RESEARCH ARTICLE

Competency Assessment Tool for the Healthcare Networks Managers in Zanjan Province, Iran: Validation, Conceptualization, and Localization

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ABSTRACT

Background: With regard to the importance of managers' competency in organizational success, a valid tool should exist for assessing these competencies.

Objective: To validate, conceptualize, and localize a competency assessment tool for the managers of healthcare networks in Zanjan Province, Iran.

Methods: This was a descriptive-analytical study. In the first stage, the validity and reliability of ACHE Healthcare Competencies Assessment Tool were examined via content validity, Cronbach's alpha, and test-retest methods. The data of the first stage were analyzed in Excel 2010 and SPSS 18. In the second stage, a sample of 350 was selected, and the factors affecting the managers' competency assessment were identified. In the second stage, the data were analyzed in Amos 23.

Results: After removed 235 out of the 302 questions due to their low content validity, 67 questions in four main dimensions remained. The content validity index of the final questionnaire was 0.84 and acceptable. The results showed that the final questionnaire is reliable (α = 0.986) and repeatable (p < 0.001). In second stage, nine new factors with their relevant scales were identified. The results of first- and second-order confirmatory factor analysis also demonstrated the good fit of the data with the factor structure.

Conclusion: It can be concluded that the localized tool for assessing the competency of Zanjan health network managers has a good fit. Healthcare organizations can use the results of this study to assess what competencies are important for new managers and how these competencies should be assessed as careers progress.

INTRODUCTION

In recent decades, organizations have made extensive efforts to design and use valid tools, methods, and techniques for the identification and supply of the human workforce [1]. To promote organizational coordination and effectiveness, there is a need for competent and effective managers, and the organization's successful realization of its goals depends on their management [2]. Evidence suggests the effects of managerial competencies on the effectiveness of marketing, leadership,

performance management, managerial effectiveness, performance assessment, learning in the workplace, boosting organizational spirits, and improving the managers' efficiency and effectiveness, especially in the healthcare sector [3, 4].

Healthcare managers work in changing settings that are continuously changing and need to focus on the implementation of a competency model in order to have obtain the best performance in healthcare organizations [5]. In recent years, considerable changes have occurred in the provision of health services and society's expectations.; The renovation and continuation of healthcare and effectiveness on health policy and service provision would be impossible without highly competent managers [6]. Thus, healthcare managers and administrators should have sufficient inherent and acquired competencies to adjust to the increasing environmental complexities [7, 8]. Moreover, as the healthcare domain is not static, healthcare management programs should periodically revise their competency models to ensure that they are aligned with the evolving healthcare mission and setting [9].

These indicate the importance of recruiting competent managers in healthcare systems and the necessity of identifying their competencies and developing standards for their competency assessment. What matters in this respect is the existence of an instrument for assessing these competencies [10, 11]. The evaluation of the managers' competencies provides them with a more realistic understanding of their competencies and abilities and helps them realize their weaknesses and strengths better to a greater extent [12]. In this study, by determining the components related to the competency assessment of Zanjan Province (Iran) healthcare managers via the localization of the ACHE Healthcare Competencies Assessment Tool [13], an instrument for this purpose is proposed for the first time. The instrument used in this study is specialized for the healthcare sector. Evidently, the development of competency assessment tools, the localization of the existing tools, and the determination of factors affecting managers' competency assessment are important steps towards the expansion of knowledge, successor training, talent management, promotion of capabilities, suitable evaluation of managers, and improvement of decision-making.; As a result, we can move towards meritocracy, and the problems resulting from managerial weaknesses in this domain can be resolved. Therefore, herein, it is attempted an attempt is made to present an appropriate tool for the competency assessment of health network managers in Zanjan through validation and localizations of the ACHE. This study aimed to achieve the following:

• Determining the validity and reliability of the ACHE for the managers of healthcare networks in Zanjan Province

• Identifying the factors contributing to the competency assessment of these managers

METHODOLOGY

Study design

This study was a descriptive-analytical study conducted from November 2019 to January 2021 to provide a competency assessment tool for the managers of healthcare networks in Zanjan. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used in the reporting of this observational study.

Study settings

The setting for this study was Zanjan University of Medical Sciences (ZUMS), northwest of Tehran, Iran. The ZUMS is a dominant university amongst Iranian medical universities and has several teaching (not-for-profit) hospitals that provide health services for the people of Zanjan and other cities. Currently, it has more than 3820 students in medical sciences, more than 347 faculties, and several research centers.

Population and sample size

This study was conducted in two phases. In the first step, to determine the validity and reliability of the ACHE for the managers of healthcare networks in Zanjan, 30 faculty members of ZUMS and the experts and managers of Zanjan health networks were selected. All the participants of this phase were selected based on their work experience and knowledge of this field.

In the second step, human resource managers, managers of health networks in Zanjan, heads of hospitals, hospital managers, and nurse managers (chief nurse, head nurses, supervisor) were selected. The inclusion criteria for this step were:1) participants ≥25 years of age; 2) a university degree (at least a BSc); 3) working in administrative positions with an experience of at least 3 years in healthcare settings; and 4) volunteering for participation in this study; 5) being available during the period of data collection. Participants were excluded from the study if they worked in the private sector.

To estimate the sample size of the second step, the infinite sample size equation ($SS = (z2 * p * q) / d2$) was used, with a confidence interval of 95% ($\alpha = 0.05$) and, hence, a z-score of 1.96, a magnitude of factors contributing to the competency assessment tool of $p = 0.5$, and an absolute precision of $d = 0.05$. Therefore, a sample size of $n = 350$ was required. Furthermore, to select the participants, the simple random sampling method was employed.

Variables

The participants' general information on the individual and organizational characteristics, including sex, age, education level, job position, work department, years of work experience, and type of employment contract was collected. Moreover, based on the participants' answers, a competency assessment tool for the managers of healthcare networks in Zanjan was

developed, and the factors contributing to this competency assessment were identified.

Instruments

The data collection tools were a demographic questionnaire and a questionnaire adapted from the ACHE. The questionnaires were administered in Persian. A five-point Likert scale was used to determine the importance of factors contributing to the competency assessment of managers. Before distributing the questionnaires, explanations were provided on how to complete the questionnaires. Finally, the questionnaires were distributed among the participants and collected after three days.

Bias

The chance of any selection bias was minimized by collecting data from managers of different levels, allowing voluntary participation of all participants, ensuring the confidentiality of the collected data before starting questionnaire distribution, clarifying the purpose of the study before the participants completed the questionnaires, and giving participants sufficient time to complete the questionnaire.

Data analysis

Once the data of the first step were collected, all the questionnaires were inputted into a customized Excel-based system (2010 version). All the data were subsequently imported into and analyzed via SPSS 18 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics were then generated for national-level estimates (proportions) and their 95% confidence intervals (Cis).

After collecting the data of the second stage, Amos 23 was used to analyze the data. Data analysis was performed via first- and second-order exploratory and confirmatory factor analysis within the framework of structural equation modeling (SEM).

RESULTS

Validity and reliability of the competency assessment tool

This competency assessment tool was provided to 30 healthcare management professors and experts in Zanjan province. To examine the validity, internal consistency, and repeatability of the tool, its content validity, Cronbach's alpha, and test-retest reliability were measured, respectively. After analyzing the data by using Excel 2010 and SPSS 18, the results demonstrated that 235 out of 302 questions related to the ACHE had low content validity and were, therefore, eliminated. The content validity index (CVI) of the final questionnaire was calculated to be 0.84, which is acceptable. The results also showed that the final questionnaire was reliable with α=0.98 and repeatable. Based on the remaining questions from the ACHE, the relevant factors and criteria are summarized in (Table 1).

Demographic characteristics of the participants (second phase)

In the second phase, 360 printed questionnaires were distributed personally among the sample population, and 350 were returned (a response rate of 97.2%). Based on the results, 162 participants (46.3%) were men and 188 (53.7%) were women. A total of 158 participants (45.1%) had a master's degree, 114 (32.6%) a PhD, and 78 (22.3%) a bachelor's degree. The largest percentage of the participants worked in healthcare settings (70.9%) and the hospitals affiliated with universities of medical sciences (29.1%). The retention-related information of the participants is shown in (Table 2).

Conceptualization, validation, and localization of managers' competency assessment tools

Prior to factor analysis, Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were performed. The scale KMO is called the sampling adequacy index, which compares the observed values with a partial correlation. When the KMO value is >0.6, factor analysis can be easily performed. Bartlett's sphericity test indicates the significance of the data matrix for factor analysis, and the significance of the Bartlett test is the minimum requirement for factor analysis. In this phase, the value of KMO was calculated to be 0.822; therefore, the sample size was enough for factor analysis. The value of Bartlett's test was significant at the level of 0.001; and accordingly, the condition for factor analysis was met (Table 3).

The results of the first-order confirmatory factor analysis are presented in (Table 4). The results demonstrated that all factors have a good fit.

Based on our analysis, significant differences in the factor loadings of the first-order confirmatory factor analysis test are given in (Table 5).

The competency assessment tool has nine factors that can act as indicators of this structure; therefore, the second-order factor analysis was performed to test the measurement model and the validity of the factors of the managers' competency structure. After removing the scales whose value was <0.3 in the first-order factor analysis, the results of the second-order confirmatory factor analysis test are shown in (Table 6) and (Figure 1).

According to the fit indicators presented in (Table 7), the localized version of the competency assessment tool has a good fit.

DISCUSSION

This study attempted to provide a suitable tool for the competency assessment of Zanjan health network managers by validation, conceptualization, and localization of the ACHE. Moreover, the factors contributing to the competency

assessment of managers were identified. In this section, we first analyze the results related to the validity and reliability of the tool. Then, we discuss the results of the first- and second-order confirmatory factor analysis and compare them with other studies.

Based on the standard tools provided by the American College of Health Care Executives, the validity and reliability of this tool for use in the healthcare networks of Zanjan Province were determined. Furthermore, a comparison of the validity and reliability of this tool in this study and other studies shows that some of the components are consistent with the findings of other studies. For instance, in a study entitled "validation of a management competency assessment tool for health service managers", Howard et al. obtained six main dimensions: 1) evidence-based decision-making, 2) resource management, implementation, and operations, 3) knowledge about the organization and healthcare environment, 4) quality management of interpersonal communication and relationships, 5) leadership of the organization and individuals, and 6) activation and management of change [14]. Mahfouzpour et al. identified and validated key management skills and competencies for use in designing educational programs and identifying and employing suitable candidates in managerial positions in Iran [15]. Based on their results, eight main criteria of 1) personality traits, 2) values, 3) general management knowledge, 4) hospital management knowledge, 5) planning skills, 6) organizing and resource allocation skills, 7) leadership skills, and 8) monitoring and supervision skills were identified.

According to the results, the indicators of adherence to work ethic (factor loading = 0.893) on the strategic planning factor have the greatest impact on assessing the competence of the managers in this study. These results were similar to those of previous studies on managers' competency assessment [16]. The indicators of establishing and maintaining relationships with medical personnel (factor loading = 0.820) on the leadership skills and behavior factor had the greatest impact on assessing the competence of the managers. Our finding related to the leadership skills and behavior factor is similar to Howard et al.'s finding [14]. Therefore, these indicators can be considered in the appointment of future managers for health networks and medical centers in Zanjan Province. Competent managers constantly communicate with their employees and adhere to ethical values in order to intelligently deal with future changes in the organization.

The indicators of the consequences of immoral acts (factor loading = 0.909) had the most, and preparing and submitting business correspondence (factor loading = 0.474) had the least effect on the general management factor in assessing the competence of managers. (Table 5) shows that the indicator of providing information to decision-makers (factor loading =0 /859) had the greatest impact on the factor of communication

skills in assessing the competence of Zanjan health managers. Therefore, it is necessary to strengthen managers' information analysis ability to provide appropriate information to decision-makers. Ranjbar et al. included the competency of information analysis in their proposed competency model of health system managers and emphasized the importance of improving the quality of management in the Iranian healthcare system [17]. The results revealed that the indicator of organizational evaluation (factor loading = 0.828) on the organizational climate and culture had the greatest impact on assessing the competence of the managers. In addition, the indicator of labor relations strategies (factor loading = 0.828) played a critical role in the negotiation and facilitation of assessing the health managers' competence.

Organizing work so that an ethical analysis can be conducted is of great importance, and top management officials need to clearly express the importance of ethical competence and allocate resources to enable adequate learning processes [18]. In this study, the indicators of professional and ethical standards (factor loading = 0.809) had the greatest impact on the ethics factor of managers' competence assessment. A competent health service management workforce is critical to the effective functioning of the healthcare system [19]. The ability of managers in involving physicians to accept risks and new business risks (factor loading = 0.879) can improve the functioning of the organization. The results of the study by Bartram demonstrate that competent managers think broadly and strategically and support and induce organizational change [20].

Future efforts can be directed towards examining the usefulness of the existing tools for assessing the competence of health managers and managing job applicants, implementation of continuing education programs for managers, and overall career development and planning [21]. Moreover, according to the results of second-order confirmatory factor analysis, leadership skills and behavior are the most correlated factors (factor loading = 0.707) and, therefore, play the most important role in assessing the competence of health managers in Zanjan. Note that the results of this section were in line with the results of previous studies [22, 23].

CONCLUSION

This study aimed to validate, conceptualize, and localize a competency assessment tool for the managers of healthcare networks in Zanjan Province, Iran. Healthcare organizations need powerful managers, and reliable tools should be used to assess their competencies. By examining the factors contributing to the competency assessment of managers at different management levels, we can gain insight into the different demands and challenges in the frontline. Healthcare organizations can use the results of this study to assess what competencies are important for new managers and how these

competencies should be assessed as careers progress.

Limitations

As with any other research, there were some limitations to this study. First, this study was conducted in Zanjan Province, and caution should be exercised in generalizing the results to other settings. The second limitation was the non-participation of some health managers in this study, a problem which the authors tried to solve by explaining the purpose of the study to them.

Future research

The biggest challenge for future research is to compare the factors contributing to the competency assessment of managers in public and private sectors. We recommend that future studies use other research methods (e.g., qualitative and mixed) to reflect the opinions of stakeholders about the factors affecting the competency assessment of healthcare managers. Researchers can also localize the competency assessment tools of health system managers for Iran and other countries.

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AUTHOR CONTRIBUTIONS

FM, SJT, and LR: idea, design, and editing. LNM, MMM, and LR: preparing the questionnaire. FM and LR: data collection. MMM, FM, and SJT: analyses. All authors: writing the draft and approval of the final draft.

CONFLICT OF INTERETS

The authors declare that they have no competing interests.

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ETHICAL STATEMENT

This study was approved by the Islamic Azad University, Tehran, Iran (No. IR.IAU.TMU.REC.1398.0702). Participation was voluntary and, prior to the start of the study, informed written consent was obtained from all the participants. The information in the informed written consent form included items such as optional participation in the study, the right to withdraw from the study at any point without providing any reason, and the confidentiality of the information.

AVAILABILITY OF DATA AND MATERIALS

Most of the analyzed data are included in this article. The datasets used and analyzed in the present study are available from the corresponding author on reasonable request.

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Table 1. Critical domains and criteria of the remaining questions

Critical domains	Criteria
Communication and relationship management	Relationship Management, Communication Skills, Facilitation and Negotiation
Leadership	Leadership Skills and Behavior, Organizational Climate and Culture, Communicating Vision, Managing Change
Professionalism	Personal and Professional Accountability, Professional Development and Lifelong Learning
Business skills and knowledge	Strategic Planning

Table 2. Characteristics of the study sample (n = 350)

Variables	Frequency	Percent (%)
Gender		
Male	188	53.7
Female	162	46.3
Age		
20-30	10	2.9
31-40	96	27.4
41-50	219	62.6
>50	25	7.1
Education		
Bachelor degree	78	22.3
Master	158	45.1
PhD	114	32.6
Job experience		
1-5	3	0.9
6-10	7	2
11-15	232	66.3
16-20	64	18.3
>21	44	12.6
Workplace		
Health Networks	248	70.9
University of medical sciences	102	29.1
Job position		
Executive manager	226	64.6
Clinical manager	124	35.4
Employment status		
Permanent	185	52.9
Contract	165	47.1

Table 3. KMO and Bartlett's Test values

KMO		0.822
Bartlett's Test	Chi-squared test	21541.565
	Degrees of freedom	2211
	p-value	0.000

Table 4. Goodness of fit value.

Factors	CMIN/DF	RMSEA	GFI	AGFI	CFI	NFI	TLI	IFI	RFI
Continuous learning and strategic planning	**2.144**	0.057	0.0948	0.917	0.991	0.984	0.979	0.991	0.962
Leadership skills and behavior	**2.139**	0.055	0.973	0.923	0.990	0.981	0.982	0.990	0.967
Public management	**1.252**	0.027	0.968	0.938	0.998	0.991	0.996	0.998	0.980
Communication skills	**1.581**	0.041	0.900	0.987	0.992	0.978	0.984	0.992	0.958
Organizational climate and culture	0.526	0.000	0.933	0.962	1	0.995	1	1	0.989
Negotiation and facilitation	0.942	0.000	0.988	0.996	1	0.987	1	1	0.790
Relationship Management	3.271	0.071	0.916	0.909	0.986	0.980	0.957	0.986	0.939
Ethical	1.150	0.033	0.978	0.987	1	0.999	1	1	0.998
Change management	2.080	0.056	0.928	0.981	0.995	0.991	0.989	0.996	0.978

Table 5. Significant differences in factor loads of first order confirmatory factor analysis test

Factors	Indicators	Loading factors
Continuous learning and strategic planning	Promoting continuous organizational learning	0.587
	Adherence to work ethic	0.893
	Presence and membership in professional communities	0.477
	Execution planning	0.788
	Strategic decision support	0.857
	Development and implementation of strategic planning procedures	0.835
	Develop and monitor the strategic and tactical goals of the organization	0.561
	Develop a benefits realization model that measures the performance of a service or product to ensure strategic goals are met	0.788
	Organizational mission, vision, goals and priorities	0.801
	Pursue and establish strategic partnership and alliance	0.557
Leadership skills and behavior	Establish and maintain relationships with medical personnel	0.820
	Help resolve disagreements and disputes	0.560
	Integrate management theories and techniques and apply them in leadership activities	0.815
	Establish attractive organizational vision and goals	0.798
	Creating an organizational atmosphere that facilitates individual motivation	0.703
	Situations in which there is a difference of taste according to regulations, policies and organizational procedures	0.736
	Help build professional knowledge and evidence	0.740
Public management	Prepare and submit business correspondence	0.474
	Creating an environment of mutual trust	0.536
	Discover opportunities for the growth and development of the organization continuously	0.684
	Anticipate the need for resources to innovate	0.740
	Establish effective relationships with medical personnel in support of the organization's mission, vision and strategic plan	0.803
	Patient rights and responsibilities	0.857
	Consequences of immoral acts	0.909
	Cultural and spiritual diversity of staff and patients as they relate to health care needs	0.770
Communication skills	Providing internal customer service	0.685
	public relations	0.550
	Sensitivity to the right behavior when communicating with diverse cultures, internal and external	0.485
	Provide data analysis to decision makers	0.859
	Use real data to prepare credible and understandable reports	0.317
	Form a team, participate in it and lead the team	0.789
	Development of foreign relations	0.784
	Collaborative techniques for collaborating and working with physicians	0.747
	Balancing personal and professional tendencies	0.397
	Linking organizational mission, vision, goals and priorities	0.149
Organizational climate and culture	Support and guide potential talents in the organization	0.643
	Creating an organizational atmosphere that encourages teamwork	0.437
	Creating an organizational culture that values and supports diversity	0.764
	Awareness of your own and others' cultural norms	0.783
	Organizational evaluation, including the combination of culture and values, work processes and the impact of systems on activities	0.828
	Professional plans, responsibility and accountability	0.448
Negotiation and facilitation	Provide and receive useful feedback	0.577
	Mediation, negotiation and dispute resolution techniques	0.642

	Labor relations strategies	0.728
	Forming efficient teams of physicians and executive managers	0.610
	Facilitate discussions, meetings, progress and group dynamics	0.490
	Styles / leadership techniques	0.712
	Adherence to legal and regulatory standards	0.506
Relationship Management	Demonstrate effective interpersonal relationships	**0.567**
	Value joint decision making and do it	**0.711**
	Principles of communication and their specific applications	**0.718**
	Identify and use human and technical resources to communicate	**0.643**
	Identify the needs / expectations of stakeholders	**0.104**
	Behavioral norms and standards related to other specialized organizations	**0.159**
	Establish a collaborative relationship	**0.137**
	Relationships and organizational structure	**0.293**
	Manage projects or resources	**0.233**
	Demonstrate effective interpersonal relationships	**0.567**
Ethical	Professional and ethical standards	**0.809**
	Acceptance and practice of ethical and professional standards	**0.790**
	Manage projects or resources	**0.680**
	Organizational work and individual ethics	**0.055**
	Professional norms and behaviors	**0.043**
Change management	Support and participation in innovations in the field of health care policy	**0.804**
	Encourage high commitment to the destination and values of the organization	**0.742**
	Be accountable to yourself and others for achieving organizational goals	**0.865**
	Involve physicians in accepting risk and accepting new business risks	**0.879**
	Upgrade and change management	**0.841**
	Predict and plan strategies to overcome obstacles	**0.558**

Table 6. Second order confirmatory factor analysis

Factors	Symbol	Factor loading
Continuous learning and strategic planning	f1	0.572
Leadership skills and behavior	f2	0.707
Public management	f3	0.639
Communication skills	f4	0.648
Organizational climate and culture	f5	0.706
Negotiation and facilitation	f6	0.600
Relationship Management	f7	0.550
Ethical	f8	0.691
Change management	f9	0.661

Table 7. Second-order factor analysis fit indices

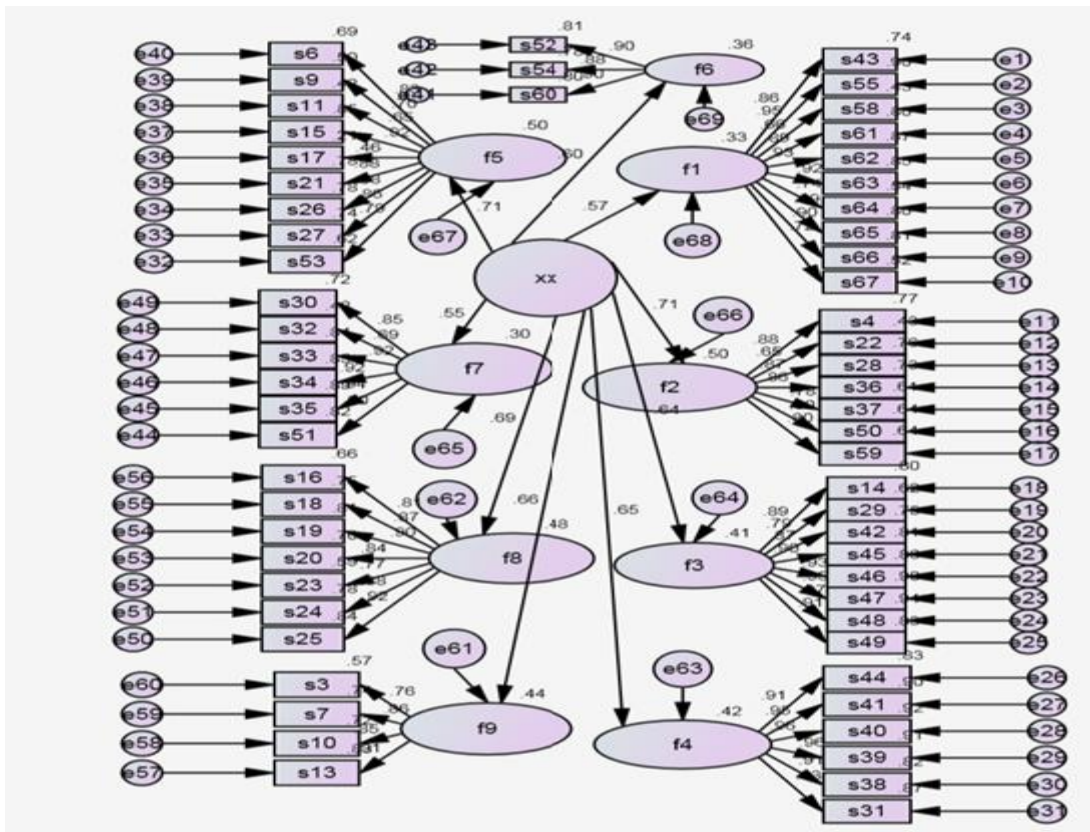| Indicator	CMIN/DF	RMSEA	GFI	AGFI	CFI	NFI	TLI	IFI	RFI
Estimation	2.401	0.063	0.923	0.901	0.983	0.964	0.961	0.932	0.924

Fig.1: Standard Estimation Coefficients for the Second-Order Factor Analysis