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Research Article

FARMERS' COMPETENCIES IN AGRICULTURAL E-COMMERCE: A QUALITATIVE CONTENT ANALYSIS

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ABSTRACT
The expansion of the access to the www leads to a rapid growth of e-commerce. However, the acceptance by farmers is still a vital step to fully exploiting the potential of e-commerce and its contribution to agricultural development. In this qualitative study, we identify relevant factors (competencies) that affect the acceptance and use of e-commerce by famers in Iran. Fifteen selected experts provide information in face-to-face interviews. We apply a qualitative content analysis to the revealed information. The results indicate twenty-eight competencies of farmers in agricultural e-commerce, which are classified into three sub categories, namely knowledge, attitude and skill competencies. The list of farmers' agricultural e-commerce competencies is like a pattern for agricultural educators to plan their teaching outlines towards enhance these competencies among farmers. In addition, it can be used as a benchmark to 1) define farmers' competency standards, 2) measure competency level of each farmer, 3) identify skills and knowledge where training is required based on competency gaps, and 4) determine the type and extent of training needed in agricultural e-commerce.

Keywords: *Competence, Agricultural E-Commerce, Qualitative Content Analysis*

INTRODUCTION
Information and communication technology (ICT) is one of the most intensively studied and extensively applied technologies in the 20th century and its research and application will be even more accelerated in the 21st century. The impact of IT is more far reaching than any one may have had imagined (Shu *et al.*, 2007). Expansion of the access to the www by developing infrastructure and technology are key drivers to the growth of electronic (e)-commerce (Ueasangkomsate, 2015). E-commerce or online trading name exchanges through the www or the internet (Ghogare & Monga, 2015). Today e-commerce is one of the most discussed topics in business. It is already leading to the reshaping of customer and supplier relationships and the streamlining of business processes (Daniel *et al.*, 2002). E-commerce is emerging as a new way of helping business to compete in the global market and thus, contributing to economic success (Gharegozi *et al.*, 2011). There are several cost / performance benefits of e-commerce. The first group of benefits are based on reduction of external and internal communication expenses, such as: the speed- up business processes and reduce administrative tasks. The second group of benefits are the revenues generated either from current business or from new initiatives. These can also serve to enhance the company's visibility and extend customer and supplier networks. The third group of benefits are tangible benefits. For example, e-commerce needs low costs to start up business, it does not need a physical store to display the products, as it can simply display them on the websites. Furthermore, online businesses are built on websites and are highly automated, and thus require fewer employee, and the removal of branches in e-commerce can save both rental and staff costs. In addition, a smaller inventory volume is needed when the number of branches is reduced. So, e-commerce reduce costs in several ways. Finally, there is a group related to intangible benefits, such as enhance competitive positioning and customer relationship (Currie, 2000).
In recent years, e-commerce in agriculture has become the most popular subject (Yanyan, 2015). However, just a few years e-commerce has entered in the agricultural sector, but it has created dramatic changes in it (Fritz *et al.*, 2004), such as: agricultural e-commerce may offers solutions for a large and

fragmented market, it improves market access through online transactions by reducing geographic obstacles to market reach, such as time and distance and it may encourage transport and logistical developments (Wilson, 2000). It can help connecting supply and demand better (Yanyan, 2015). E-Commerce in agriculture could potentially tighten the supply chain and cut marketing margins and transaction costs in ways that benefit smaller, local producers as well as local agribusinesses. It enables a vast array of products to be transacted, usually at a price that is competitive with local retailers (Ehmake *et al.,* 2001). In addition, ICT allows producers to more easily access international markets (Ghogare & Monga, 2015). Also, e-commerce has this potential to increase profitability in agricultural markets by increasing sales and decreasing search and transactions costs (Carpio *et al.,* 2013). E-commerce helps farmers to find new customers and to broaden market reach, to cross geographic market limitations and to find new markets. Also, e-commerce lets farmers to conduct direct marketing for their products and is a suitable way to avoid intermediaries that usually have high margins that decrease farmers, profits (Strzębicki, 2011).

According to the benefits of agricultural e-commerce, acceptance and application of e-commerce by farmers as the most important stakeholders in the agricultural sector, is a vital step towards agricultural development. Since, application of e-commerce is a new and vague task for most of the farmers and the adoption rate of e-commerce by farmers is still undersized. On the other hand, if farmers do not achieve new competencies, they can not accept this type of innovation or maybe during the time their acceptance would be thwarted. So, achieving agricultural e-commerce competencies is an important factor for their satisfactory performance.

Literature Review

There is a vast literature on the concept of competence. The main goal of many of these researches are finding, defining and evaluating of competence in a specific function. For example, Petrovici (2014) explored necessary competencies of future teachers of preschool and primary school education. The results of this study, indicated six professional competencies and three transversal competencies, accompanied by level statements for each competence and standards of minimum performance for the assessment of them. Umar *et al.,* (2017) studied about competencies of agricultural extension workers in Malaysia. They found thirty- three core competencies and the need assessment model were used to evaluate these competencies among agricultural extension workers. They noted that any capacity development programme such as in- service training should pay more attention to which competencies with lower scores among agricultural extension workers to enhance these competencies among them. Martina *et al.,* (2012) stated that identification and development of managerial competencies are important tools of human resources management. They identified twenty-seven competencies in knowledge-based organizations in the Czech Republic using content analysis method. Taylor *et al.,* (2004) noted that small and medium enterprises managers need to ensure that those undertaking electronic commerce development work have the necessary skills and knowledge to undertake such work in a competent and professional manner. They found that there is a wide variety of skills and knowledge required for electronic commerce projects in the small and medium enterprises sector and some of these most important competencies were determined. Khosrowpour (2008) explored the necessary competencies for successful adoption and assimilation of business- to- business e-service in small and medium size corporations (SME_S).

This study identified the most important groups of competencies such as technical, interpersonal and conceptual skills. Kiplangat *et al.,* (2015) studied about the effect of human competencies in adoption of e-commerce strategies among small and medium enterprises in Kenya. The results showed that ICT competencies among managers and employees influence the adoption of electronic commerce. Mangkunegara and Waris (2015) explored the effect of competence on employee performance in company. The results of this study indicated that competencies of employee have a positive influence on the performance. They noted that competence is an important factor in order to achieve individual and company performance and if the employee has a good competence, then, he will work well in completing the work.

According to the various research fields, competency has been defined differently. For example, Miller (1990) believed that competence is knowing how to do something. He argued that competence is a basic item for performance and action. IPMA (2006) noted that competence is a collection of personal attitudes, abilities and experience necessary for the successful exercise of a determined function. Aesaert and Braak (2015) stated that ICT competencies refer to persons' ability to use information and communication technology. Petrovici (2014) defined teachers competencies as knowledge (knows what), skills (know how) and attitude (know why) and according to this definition, he argued that assessing the professional competences of the teaching staff means evaluating their capacity to perform number of professional tasks using an organized ensemble of knowledge, abilities and attitudes. Wu *et al.,* (2015) described the competence of graduate nursing students as theoretical and clinical knowledge, with the set of values and attitudes used in the practice of nursing, incorporating psychomotor and problem-solving abilities, with the goal of providing safe care for patients. Mulder (2015) proposed that competence is integrated capabilities that is conditional for sustainable effective performance, which is consist of cluster of knowledge, skills and attitudes, and it is related to professions, occupations, jobs, roles, organizations or situations. He stated that the concept of competence has two sides: the first one is related to what people actually can do. The second is what they are allowed to do. He believed that as more and more professionals are being held accountable for what they are doing and why.

Regardless of various meaning of competency and different types of researches about this concept, it can be concluded that competency is related to performing good performance, regardless of the type of job. As Mulder (2011) believed that competence needs to be related to performance because the use of skills, knowledge and attitudes in professional action expresses the possession of competence and it is related to effective performance. Sandberg (2000) stated that researchers have found the concept of competence attractive for describing essential human knowledge, attitude and skills at work, because of the concept's focus on the relation between person and work. In addition, Lopes *et al.,* (2016) stated that there are various models to measure and understand performance output and one of the best, is a set of competences. Mangkunegara and Waris (2015) noted that competence is the ability and willingness to perform a task with effective performance.

Therefore, making a list of competencies enhance the successful performance of the work (Uddin *et al.,* 2012) and development, measurement and evaluation of competence has become an important issue in education and training researches (Albano, 2012). If each agricultural market policy wants to encourage farmers to accept e-commerce in their transactions, the agricultural educational and training plans should be turned towards stablishing and sustaining these competencies among farmers. However, farmers' competencies in agricultural e-commerce has been ignored in the literature. Therefore, the main aim of this study is identifying the competencies that farmers need for application of e-commerce in agriculture.

MATERIALS AND METHODS

Study Design and Data Analysis

In this study, a qualitative content analysis performed to understand and describe the farmers' competencies in agricultural e-commerce. Qualitative content analysis is a method to analysis qualitative data. It focuses on subject and context and emphasizes variation, e.g. similarities within and differences between parts of the text (Graneheim *et al.,* 2017). The methodological approach in qualitative content analysis can be inductive, deductive, and adductive (Krippendorff, 2013).

In this study, the deductive approach used. Deductive category application works with prior formulated, theoretical derived aspects of analysis and bringing them in connection with the text (Mayring, 2014). In Figure 1, step model of deductive category application shown.

Study Participants

As agricultural e-commerce is a new idea and is a kind of an innovation, a few experts have adequate knowledge and experiences about it. The participants in this study included 15 Jihad Agricultural Organization experts of Fars province in Iran who had valuable knowledge and experiences in agricultural e-commerce.

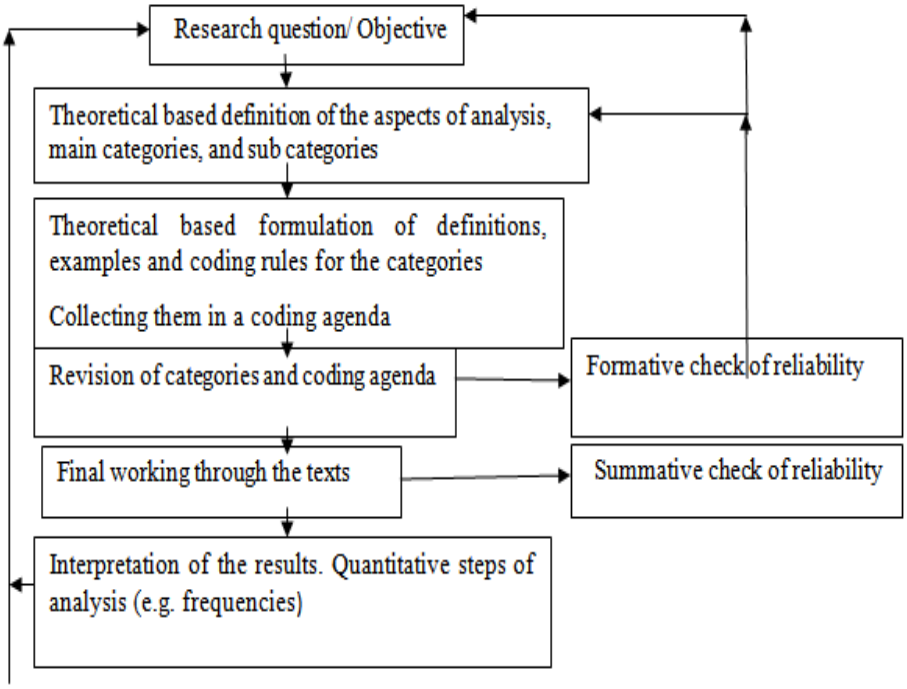

Figure 1: Step Model of Deductive Category Application (Mayring, 2014)

Sampling Method

In qualitative studies, items should be selected purposefully. In this study, experts were selected with the snowball sampling method. It means that each expert introduced the next one. The sampling continued until the theoretical saturation obtained.

Snowball sampling is a special nonprobability method for developing a research sample where existing study subjects recruit future subjects from among their acquaintances (Katz, 2006). The characteristic of the snowball sampling is that it is not used to estimate the characteristics of the general population but to estimate the characteristics of a network of "hidden" populations (rare, difficult to identify). The term "hidden population", synonym to "very seldom" population or "difficult to encounter" population. In other words, due to their rarity, this type of population is difficult to identify, to study and to recruit for the imposed investigation (Dragan & Isaic-Maniu, 2013).

Data Collection

Data were collected using face- to- face interviews. At the beginning of each interview, the researcher explained the purposes and the main parts of the study, like total definition of competence and its elements, research method and other information that each expert might liked to know. Then, the study subjects were asked the following: please determine and describe which competencies farmers should obtain for conducting their transactions electronically. It should be noted that during the interview, the researcher recorded all the quotations and answers.

RESULTS AND DISCUSSION

As it is shown in Figure 1, the qualitative content analysis has several steps. Due to the main goal of this study, these steps were taken and in the following, each step will be described. The summary of its process is shown in table 1.

Research question/ Objective

As in all studies, the first stage in qualitive content analysis is define the research question. Because the primary research question forms the basis of the study objectives (Farrugia *et al.*, 2010). In this study the main question was: what are the farmers' competencies for conducting their transactions electronically?

Due to this question the main objective of this study was: identifying the farmers' competencies for agricultural e-commerce.

Theoretical based definition of the aspects of analysis, main categories, and sub categories

The second step in the qualitative content analysis is definition main categories and sub categories according to theoretical bases. In this study, the main category that should be determined and defined was competence. As mentioned, the definition of competence is various, but one of the comprehensive and complete definition of competence that is used in this study, was the definition of Mulder (2015) as he mentioned that competence is the cluster of knowledge, skills and attitudes, which is conditional for sustainable effective performance in a certain context, profession, organization, job, role and situation. As it is shown in figure 2, the totality of knowledge, skills and attitudes, shape the competence in a particular professional practice.

After determination of the main category and its definition, sub categories determined. These sub-categories were knowledge competencies, attitude competencies and skill competencies. For definition of these concepts, the Bloom's taxonomy of learning domain used.

Bloom *et al.,* (1956) identified three domains of educational activities or learning; which includes: Cognitive (Mental skills (Knowledge)), Affective (Growth in feelings or emotional areas (Attitude)) and Psychomotor (Manual or physical skills (Skills)). Trainers often refer to these three categories as KSA (Knowledge, Skills, and Attitude). This taxonomy of learning behaviors can be thought of as "the goals of the learning process". That is after a learning episode, the learner should have acquired new skills, knowledge and attitude. According to Blooms' taxonomy, knowledge refers to cognitive domain that means the recall or recognition of facts, procedural patterns, and concepts that serve in the development intellectual abilities and skills. Attitude, refers to affective domain that means the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations and attitudes and skill, refers to psychomotor domain that include manual or physical skills.

So, the definition of knowledge competencies in this study were competencies that are necessary for conducting agricultural e- commerce and related to cognitive domain of farmers.

The definition of attitude competencies were competencies that are necessary for conducting agricultural e-commerce and related to affective domain of farmers.

At last, the definition of skill competencies were competencies that are necessary for conducting agricultural e-commerce and related to psychomotor domain of farmers.

So, the total of these three sub-competencies, creates the whole competencies of farmers in agricultural e-commerce.

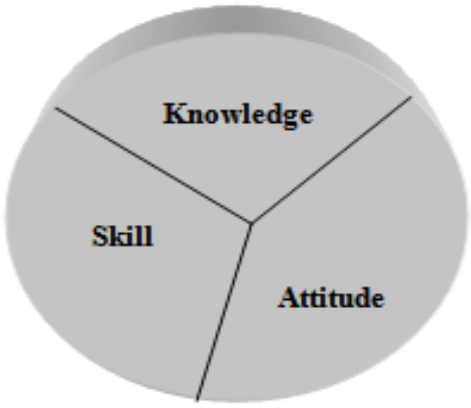

Figure 2: The Elements of Competence

Theoretical based formulation of definitions, examples and coding rules for the categories collecting them in a coding agenda. At this stage, based on the category, sub-categories and their definitions, the coding

rules defined. The coding rule is like a pattern that it determines exactly under what circumstances a text passage can be coded with a category (Mayring, 2014). As, all the texts and quotations should be categorize in three sub- categories, so three coding rules were defined. The first one was a coding rule for categorize the experts' quotations and answers to knowledge competencies. So all the experts' quotations and answers that were related to farmers' cognitive domain, placed in this sub- category.

The second, was a coding rule for categorize the experts' quotations and answers to attitude competencies.

Therefore, all the experts' quotations and answers that were related to farmers' affective domain, placed in this sub- category.

The last, was a coding rule for categorize the experts' quotations and answers to skill competencies. Therefore, all the experts' quotations and answers that were related to farmers' psychomotor domain, placed in this sub- category.

According to these coding agenda, the coding process done and all of the texts that were written by researcher, read, analyzed, coded and placed in one of these three sub categories (knowledge competencies, attitude competencies and skill competencies) and which were not relevant to these sub categories, were deleted.

Formative and Summative Check of Reliability

Reliability is an important concept in research and generally refers to the consistency, stability and repeatability of results (Twycross & Shields, 2004) and in qualitative research, is referred to as when a researcher's approach is consistent across different researchers and different projects (Creswell, 2014) and the reliability of content analysis technique is especially based on coding process (Krippendorff, 2004).

In this study, two researchers read the experts' quotations and answers and checked thier places in each sub categories at two different times and coefficient of agreement is calculated. The consistency ratio of two researchers has been observed.

The formula "reliability= coefficient of agreement" has been used. Calculations showed that there are adequate consistencies between the coders and it has been presented as an evidence to show the reliability of the study.

Interpretation of the Results Quantitative Steps of Analysis

The experts had agreed with similar items. It means that they named the similar items as the competencies of farmers in agricultural e-commerce. At this stage, these items were counted and their percentage were determined.

According to these percentages, the most important farmers' competencies in agricultural e-commerce determined. In the sub category of knowledge competencies: recognition the needs, demands and interest of customers, information about the prices of agricultural products in market, knowledge about the prices of agricultural inputs in market and the basic literacy of English language were the most important competences.

The most important attitude competencies were: belief in the more economic benefits of e-commerce compared to traditional methods, positive opinion about the safe and controllable environment of e-commerce, and belief in improving income by e-commerce.

At last, being able to work with computer and internet, abilities to package agricultural products due to the customers' needs and being able to get correct information about the market in right time were the most skill competencies that farmers should obtain for agricultural e-commerce.

As it is shown in figure 3, twenty-eight competencies were determined by qualitative content analysis method and these competencies were divided into three sub categories: knowledge competencies; attitude competencies; and skill competencies and competencies in each sub category were listed. These competencies can be used as a benchmark to 1) define farmers' competency standards, 2) measure competency level of each farmer, 3) identify skills and knowledge where training is required based on competency gaps, and, 4) determine the type and extent of training needed.

In addition, the most important competencies in each sub category were shown in bold (Figure 3).

Table 1: The Qualitative Content Analysis Processes to Identify Farmers' Competencies in Agricultural E-Commerce

Sub Categories	Definition	Coding Rules	experts' quotation and answers	Percentage
Knowledge competencies	competencies that are necessary for conducting agricultural e-commerce and related to farmers' cognitive domain	All of the experts' quotations and answers that related to cognitive domain should be placed in this category	Farmers should recognize all kinds of customers	66.6 %
			Farmers should recognize the needs, demands and interest of customers	86.6 %
			Farmers should know and aware about legal rules of e-commerce	40 %
			Farmers should know about the prices of agricultural inputs in market	80 %
			Farmers should have enough information about the prices of agricultural products in market	86.6 %
			Farmers should recognize different types and varieties of their agricultural product	13.3 %
			Farmers should have information about the appropriate transportation' methods of citrus products	13.3 %
			Farmers should have information about the practices and methods of e-commerce in agriculture	53.3 %
			Farmers should know about the electronic payment methods	40 %
			Farmers should have the basic literacy of English language	80 %
Attitude competencies	competencies that are necessary for conducting agricultural e-commerce and relatade to farmers' affective domain	All of theexperts ' quotations and answers	Farmers should believe that by using e-commerce, their income will be improved	73.3 %
			Farmers should believe that by using e-commerce, their customers will be increased	66.6 %
			Farmers should believe that stablishing and management of e-commerce is possible for them	46.6 %

		that related to affective domain should be placed in this category	Farmers should believe that e-commerce, can move them towards appropriate markets	20 %
			Farmers should believe that e-commerce have more economic benefits than traditional methods	86.6 %
			Farmers should have this opinion that the environment of e-commerce is safe and controllable	80 %
			Farmers should have this opinion that the e-commerce environment is safe and controllable	66.6 %
Skill competencies	competencies that are necessary for conducting agricultural e-commerce and related to farmers' psychomotor domain	All of the experts ' quotations and answers that related to psychomotor domain should be placed in this category	Farmers should have appropriate abilities to packaging agricultural products according to the customers' needs and interests	93.3 %
			Farmers should have good skills in writing the contract deals	13.3 %
			Farmers should be able to working with computer and internet	100 %
			Farmers should have the ability of designing weblogs	53.3 %
			Farmers should have the ability of using applications software	6.6 %
			Farmers should have the ability of working with social networks	26.6 %
			Farmers should be able to analyzing the cost-benefit of transactions	40 %
			Farmers should have the appropriate skill to pricing on their agricultural products	26.6 %
			Farmers should be able to write the correct information in weblogs	46.6 %
			Farmers should be able to getting the correct information about the market in the appropriate time	66.6 %

Figure 3: Farmers' Competencies in Agricultural E-Commerce

Conclusion

E-commerce penetrated into various industries, including agriculture (Liu et al., 2013). According to the review of the literatures, the adoption of e-commerce leads to various benefits such as, product quality improvement, cost reduction, new consumer or supplier contacts and the creation of new ways of selling existing products (Butt & Aijaz, 2009).

Acceptance of e-commerce by farmers is an important factor in agricultural development. Application of e-commerce is a new and vague task for farmers and achieving new competencies is a vital factor for their satisfactory performance.

Competence is a cluster of related knowledge, attitudes and skills that fulfill four criteria: a) affects a major part of one's job, b) correlates with performance on the job, c) can be measured against well-

accepted standards, and d) can be improved via training development (Parry, 1998). The concept of competence is related to effective performance (Mulder, 2011) and making the list of competencies can enhance the successful performance of the work (Uddin *et al.,* 2012).

Obtaining necessary competencies of agricultural e-commerce is a fundamental task for farmers towards adoption of agricultural e-commerce. On the other hand, Training programs can play a crucial role in farmers' decisions, providing them with the technical knowledge necessary for the selection of appropriate and effective methods (Prudent *et al.*, 2007). Rapid changes in agricultural technology, such as information technologies, indicate that agricultural educators will need to reassess their role and responsibility in the planning and delivery of farmer education (Trede & Whitaker, 2000). As competencies are educable and can be improved by education and training, the list of farmers' agricultural e-commerce competencies is like a pattern for agricultural educators to plan their teaching outlines towards enhance these competencies among farmers.

So, Agricultural e-commerce competencies can be considered as educational outcomes that farmers need to acquire.

In this study, with a qualitative content analysis method, the farmers' competencies in agricultural e-commerce in Iran were determined. These twenty-eight competencies classified into three sub category: knowledge competencies, attitude competencies, and skill competencies. The most important competencies identified in each category. Educators should pay more attention to these competencies in their curriculum development. It is hoped that the list of farmers' competencies in agricultural e-commerce be used in other studies as a benchmark to 1) measure agricultural e-commerce competency level of each farmer, 3) identify farmers' training need based on competency gaps, and, 3) determine the type and extent of training needed.

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