Journal of Retailing and Consumer Services 50 (2019) 154–162

Contents lists available at ScienceDirect

Journal of Retailing and Consumer Services

journal homepage: www.elsevier.com/locate/jretconser

A new model for assessing the impact of the urban intelligent transportation system, farmers' knowledge and business processes on the success of green supply chain management system for urban distribution of agricultural products

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ARTICLE INFO

Keywords:
Urban planning
Energy
Knowledge
Supply chain
Business processes
GSCM

ABSTRACT

Today, in urban planning, the role of an efficient Supply Chain Management (SCM) system is very important. Also, Green SCN (GSCM) because of its inherent capabilities such as faster delivery of goods and services, reduced latency, increased quality, value-added for customers to supply clean products and improve the organization's economic performance becomes very popular. Recently, GSCM has become one of the most important approaches in supply chain. Supply chain and urban managers through the logistic process try to get benefit from GSCM and improve their environmental performance as a valuable resource. The results of these measures save and eliminate excess energy and reduce operational points that are consistent with the green supply chain. The green supply chain also helps to distribute crops using urban ITS. This research presents a model for assessing the impact of urban ITS, farmers' knowledge and business processes on the success of GSCM systems for urban distribution of an agricultural product. The structural equation modeling method is employed to assess the causal model and to verify its validity and reliability. Also, the evaluation of the consistency and validity of the model is done through a structural equation model. The model and data based on the questionnaire are analyzed using Smart PLS 3.0. The collected results have shown that all the considered factors, urban intelligent transportation system, farmers' knowledge, and business processes play an important role in the success of GSCM for urban distribution of the agricultural product.

1. Introduction

Today, due to the energy concerns of urban planners, effective energy management becomes a very common issue (Aghajani and Ghadimi, 2018; Ghadimi et al., 2013). In this regard, the green supply chain becomes one of the most important issues to distribute the products among consumers (Banerjee and Mishra, 2017; Chavez et al., 2016; Y. Liu, Wang and Ghadimi, 2017). Green Supply Chain Management (GSCM) has been introduced as a preventive approach and a solution to improve the performance of enterprise processes and products (de Sousa Jabbour et al., 2015). It also boosts productivity by preserving the new green environment (T. A. Chin, Tat and Sulaiman, 2015). Attention to the green supply chain helps to increase the ability to design products, create markets and business processes, and urban ITS processes (Dubey et al., 2015). Currently, the green supply chain is used as a strategy for gaining a competitive advantage (Cosimato and Troisi, 2015). Also, it is considered as a new template of the companies to achieve desired goals and to reduce the environmental impact (Hervani et al., 2005). GSCM in companies helps to sustainable transport, green packaging, reusable containers to recycling, and the use of environmentally friendly packaging materials (Dubey et al., 2017).

On the other hand, farming activities try to produce fresh and on-

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https://doi.org/10.1016/j.jretconser.2019.05.007
Received 13 March 2019; Received in revised form 5 May 2019; Accepted 5 May 2019

demand products with less operational costs (Conrad et al., 2018). Distribution of these products must always be consistent with market demands to increase the profit (Campi and Dueñas, 2016; Rana and Paul, 2017). For selling agricultural products some factors affecting profitability, such as managing labor costs, preserving the value of degrading products, and using best-in-time transportation methods (Sharma et al., 2017). Evidence suggests that using urban ITS in this process can minimize the harmful effects of environmental perilous on products and services (B. Singh and Gupta, 2015). In urban planning, urban Intelligent Transportation System (ITS) uses information and communication technology for utilizing the proper design of urban infrastructure to improve the performance of the system (Cheng et al., 2015; Ganin et al., 2019).

In fact, the use of the GSCM to integrate internal and external measures (business processes) in the product life cycle is very common (Jabbour and de Sousa Jabbour, 2016). This cycle includes product design, resource supply, distribution, and transfer processes, customer delivery, after-consumption, and recycling management where try to maximize energy efficiency along with improved overall supply chain performance that an organization must offer (Hervani et al., 2005; Zhao et al., 2017). The requirement for organizations to transport and distribute products has led to significant changes in the transportation infrastructure in this section (Išoraite, 2005).

On the other hand, organizations try to use environmental protection and biological resources in order to make their products available to customers (Brännström et al., 2001). Urban ITS is the way to properly distribute products to customers (Wisetjindawat, 2010). In this paper, we have tried to examine the impact of urban ITS, farmers' knowledge and business processes on the success of the GSCM system for urban distribution of an agricultural product. In general, the contribution of the article is as follows:

- Investigating the effect of urban ITS on the success of the GSCM system for urban distribution of the agricultural product.
- Investigating the effect of farmers' knowledge on the success of the GSCM system for urban distribution of the agricultural product.
- Investigating the effect of business processes on the success of the GSCM system for urban distribution of the agricultural product.

The following classification shows the contents of this paper. The related literature is reviewed in Section 2. The research methodology by outlining the data collection, presenting the research model and defining the measurement of variables is discussed in Section 3. Sections 4, 5 and 6 include the analysis of results, conclusions, limitations and the suggestions for future research, respectively.

2. Literature review

This paper offers a new framework and model to assess the influence of urban ITS, farmers' knowledge and business processes on the success of the GSCM system for the distribution of agricultural products. The distribution of agricultural products depends on some factors such as fast transportation, environmental protection, delivery to customers, product quality and productivity (Zielinski, 2007). Also, many companies are looking to gain more market share and earn customer trust via efficient SCM (Segal-Horn, 2003). Through GSCM, the organization can handle all internal and external measures from product design for products distribution and their delivery to customers (Trkman, 2010). In this regard, business processes also play an important role in the organization (Tidd, 2001). Business processes in the organization require innovation for efficiency and cost reduction (Hammer, 2015). So, the organizations through earning knowledge and information from external sources and internalization of information, make innovation (Naderi et al., 2018; Vom Brocke and Mendling, 2018). Acquiring knowledge from external sources is done through the knowledge of farmers about competitors, markets, information technology and communications (Akhavan et al., 2013; Dayan et al., 2017; Qian et al., 2017). It will also help the success of GSCM for the distribution of agricultural products (Srivastava, 2007). The rest of this section provides a summary of the most important research on GSCM and distribution of agricultural products as well as offering the conceptual framework and hypotheses.

Seman et al. (2019) have studied the mediating effect of green innovation on the relationship between GSCM and environmental performance. The goal is to provide empirical evidence to illustrate the impact of GSCM and green innovation practices on environmental performance. A Likert-scale was used to collect data. To do descriptive statistics, they have used the early data from PASW (version 18), previously known as IBM SPSS statistics and performed partial modeling of partial structural equations (PLE-SEM) using Smart PLS (version 3.2.1) to test the hypotheses. The results have shown that there is a meaningful and positive relationship between GSCM, green innovation, and environmental performance. Green innovation also has a positive impact on environmental performance. The limitation of this research was selecting only a small sample of an organization for examination.

Also, Ikram and Siddiqui (2019) have explored the effect of GSCM on environmental and export performance. The data was collected using a questionnaire with Likert-scale. The PLS is used to assess the validity of the questionnaire and evaluate the model and assumptions. The results have shown a significant relationship between GSCM, export performance and environmental performance. It also showed that GSCM contributes to improving the environmental performance and export of the textile industry, increasing export performance and, consequently, increasing revenue. The research limitation regards to the use of available samples, as well as the management of GSCM in short-term investments.

L. Liu (2019) has focused on top management characteristics of GSCM and corporate performance. The goal of the study is manufacturing companies. The study investigates the impact of large companies within the framework of GSCM on investment and competition. A questionnaire with Likert scale was used to conduct the research and the questionnaire was translated into several languages. The PLS software used to examine the model and hypotheses. The results have shown that GSCM, in the long run, would improve company competitiveness and improve economic performance. The research limitation is excessive dispersion of samples.

Furthermore, Laari, Töyli, Solakivi, and Ojala (2016) have examined firm performance and customer-driven GSCM. The goal was to recognize direct and indirect relationships between GSCM practices and environmental and financial performance in production processes. A questionnaire was used to collect data. The results have shown that manufacturers, using GSCM techniques and environmental monitoring, can do well on environmental issues. Also, if a company tries to enhance financial performance, it must establish more cooperative relationships with customers to achieve environmental purposes. The research limitation is mainly about the small sample, which only includes Finnish manufacturing companies. Also, some intermediary factors are not considered.

The effect of customer-centric GSCM on operational performance and customer satisfaction has been investigated by Chavez et al. (2016). The purpose of this study was to investigate customer pressure and review performance results in organizations. The data was collected through a survey and manufacturers were randomly selected. SEM was used in this study to analyze data and results in a conceptual framework. The results show that customer pressure has a positive effect on the implementation of GSCM on the customer base, which in turn results in improved performance. While flexibility and production costs have no effect on customer satisfaction, the quality and delivery of the product are significantly related to customer satisfaction.

Finally, Green et al. (2012) have studied the GSCM practices and their impact on performance. Data collected from production managers and was analyzed using LISREL structural equation method. The results

Table 1
Summarization and comparison of the discussed papers in the field of GSCM.

Article	Year	Method	Advantages	Limitation
Seman et al., (2019)	2019	● Studying the mediating effect of green innovation on the relationship between GSCM and environmental performance	● Providing practices for improving GSCM implementation and green innovation	● Selecting only a small sample of an organization for examination
Ikram and Siddiqui (2019)	2019	● Exploring the effect of GSCM on environmental and export performance	● Helping companies deal with external pressures. ● Enhancing performance levels.	● Focusing on a specific area
L. Liu (2019)	2019	● Focusing on top management characteristics of GSCM and corporate performance	● Promoting economic performance	● The sample companies have an extensive range of sources, resulting in scattered data.
Töyli et al. (2016)	2016	● Examining a firm performance and customer-driven GSCM	● Responding to customer pressure	● Limited to one area
Chavez et al. (2016)	2016	● Investigating the effect of customer-centric GSCM on operational performance and customer satisfaction	● Proving multiple operational performance improvements.	● Focusing on customer pressures
Green et al. (2012)	2012	● Studying the GSCM practices and their impact on performance	● Improving environmental and economic and operational performance.	● As a first empirical investigation, the study is limited by sample size.

have shown that the adoption of GSCM practices has a positive effect on company performance. However, since the research was the first comprehensive theoretical model test, more examples should be considered.

Briefly, Table 1 summarizes and compares the discussed related work in the field of GSCM. Also, this table illustrates its main advantages and limitations.

3. Research model and hypotheses

The present literature examines the impact of urban ITS, farmers' knowledge and business processes on the success of GSCM for urban distribution of the agricultural product. In a GSCM, internal measures include purchasing raw materials, choosing a vendor, deploying a vendor, improving transportation, choosing a means of transportation, controlling raw materials and warehousing (Laari et al., 2016). Foreign actions, in addition to the above, including collecting, storing and distributing goods between buyers (R. Singh, Rastogi and Aggarwal, 2016). Therefore, improved transportation will improve GSCM (Zhu et al., 2011). The processes that are carried out inside and outside the organization to improve the performance of the organization are business processes (Holt and Ghobadian, 2009). Improving the business process will improve GSCM for the distribution of agricultural products (Li, 2011). Also, organizations through information acquisition from outside sources (Knowledge of farmers about the market, rivals, and communications) and internalization, causing an improvement of GSCM process (Lee et al., 2012). This section plans to provide a new model for assessing the impact of urban ITS, farmers' knowledge and business processes on the success of the GSCM for the distribution of agricultural products. This research develops such a framework including those variables which is shown in Fig. 1. Also, definitions of these variables and assumptions are presented in this section.

3.1. Farmers' knowledge

Knowledge is the core concept in the success of a wide range of organizations and business (Arbabi et al., 2016; Charband and Jafari Navimipour, 2018; Fouladi and Jafari Navimipour, 2017). In this regards, farmers' knowledge has the skills to use agricultural experience and new technologies for increasing the productivity, management capabilities, awareness of planting time, making the changes with the help of innovation, managing the profit and environmental protection. Farmers', through knowledge of farming, can affect the supply and demand of the economy (Sharma et al., 2017). The agricultural industry, utilizing GSCM, can improve product design, locating, processing, distribution, and reimbursement (Qianlei, 2012). This will also help the organization's operations to distribute crops (S. Liu, Xu, Shi, Li and Liu, 2018). So, the relationship between farmers' knowledge and the success of GSCM can be investigated for the distribution of agricultural products. In this paper, farmers' knowledge includes some indicators such as education and learning, related experiences, management abilities, and innovation aspects. Therefore, farmers' knowledge in the present research model is used to assess the effectiveness of the success of GSCM for the distribution of agricultural products. Therefore, the related hypothesis is:

H1. The effectiveness of the GSCM for the distribution of agricultural products is affected by farmers' knowledge.

3.2. Urban ITS

Urban ITS helps transport flows through information, communications and control techniques, and these three features help transport operators make better and more coordinated decisions (Grip, 2019; Navin et al., 2009). These systems save time and transport costs and improve the productivity of the business process (Martins et al., 2019).

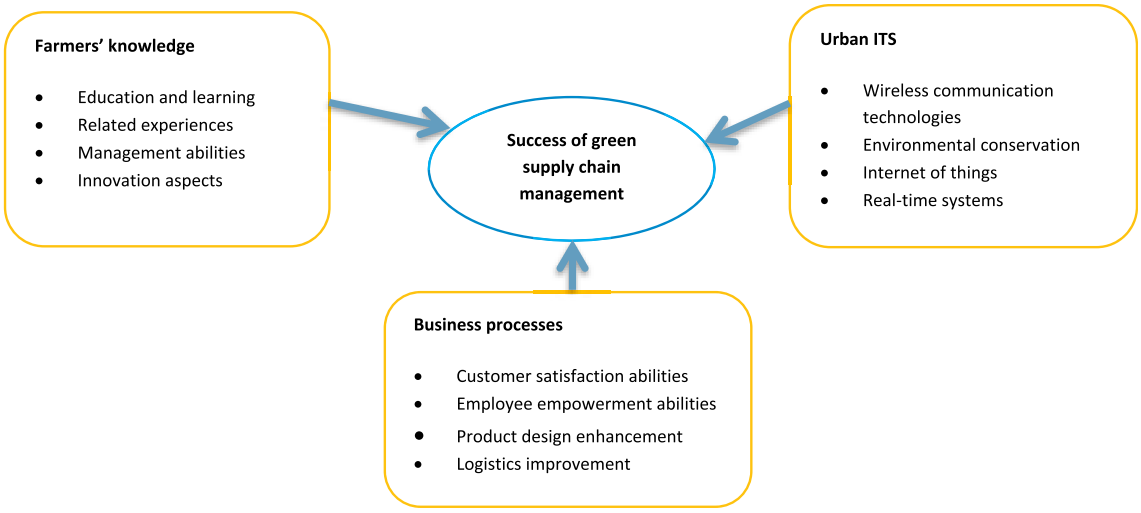

Fig. 1. A new model for assessing the impact of urban ITS, farmers' knowledge and business processes on the success of GSCM for urban distribution of the agricultural product.

These systems provide opportunities for transport and distribute the organizational product to create new opportunities and increase efficiency (Ta et al., 2009). The performance of organizational product distribution depends on the urban transport system (Nozick and Turnquist, 2001). In designing distribution networks, the goals of the company and customer satisfaction must be considered (Klose and Drexl, 2005). Designing and implementing urban transport systems depends on some activities in various fields such as control, communications, sensing, signal processing, and information systems using to help collaboration in various areas at the urban level (Mintsis et al., 2004). GSCM involves all out-door physical distribution activities of the organization, including collecting, storing and distributing products through urban transport systems between buyers (Nozick and Turnquist, 1998; Sheu et al., 2005). In this way, urban transport systems will have a positive impact on the success of the GSCM for the distribution of agricultural products. In this paper, urban ITS include wireless communication technologies (Aznoli and Navimipour, 2017), environmental conservation (Zareie and Navimipour, 2016b), Internet of things (Ghanbari et al., 2019; Kamble et al., 2019), and real-time systems (Mahmassani et al., 2003). Therefore, in the present research model, the impact of urban ITS on the success of the GSCM for the distribution of agricultural products is assessed. Therefore, the related hypothesis is:

H2. The effectiveness of the GSCM on the distribution of agricultural products is affected by urban ITS.

3.3. Business processes

A set of measures which are taken to coordinate the organizations and technical environments is called the business process (Aguilar-Saven and Ruth, 2004; Banerjee and Mishra, 2017). These processes can include product design, logistics, production, quality assurance, packaging, shipping and sales (Zur Muehlen and Shapiro, 2015). In order to carry out these activities, management, information technology, legal services, marketing, and customer satisfaction should be used to coordinate and support organizational processes (Tregear, 2015). Improving the performance of business processes may have a positive effect on the success of GSCM for the distribution of agricultural products. In this paper, business processes include customer satisfaction capabilities (Souri et al., 2019), employee empowerment abilities (Zareie and Navimipour, 2016a), product design enhancement (Machiels and Orth, 2017; Maier and Dost, 2018), and logistics improvement (Dehgani and Jafari Navimipour, 2019). Therefore, business processes variable in the present research model is considered as a candidate variable which has an effect on the success of GSCM for the distribution of agricultural products. So, the business process hypothesis is:

H3. The effectiveness of the GSCM for the distribution of agricultural products is affected by business processes.

4. Methods and measurements

A questionnaire is designed for evaluating the data and model elements. To ensure the validity of the content of the questionnaire, some professors and experts with significant experience in GSCM are confirmed the questionnaire. Standard and valid sources are used to assess the credibility of the questionnaire. The employees of ten Tehran agricultural distribution centers are considered as a sample (about 130 employees). The questionnaire is designed based on Likert-scale (1 = completely opposite, 2 = opposite, 3 = neither agree nor disagree, 4 = agree, 5 = totally agree) (Likert, 1932). Research hypotheses are evaluated using the considered questions. These hypotheses are from the collection of research, theoretical literature and collected data. SPSS 22[1] and SMART-PLS[2] (Partial Least Squares) software are used to check the statistics of the questionnaire. In addition, PLS enables both constructive and reflective structures to be tested together in the model (Low, 2018). SPSS 22 measurement tool is used to analyze the reliability of the questionnaire. Since the distribution of crops is one of the main goals of this organization, we must recognize the factors that contribute to the success of GSCM for the distribution of agricultural products. According to Morgan's table (Appendix A), 97 samples were randomly selected. 97 questionnaires (Appendix B) are distributed among the employees of the sample. 87 completed questionnaires were fully answered. The questions raised were related to factors affecting the success of GSCM for the distribution of agricultural products. This research is conducted in 2019. The research hypothesis and data collected from the research literature review are the basis for examining the hypothesis in the standardized assessment questionnaire. Male and female are involved in the selection of samples. Descriptive statistics about gender, age and education were investigated by SPSS software (Museli and Jafari Navimipour, 2018). The results showed that 54% of respondents were male and 33% were female respondents.

[1] http://www-01.ibm.com/software/analytics/spss/.
[2] http://www.smartpls.com/.

Table 2
The frequency of work experience.

The cumulative percentage	Acceptable percentage	Abundance	Work experience
34/7	11.5	10	1–5
78/7	41.4	36	6–15
100%	47.1	41	16–25
	100%	87	Total

Table 3
The frequency of gender.

The cumulative percentage	Acceptable percentage	Percentage	Abundance	Gender
37.9%	37.9%	37.9%	33	Female
100%	62.1%	62.1%	54	Man
	100%	100%	87	Total

Table 4
The frequency of education level.

The cumulative percentage	Acceptable percentage	Abundance	Education level
4.6	4.6	4	Diploma
18.4	13.8	12	Associate
47.1	28.7	25	Bachelor
88.5	41.4	36	Master
100.0	11.5	10	higher
	100%	87	Total

27.8% of the respondents had a bachelor's degree and 41.4% of the respondents, according to the questionnaire evaluation, had a job experience of 6–15 years. Cronbach's alpha value is more than 0.7 using SPSS software. Therefore, this questionnaire has acceptable reliability. In Tables 2–4, analytical measurements, including frequency of gender, frequency of occupational experience and frequency of education, are shown respectively.

5. Results and discussion

The research model has been tested through PLS, which is a model based on partial structural equations. The researcher is able to understand and predict the role of individual structures and their relationships through the PLS method according to the standardized structural equation modeling guidelines (Wong, 2013). In addition, the advantage of PLS is more than covariance-based modeling techniques such as LISREL, because the emphasis of it is on the prediction of the variance explained in the dependent structure (Goodhue et al., 2006). This approach can create a lot of demands for data properties and sample sizes (W. W. Chin, 2010). Using a component-based method is one of the finest methods for testing structural equation models in groups (Navimipour et al., 2016). Reliability, convergent validity, and discriminatory validity of all structures are characteristics for measuring the measurement model (Soltani et al., 2018). The convergent validity was evaluated using Average Variance Extracted (AVE) which should be at least 0.5 (Alarcón et al., 2015). Composite reliability and Cronbach's alpha are used to check the reliability of measurements. Generally, the minimum composite reliability value is 0.7, and the minimum Cronbach alpha value is 0.7 (Cronbach, 1951). As shown in Table 5, the Cronbach's alpha and the composite confidence of all structures for a complete sample are greater than 0.70 and an AVE of over 0.50 indicates an adequate level of confidence. Table 6 shows the AVE values and the estimated correlation squares for each pair of constructors.

As shown in Table 7, the hypotheses were positive and significant.

Table 5
The convergent validity and reliability of measurement for the measurement model.

Indicators	AVE	Composite reliability	Cronbach's alpha
GSCM	0.630	0.769	0.751
Farmers' knowledge	0.563	0.815	0.828
Urban ITS	0.581	0.845	0.845
Business processes	0.553	0.831	0.833

Table 6
The discriminant validity of the measurement model.

Structures	Business processes	Farmers' knowledge	GSCM	Urban ITS
Business processes	0.744			
Farmers' knowledge	0.734	0.750		
GSCM	0.517	0.387	0.794	
Urban ITS	0.416	0.337	0.541	0.785

Table 7
T-value and path analysis of the structural model.

Path		β	T-value	Contrast
Business processes →	Effectiveness of agility SCM	0.352	9.101*	Accepted
Farmers' knowledge→	Effectiveness of agility SCM	0.351	5.849*	Accepted
Urban ITS →	Effectiveness of agility SCM	0.354	6.147*	Accepted

$P < 0.001^{**}$

Farmers' knowledge has a positive and significant effect on the success of GSCM for the distribution of agricultural products based on *t*-test results and path coefficient ($b = 0.351$, $t = 5.849$, $p < 0.001$), which supports hypothesis 1. In hypothesis 2, the effective relationship between urban ITS and the success of the GSCM system for the distribution of agricultural products is supported ($b = 0.354$, $t = 6.147$, $p < 0.001$). Also, the findings related to the second hypothesis shows that urban ITS increases the success of GSCM for distribution of agricultural products. Also, as suggested by hypothesis 3, business processes affect the success of GSCM for distribution of agricultural products where the findings indicate that there is a positive relationship between these two variables ($b = 0.352$, $t = 9.101$, $p < 0.001$). Also, the findings have shown the proposed model based on the three factors suggested in this study can increase the success of GSCM for distribution of agricultural products.

In PLS, R^2 is a statistical measure of the percentage of variance, which can be interpreted as "the relative amount of variance of the dependent variable explained or accounted for by the explanatory variables jointly" (Navimipour et al., 2015). The range of R^2 is from 0 to 1; in general, the higher amount shows the higher variance that can be explained. Generally, the model explains 0.988% of the variance in environmental behaviors. Also, recently, a global fit measure (GoF) has been suggested (Soltani et al., 2018). GOF ($0 < GOF < 1$) is defined as the geometric mean of the average commonality and average R^2 value. GoF value are small = 0.1, medium = 0.25, and large = 0.36 (Akter, D'Ambra and Ray, 2011). The GoF index was calculated by[3] (1):

$$GOF = \sqrt{AVE \times R^2} \quad (1)$$

A GoF value is obtained about 0.988, which exceeds the cut-off value of 0.36 for large effect sizes of R^2 and tells us that this model performs well compared to the baseline values. So, the structure of the model had a good fit with the data.

[3] https://www.researchgate.net/post/How_to_find_Guide_to_Goodness_of_Fit_GoF_for_Smart_PLS.

6. Conclusions, limitations, and guidelines for future research

With the use of GSCM, organizations gain many opportunities for competitive advantage. Many product and service distribution organizations have been successful with the help of GSCM to reduce costs and provide customer service. One of the ways to succeed in GSCM is through the use of internal and external organizational knowledge. Also, transportation and distribution in business processes will contribute to the success of GSCM. Therefore, since the organization needs several factors for assessing the success in GSCM for distribution of agricultural products, the purpose of this paper was to investigate the impact of farmers' knowledge, urban ITS and business processes on the success of GSCM for urban distribution of the agricultural product. The results of this study have shown that these three factors play an important role in the success of GSCM for the distribution of agricultural products. It also brings many competitive advantages.

Companies must always have new technologies for designing and distributing products, promoting customer satisfaction, creating the innovation, optimizing the demand balances, and implementing them on the GSCM for higher productivity. GSCM can be used to increase distribution quality due to its importance in distributing goods and services. Our research findings have shown that urban ITS intensifies the success of GSCM by distributing products. Choosing how to carry goods will have a dramatic effect on customer satisfaction and reduces the cost and success of a GSCM. By utilizing urban ITS for commercial purposes and distributing services and goods, organizations can use wireless communication technologies, environmental protection, Internet of things, and real-time systems to increase productivity. By utilizing the technologies of urban ITS, road systems can be safer, more efficient, and more environmentally friendly. Since GSCM is used for distribution of agricultural products from a superior technology for urban ITS, the use of this system will reduce the transport time and increase the efficiency and success of the GSCM for the distribution of products. Our analysis clearly showed that farmers' knowledge has a positive impact on the success of GSCM for the distribution of agricultural products. Also, with the interaction of communications and information with the agricultural sector, supply and demand in the market and inventory stock in the organization are balanced. In fact, our results showed that farmers' knowledge inside and outside the organization increases the success of GSCM for distributing agricultural products.

The research results also indicated that business processes can increase the success of GSCM for distributing agricultural products. Business processes in all parts of the organization increase organizational performance by providing information and communication with other organizational sectors as well as innovation in service delivery. In this way, distribution organizations will succeed in supplying the product with less time and reduced time of distribution and additional costs. GSCM helps distribution organizations to optimize resources, reduce costs, reduce excess inventory in stock, prevent mistakes and damage, optimize transportation, improve productivity and improve business performance, and customer satisfaction will increase.

Our research offers some important contributions to academics and experts, but some limitations exist. The main limitation of this study is a limited sample of research of products distribution organizations. The sample size is small and may not reflect general results. Second, the implementation of GSCM is time-consuming and costly, but its implementation, in the long run, can be highly productive. Third, the study is limited to one region. It cannot be guaranteed that the studied factors are also effective in other areas. Fourth, in this study, due to the lack of time and cost of research data, a sample has been gathered in one place; and the use of variables to demonstrate the success of the GSCM may not be comprehensive and explicit. Therefore, we suggest considering different dimensions to examine the success of GSCM for the distribution of agricultural products for future research. In addition, other factors affecting the success of the GSCM for agricultural products can be determined. Finally, the following points should be considered in future studies:

- Investigating the impact of internal and external operations of GSCM on technological innovation.
- Investigating the role of the green purchasing process on the success of the GSCM.
- Establishing GSCM in the organization and its role in improving the supply chain.
- Integrating internal and external actions of GSCM and assessing its impact on the success of organizations.
- Implementing GSCM in manufacturing and service-based organizations.
- Comprehending the internal and external actions of the GSCM in industries and other manufacturing sectors for its implementation.
- Investigating the effect of internal and external operations of GSCM on company competition and gaining competitive advantage.
- Deep investigation of public libraries (Isfandyari-Moghaddam and Saberi, 2011; Saberi, 2018) for finding more related factors in this domain.
- Finally, applying some new meta-heuristic algorithms such as imperialist competitive algorithm (Razmjooy et al., 2017), bee colony algorithm (Ahmadian et al., 2014), and world cup optimization algorithm (Razmjooy et al., 2018) for finding the shortest path between factories and customers in the GSCM process.

Appendix A

Table 8
The Morgan table

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379

(continued on next page)

Table 8 (*continued*)

N	S	N	S	N	S	N	S	N	S
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Appendix B

Table 9
The applied questionnaire

Row	Dimensions		Responsive comment for each option				
			Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
Farmers' knowledge							
1	Education and learning	Do you think training and learning of farmers have an impact on the success of green supply chain management for the distribution of agricultural products?					
2	Related experiences	Do you think using relevant experiences in agriculture, increases the success of green supply chain management system for urban distribution of agricultural product?					
3	Management abilities	Do you think management abilities increase the success of green supply chain management system for urban distribution of agricultural product?					
4	Innovation aspects	Do you think Innovation aspects increase the success of green supply chain management system for urban distribution of agricultural product?					
Urban ITS							
5	Wireless communication technologies	Do you think wireless communication technologies aspects increase the success of green supply chain management system for urban distribution of agricultural product?					
6	Environmental conservation	Do you think environmental conservation increase the success of green supply chain management system for urban distribution of agricultural product?					
7	Internet of things	Do you think Internet of things increases the success of green supply chain management system for urban distribution of agricultural product?					
8	Real-time systems	Do you think Real-time systems increase the success of green supply chain management system for urban distribution of agricultural product?					
Business processes							
9	Customer satisfaction abilities	Do you think customer satisfaction abilities increase the success of green supply chain management system for urban distribution of agricultural product?					
10	Employee empowerment abilities	Do you think employee empowerment abilities increase the success of green supply chain management system for urban distribution of agricultural product increase the success of green supply chain management system for urban distribution of agricultural product?					
11	Product design enhancement	Do you think product design enhancement increase the success of green supply chain management system for urban distribution of agricultural product?					
12	Logistics improvement	Do you think logistics improvement increase the success of green supply chain management system for urban distribution of agricultural product?					

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