Designing a Model for Professional Competencies of Greenhouse Production Unit Managers in South Khorasan, Iran

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Abstract

The present study aimed to design a model for the professional competencies of greenhouse production unit managers in South Khorasan, Iran. The research was of applied type in terms of purpose and descriptive-correlational in terms of data collection, which was conducted by survey method. The statistical population consisted of 117 managers of greenhouse production units, who were surveyed through census because of their limited population. A questionnaire was used to collect data for the study. SPSS and Smart PLS software were employed for data analysis. For all competencies, Cronbach's alpha and composite reliability were estimated to be greater than 0.7. The analysis of structural equations with partial least squares (PLS) supported all hypotheses. Finally, the model of professional competencies was identified with seven competencies including managerial, individual, business environment, theological-ethical, technical and professional, academic, and general agriculture competencies, among which the managerial and individual competencies were the most important ones from managers' viewpoints. It is, therefore, suggested that managers need to continually update and modify their management skills and information in order to make right decisions in dealing with new and different issues and reach the ultimate goal of production.

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INTRODUCTION

The process of globalization and connectivity of the agricultural sectors to the growing economic markets at the international and regional levels have led the agricultural sector to play a determinative role in the economic relations of various regions. The successful involvement of the agricultural sector in the global economy requires sustainability, profitability, and high productivity of this sector (Moradinejad et al., 2007). Iran's location in the arid and semi-arid zone, its decreased rainfall and snowfall, and the excessive consumption of groundwater in recent years have greatly restricted the development of crop cultivation. One solution to deal with the water deficit crisis in the agricultural sector is to change the production method of some crops, which have high water consumption, through greenhouse cultivation (Rousta et al., 2011).

South Khorasan province, the easternmost province of Iran, is located at 32.5176°N and 59.1042°E. The average annual rainfall in this province is 134 mm and its average annual temperature is 17.5°C. According to the Agricultural Statistics of 2016, the production rate of greenhouse crops in Southern Khorasan is 10.205 t, including 0.5 percent of the total national production rate, and its cultivated area is 58.3 ha accounting for 0.7 percent of the national total cultivated area. In total, it is ranked the 17th province in terms of production rate and cultivated area. Most greenhouse owners in Southern Khorasan are engaged in greenhouse cucumber (81.3%), whose total production rate is 183 t with an average production yield of 18.30 kg/m^2/yr while the average national production of cucumber is 39.73 kg/m^2/yr, implying that the production yield in Southern Khorasan is less than half of the national average (Ahmadi, 2017). Surveys show that one of the main reasons for this is the lack of unskilled and inefficient human resources that can be largely regulated by upgrading the professional competencies of greenhouse producers.

To succeed in his/her job, a greenhouse production unit manager must have some competencies including individual (Rambe & Makhalemele, 2015), academia, business environment, general agriculture, managerial competencies, etc. In addition to specific technical competencies so that he/she can contribute to the growth of greenhouse production. The word "competency" is used to describe a set of behaviors that reflect a complex but unified mix of knowledge, skills, abilities, and motivations and are associated with performance in a particular role (Hwang & Kuo, 2018; Salleh & Sulaiman, 2015). In fact, competency is not behavior without intention and practice (Liikamaa, 2015). If we conceive all the expected competencies of a desirable and ideal role or occupation in a conceptual model, a new term emerges as "competency model" (Evans, 2015). Here are some of the studies most relevant to the research topic.

In a study entitled "*Assessing the factors affecting the management of cucurbits greenhouses in Khuzestan Province*", Rahmani et al. (2012) concluded that the age, discipline, and work experience of greenhouse owners may make a significant difference in the optimal management level. Also, there was a significant statistical relationship between the knowledge of greenhouse owners and their attitude towards sustainable agriculture with optimal management. Adib (2010) investigated the main components of the knowledge and information system of agriculture in increasing the production of greenhouse crops in Southern Khorasan province. The results of multiple regression analysis related to estimating the performance of greenhouse owners showed that the variables of education, cultivated area, and work experience were the most important variables that had the highest contribution to the changes in the dependent variable of yield rate. Sayyad Mansour et al. (2015) addressed the effect of training activities on improving the management skills of greenhouse owners in Baraan-e Jonubi rural district in Isfahan. The

International Journal of Agricultural Management and Development, 11(2), 261-269, June 2021.

262

findings showed that from the viewpoint of greenhouse owners, technical training had the strongest impact on improving their management skills. Mohebbi and Mohammadian Shamim (2017) concluded that managerial competency had four dimensions including interpersonal, individual, technical or professional, and organizational competencies, among which the organizational competency had the lowest mean and the technical or professional competency had the highest mean. In another study, Aslan and Pamukcu (2017) investigated the managers' competency and its impact on management levels and found that managers' competency had an impact on the performance and development of individuals and the function of the organization. At the International Conference on Human Resources, Ulrich et al. (2015) stated 12 main categories for Human Resource Competency Model including good nature, customer accountability, secure accountability, leadership, operational efficiency, knowledge management, external sense, innovation, technology, speed, culture or common mentality, connection and communication. Studying the development of greenhouse crops in the United States, Hall (2003) acknowledged California's superiority in producing greenhouse crops as a result of increased technical knowledge, as well as the high level of greenhouse owners' education in the US.

In general, the results of the related research indicate that in today's changing world, the competencies required by a job are rapidly changing. Human resources must have special skills and occupational competencies to carry out their occupation. What makes the present study important is the recognition of the professional competencies of greenhouse unit managers in empowering the active human resources to improve and modify the quality and quantity of balanced production and development of value-added greenhouse products in the region. In fact, the main purpose of this study was to present a model for professional competencies re-

quired by the managers of greenhouse production units in South Khorasan, Iran.

METHODOLOGY

The present study was quantitative in terms of nature, applied in terms of purpose, and survey in terms of data collection. The tool for data collection was a questionnaire. To extract, identify, and classify the general competencies (basic business environment, academic, individual, managerial, and theological-ethical competencies) based on documentary studies, available models and information were examined. Also, to identify the technical and specialized competencies of greenhouse production unit managers, tasks and functions associated with the greenhouse production unit management were identified by experts using a job analysis model and it was used as a basis for designing a questionnaire to determine the technical and specialized competencies. Job analysis is a process through which the nature and characteristics of a job are examined and sufficient relevant information is collected and reported. By analyzing a job, it becomes clear what tasks each job entails and what skills and knowledge are required to perform it properly (Ford, 2014). In all these stages, O*NET[1], ISCO[2]-2008 occupational information network, and the system of classification and Iranian comprehensive job description were used to comply with the occupational standards. Finally, a questionnaire was developed that contained seven main categories of competency, the most important ones of which are listed in Table 1.

The statistical population of the study was composed of 117 managers of greenhouse production units who were selected through the census due to the limited statistical population. After distributing the questionnaire and receiving them, they were analyzed by $SPSS_{25}$ and Smart PLS software.

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[1] . http://www.onetonline.org

[2] . International Standard Classification of Occupations

Table 1
Classification of Dimensions and Components of Managers' Competencies by Library Method and Job Analysis

Dimensions	Components
Individual and interpersonal competency	Loyalty and reliability; positive thinking; criticism; flexibility; physical and mental health; accuracy and speed; collaboration spirit; kindness; diligence; continuous learning; responsibility
Academic competency	Computer literacy; English language proficiency; ability to work with the Internet; communication skills; listening and speaking skills; knowledge of production tools and knowledge dissemination
Business environment competency	Creative and innovative thinking; problem-solving; business principles; customer orientation; decision-making
Theological-ethical competency	Work conscience; social relations; work discipline; internal faith; social moderation; empowerment
General agriculture competency	Soil science; horticulture; irrigation; plant structures; climate; agriculture equipment and tools
Managerial competency	Planning; organizing; guiding; coordinating; recruiting; reporting; budgeting; decisiveness; negotiation; analysis
Specialized-technical competency	Locating a greenhouse and choosing the type of structures; equipment and installations; litter preparation and planting operations; growing, harvesting, and post-harvesting stages; marketing; administrative and personnel affairs; inspection and supervision; occupational safety and health standards

The validity of the questionnaire was investigated in several ways. To investigate the content validity and face validity, the research instrument was approved by some professors and experts. The convergent validity index was estimated by the average variance extracted (AVE) to be higher than 0.5 for all competency classes, indicating that the correlation of each dimension with the relevant components was acceptable. Cronbach's alpha coefficient and composite reliability to measure reliability and internal consistency of the questionnaire were greater than 0.7 for all dimensions, indicating the internal consistency of the questionnaire (Table 2).

RESULTS

Demographic and professional characteristics of respondents

The findings showed that 18 managers were female and 99 managers were male. Their average age was 39 years. One-third of the managers were in the age range of 36-40 years. The literacy level of the managers was as follows: 37 percent B.Sc., 34 percent diplomas, and 14 percent M.Sc. In terms of discipline, 52 percent of them had studied agriculture. The average working experience of the respondents was 7 years. For 82 percent of managers, the cultivated area was 2000-3000 m^2. The average yield was 16 kg/m^2 and the average number of workers in the greenhouses was 2.63. According to the results, 71 percent of the greenhouse ownership was possessive, 17 percent was rental, and the others were related to other types of property. The average greenhouse income per year was 252.4 million IRR in Southern Khorasan. The average number of courses in the training course was 1.9.

Model evaluation

Before discussing the model evaluation, the adequacy of the sample is first investigated. As we know, one method to measure sample size fit for factor analysis is the Kaiser-Meyer-

Table 2

Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE)

Professional competency	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Business	0.90	0.92	0.72
Academic	0.82	0.86	0.66
Theological-ethical	0.71	0.81	0.63
Individual	0.89	0.90	0.58
General agriculture	0.81	0.85	0.69
Specialized-technological	0.74	0.81	0.58
Managerial	0.94	0.95	0.61

Olkin (KMO) index and Bartlett's test calculation. The range of the KMO index is between 0 and 1 so that the closer this value is to 1, the more suitable the data is considered for factor analysis. The minimum acceptable value for this index is 0.6. Bartlett's test is another method to determine data suitability, testing the hypothesis that the observed correlation matrix belongs to a community of uncorrelated variables. It is desirable to reject the null hypothesis. Rejecting the null hypothesis means that the variances are not equal and indicates that the correlation matrix has significant data. If the null hypothesis is not rejected, the utility of the factor analysis is questioned and it must be reconsidered.

The results of the calculations in this section are described in Table 3. As can be seen, the KMO value is 0.855 and the significance level of Bartlett's test is below 0.05. Therefore, it is concluded that the research data is suitable for factor analysis.

Structural equation modeling

Based on the analysis of the managers' views, the obtained model has the components presented in Figure 1. The results of confirmatory factor analysis showed that all the components related to competency dimensions in the analysis were significant at the level of 0.05. Therefore, a significant positive relationship was found between each dimension and managers' competencies. It is worth noting that the standard coefficients (factor loading) and significant numbers were used to confirm or reject each dimension. Given that the t-statistic for all dimensions is greater than 1.96, it is concluded that all identified competency factors are effective in obtaining the competency model from the perspective of the managers. As illustrated in Figure 1, the path coefficients are at a very strong level for the managerial and individual dimensions, at a strong level for the theological-ethical and business environment dimensions, at a medium level for the specialized-technical and academic dimensions, and at a poor level for the general agriculture dimension.

Table 3

Results of Sampling Adequacy

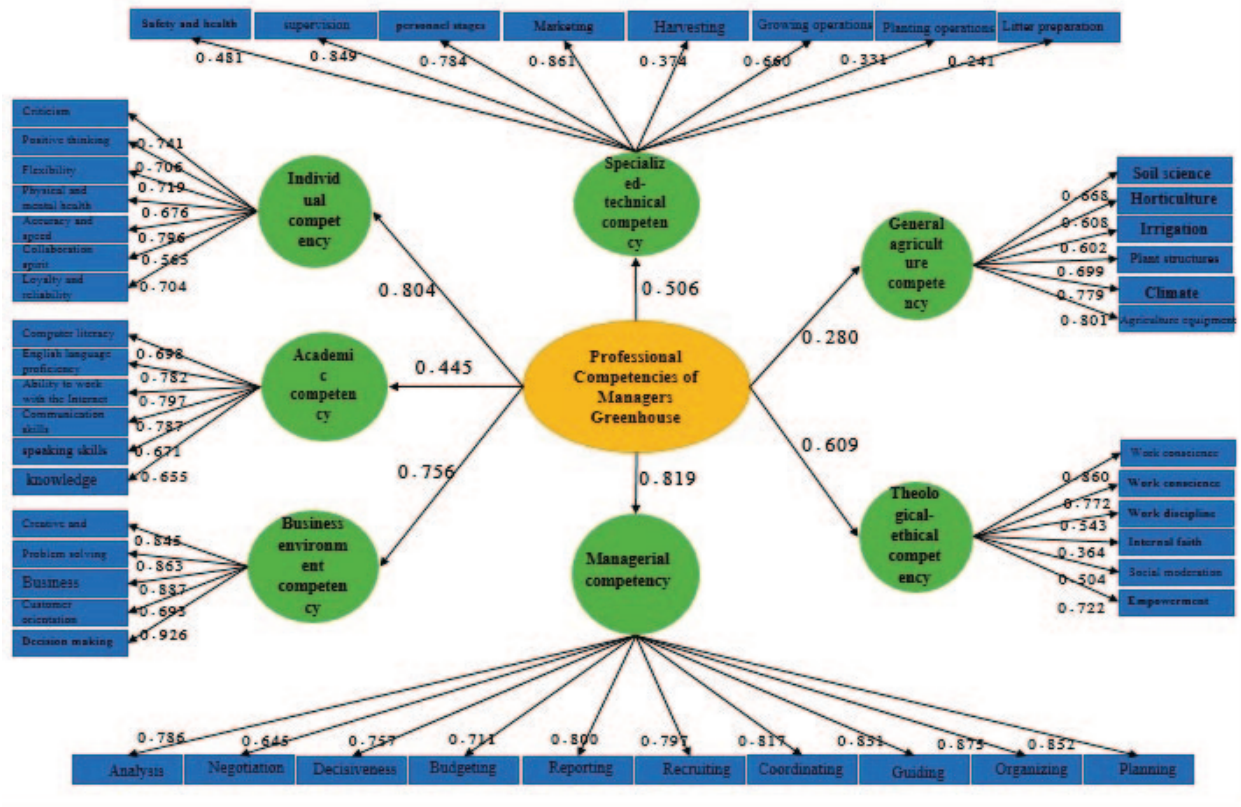| *p*-value	Degree of freedom	Bartlett's test statistics	Sample benchmark of KMO
0.000	820	4324.315	0.855

Figure 1. Standard Coefficients of the Model

International Journal of Agricultural Management and Development, 11(2), 261-269, June 2021.

266

DISCUSSION AND CONCLUSION

Today, managers of greenhouse production units need to be familiar with a variety of social, political, economic, ecological, aesthetic, and ethical complexities due to numerous challenges in the field of agriculture. All these cases require a greater focus on developing empowered, professional, and knowledgeable individuals in access to information with general skills and competencies and effective communication, who can analyze challenges, provide solutions, think creatively, and recognize the national and international environment. Therefore, the present study was designed and validated to establish a model for the professional competencies of greenhouse production unit managers. In this model, seven competencies were identified, including individual, managerial, business environment, academic, general agriculture, specialized-technical, and theological-ethical competencies that could serve as a basis for selecting individuals who intend to manage greenhouse production units.

According to the results, the dimension of the individual and interpersonal competency with a factor loading of 31.12 and an explanatory power of 0.804 was identified as the most important competency dimension for managers. Individual and interpersonal competency is a set of functional attributes that are largely acquisitive and the rest are inherent and a mixture of responsibility, loyalty, reliability, willingness, and readiness for continuous learning, kindness, diligence, positive thinking, criticism, flexibility, accuracy, and speed in performing tasks, being forgiving and generous, and having a spirit of cooperation and teamwork. Respondents believed that the individual competency was the most critical one, which was in line with Ulrich et al. (2015) and Mohebbi and Mohammadian Shamim (2017). As management involves the human factor, it is naturally associated with certain human

traits or individual characteristics.

According to the managers and based on the results, the managerial competency with a factor loading of 26.43 and an explanatory power of 0.819 was introduced as the second important dimension. This competency includes a number of items related to managing the production process of greenhouse crops, including planning and designing methods to achieve production goals, organizing and co-ordinating activities, attracting and employing required human resources, controlling costs and revenues, guiding, decision making, accountability reporting, decisiveness, con-sultation, negotiation, and analysis of duties. In fact, the more the principles of production management are met in the production of greenhouse crops, the more the productivity growth that can be expected. In response to technological changes, prices, and other eco-nomic factors, greenhouse owners make dif-ferent decisions over time that reflect the collective effects of these changes on the yield of production units. Greenhouse owners need to be ready to identify serious changes and make the right decisions in response to them.

The third important competency from the perspective of managers was the business environment competency with a factor loading of 23.72 and an explanatory power of 0.756. This competency includes several items in-cluding creative and innovative thinking, cus-tomer orientation, problem-solving, business principles, and the use of tools and technology. If this competency is developed, the ability to generate new ideas and to look at the situation in a curious way, as well as the ability to identify and analyze working problems to determine the causes, make decisions, implement solutions, and solve problems is raised among managers, which improve the quality and quantity of the product.

According to the results of this study, the theological and ethical competency with a factor loading of 15.78 and an explanatory power of 0.609 was identified as the fourth priority by the managers. From among the most influential items of this variable, one

can mention seriousness in work, not violating the assigned duties, efforts to improve and promote production, respecting the rights of partners, customers, and clients, adherence to accepted beliefs and norms of society and advising them others, accepting the suggestions and constructive criticisms for professional development, informing and responding to customers and clients, and observing the health and environmental considerations during production.

According to the findings of the present study, the academic competency with a factor loading of 90.72 and an explanatory power of 0.445 and the technical-specialized competency with a factor loading of 7.72 and an explanatory power of 0.506 were considered to be of moderate importance. The academic competency means information literacy, mathematics literacy, science literacy, computer literacy, etc., which was less important in managers' view. The technical-specialized competency includes locating a greenhouse and selecting the type of structure, selecting the appropriate greenhouse equipment and facilities, managing the planting bed preparation, managing the seedbed preparation, transplanting, and planting, growing, harvesting, and post-harvesting operations, marketing the product, coordinating the administrative and personnel affairs, and inspecting, monitoring, and observing the occupational safety and health. Although this competency is important in increasing the production rate and improving the quantity and quality of products produced in greenhouses, it was considered at a moderate level by the respondents. According to research by Hall (2003) and Sayyad Mansour et al. (2015), the decline in greenhouse production may be attributed to the underestimation of this competency.

Finally, the least important competency from the managers' view was the general agriculture competencies with a factor loading of 5.50 and an explanatory power of 0.280. This competency includes knowledge

in the field of soil science, horticulture, irrigation, plant structure, climate and environmental conditions, and agriculture and horticulture tools. Perhaps the most important reason for underestimating this competency is that the major of most managers is agriculture, so they are well-familiarized on these principles.

RECOMMENDATION

The relationship between learning and management is undeniable. The managers who are trained in the field can do things more accurately and quickly and increase their efficiency. Such managers are acute and more precise and quick in problem analysis and concluding.

In a dynamic economy, a greenhouse owner cannot wait for progress without acting in a timely and accurate response. Greenhouse owners need to constantly update their skills and knowledge so that they can reach the ultimate goals of production to make right decisions in dealing with new and changing issues.

In fact, one of the principles that must be taken into account today in agriculture, especially in the greenhouse setting, is ethics because it plays a significant role in producing healthy and organic crops and forming healthy communities. Also, adhering to the beliefs and norms accepted by the community and recommending them to others are important issues that are always addressed.

Overall, it is suggested that the presentation of the competency model is, above all, a means of better understanding and thus, the optimal use of competencies in recruitment, training, and empowerment, performance evaluation, payment and reward, etc.; that is, it is a means to achieve an accurate list of competencies required by the managers of greenhouse production units.

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268

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