.85 according to the figure.

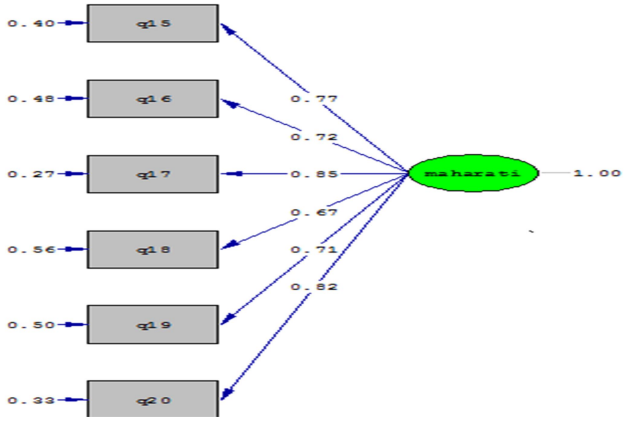

Figure 7. Factor Analysis of skill construct (Standard Estimation Model)

As all relationships between variables and constructs (skill competencies) were greater than 1.96 according to figure 7, all relationships were significant and confirmed.

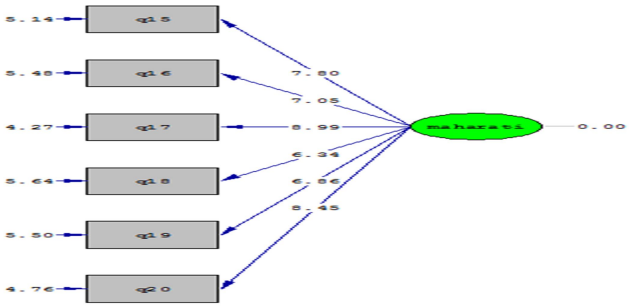

Figure 8. Factor Analysis of skill construct (significant model)

Factor analysis of personality construct

The factor loading of all the personality construct competencies are in optimal status according to figure 8. The highest factor loading is related to the adaptability and consistency variable (q23) with 0.84 according to the figure.

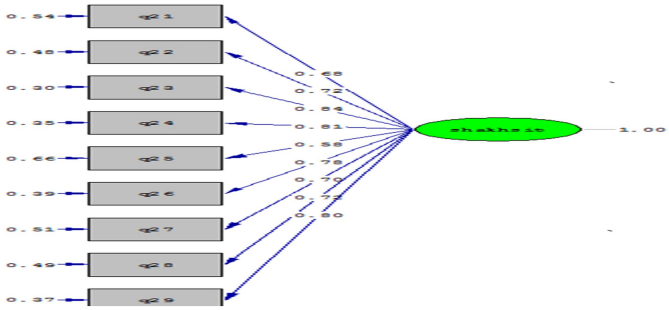

Figure 9. Factor Analysis of personality construct (Standard Estimation Model)

As all relationships between variables and constructs (personality competencies) were greater than 1.96 in Figure 9, all relationships were significant and confirmed.

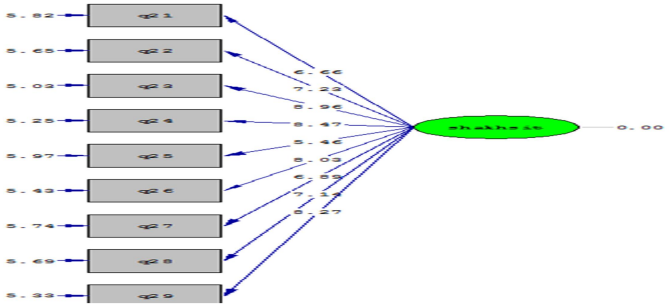

Figure 10. Factor Analysis of Personality construct (significance model)

Factor analysis of relational construct

The factor loading of all the relational construct competencies is in optimal condition according to Figure 10. The highest factor loadings are related to the variables of evaluation capacity and conflict management (q23) with 0.83 according to figure.

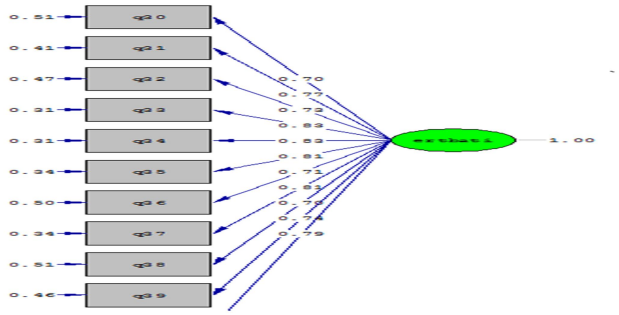

Figure 11. Factor Analysis of relational construct (Standard Estimation Model)

As all relationships between variables and constructs (relational competencies) were greater than 1.96 in Figure 11, all relationships were significant and confirmed.

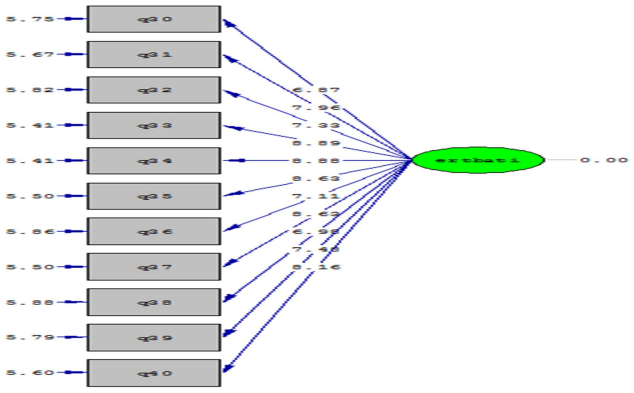

Figure 12. Factor Analysis of relational construct (significance model)

Factor analysis of foresight construct

The factor loading of all the foresight construct competencies is in optimal condition according to Figure 12. The highest factor loadings are related to the variables of Science and Technology Policies (q44) with 0.83 according to figure.

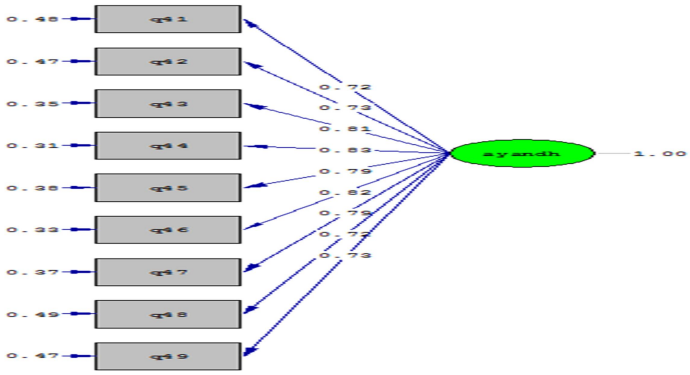

Figure 13. Factor Analysis of foresight construct (Standard Estimation Model)

As all relationships between variables and constructs (foresight and tact competencies) were greater than 1.96 in Figure 13, all relationships were significant and confirmed.

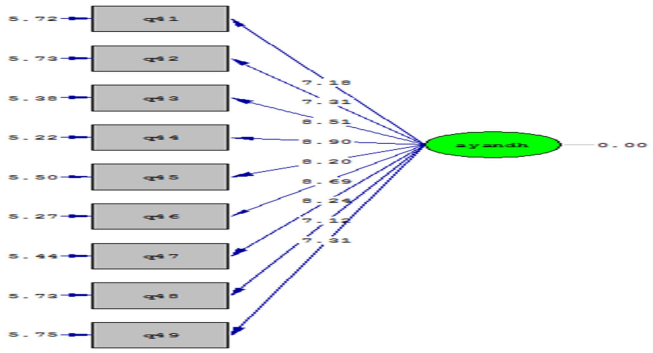

Figure 14. Factor Analysis of foresight construct (significance model)

Second-order factor analysis

The first-order Confirmatory Factor Analysis evaluates the relationship between factor(s) (latent variables) with items (observable variables). No relationship between latent variables is examined in this method. This type of measurement model is simply to ensure that latent variables are measured correctly. One can examine the relationship of one factor with multiple items or factors or multiple items in the first-order confirmatory factor analysis.

However, when a large construct is composed of several latent variables, the second-order confirmatory factor analysis is used. In addition to examining the relationship of observable variables with latent variables in the second-order confirmatory factor analysis, the relationship of latent variables with their main construct is also examined.

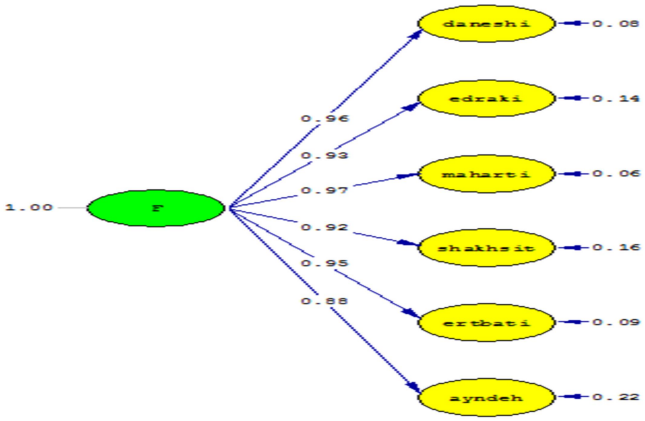

Figure 15. the second-order Factor Analysis (Standard Estimation Model)

The factor loading of all the competence groups (6 groups) is in optimal status according to Figure 14, as all factor loading are greater than .70. It is also seen that the highest factor loadings belong to the skill class with 0.97

The final questionnaire was distributed among the researchers of the oil industry research and the score of teach index is obtained based on the Likert classification that the mean of each index was determined and confirmed based on rank and score using the following statistical methods.

III. Conclusion

The strategic competencies needed by researchers in the oil industry research centers are listed in the table below according to the average score of experts and researchers. As can be seen, the creativity and innovation, integration and accountability, and customer orientation competencies have higher priorities followed by the women presence in the labor market, the water crisis, financial management, the use of ICT and self-confidence. However, all the identified strategic competencies have a significant positive distance to mean. The researchers were also asked to provide any other mention to incorporate in the second phase of the questionnaire.

The strategic competencies needed by researchers according to the mean score of the Research Institute researchers are provided in the table below. According to this table, the competencies of scientific and professional knowledge, the tendency for continuous learning, the ability to perform, creativity and innovation, analytical and critical thinking have top priorities followed by women's presence in the labor market.

The final questionnaire was distributed among the researchers of oil industry research centers and two indices were selected based on Likert classification so that the mean of each index was determined by rate and score using the specified statistical methods and confirmed by the statistical methods.

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