

Investigating the Impact of Learning Orientation on Market Orientation Based on Data Mining and Association Rules

seyed mehdi mirmehdi^{1*}, reza salehzadeh²

1 Department of Management, Literature and Human Sciences Faculty, Malayer University,
Malayer, iran

2 Department of Management, University of Isfahan, Isfahan

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Abstract

Market orientation is the ability of appropriate response in complex conditions of the market and that is the most fundamental issue in the marketing and business literature. In fact, market orientation is considered as a practical marketing application. market orientation enables companies to learn about customers, competitors and environmental factors continuously within the existing and potential market. One of the best ways to extract significant relationships among data is to use data mining algorithms. The purpose of this research is to investigate the relationship between learning orientation and market orientation by association rules and data mining. after sampling, 132 questionnaires have been used for data analysis. After data collection the relationship between learning orientation components (commitment to learning, shared vision and open mindedness) and market orientation (customer orientation, competitor orientation and inter-functional coordination) was explored. Learning orientation is one of the factors that plays a key role in organizations' market orientation. the relationship between learning orientation components including commitment to learning, open mindedness and inter-functional coordination was investigated using data mining. The findings showed that commitment to learning, shared vision and open mindedness lead to customer orientation, commitment to learning and open mindedness lead to competitor orientation and commitment to learning and shared vision lead to inter-functional coordination

Keywords:

Association Rules, Data mining, Learning orientation, Market orientation

Introduction

Market orientation is an organizational culture that directs a company's activities intended to create competitive advantages (Pratono et al., 2019). Market-oriented companies understand and fast respond to the hidden needs of their customers (Wilson & Liguori, 2022). However, market orientation is a concept that is rooted in marketing thinking and is oriented towards the notion of market learning. In other words, it is based on the expansion of market understanding and its usage for marketing activities (Anabila et al., 2020). In fact, market orientation is considered as a practical marketing application. Market orientation enables companies to learn about customers, competitors and environmental factors continuously within the existing and potential markets (Bodlaj, & Čater, 2022; Panigyrakis and Theodoridis, 2007; Hamzah et al., 2020). One of the issues that can play a central role in market orientation of an organization is learning orientation (Eris and Ozmen, 2012). Learning orientation consists of three components of commitment to learning, open-mindedness and shared vision (Ibidunni, Agbi, & Kehinde, 2023). Studies have shown that learning orientation supports market orientation and there is a high degree of coordination between learning and market orientation at different cultural and behavioral levels. But these researches have mainly used the structural equation model (SEM) method (Beneke et al., 2016; Blankson et al., 2015; Cho & Lee, 2020). Although structural equation modeling is a well-known technique in marketing research; however, in recent years the strengths of this method have been challenged. As mentioned by Tomarken and Waller (2005) this data-analytic technique has some major limitations. In this regards, new studies propose to use data mining techniques in marketing fields. For example Han et al. (2022) used data mining technology to formulate marketing strategy. Other researchers try to combine structural equation modeling with data mining techniques to get better results. Brandmaier et al. (2014) by combining structural equation models and decision trees techniques, proposed Structural Equation Model Trees (SEM Trees) methodology that allows an exploratory approach to SEM. Qafari and van der Aalst (2022), combined process mining technique and structural equation model to improve organizational operational processes. Based on abovementioned points, using data mining techniques with their exploratory nature brings new insight in marketing research and for this reason current research uses data mining and association rules to evaluate the

impact of learning orientation on market orientation. Data mining is one of the techniques of artificial intelligence developed to analyze a large amount of data to discover meaningful rules and patterns (Gupta & Chandra, 2020). Data mining can be widely used to support marketing decisions (Bose and Mahapatra, 2001; Van Nguyen, Zhou, Chong, Li, & Pu, 2020; Saura, 2021). The most important tasks in data mining are the discovery of repeated items and association rules (Shankar and Purusothaman, 2009). Association rules could discover the dependencies and relationships between data in a database (Shahin and Salehzadeh, 2011). According to the materials presented in this study, the relationship between learning and market orientation of the organization is explored using association rules.

So far, data mining has been used in many areas. In recent years, data mining has become common in the field of marketing and customer recognition. Liao et al. (2009) extracted the rules and patterns of knowledge from the sports customer data and used them in marketing (Liao et al., 2009). Wan et al. (2012) used data mining to acquire knowledge from the customers of luxury goods stores in Taiwan and achieved patterns and knowledge maps to empower stores to deliver services. Babu and Bhuvaneshwari (2012) used data mining and simulation techniques to identify the appropriate customers. HV and Varadarajan (2011) applied data mining method and the heuristic approach to cluster bank customers and introduced it as a substitute for the k-medium method. Baumann and Elliott (2012) examined relationships between customer satisfaction and customer loyalty in banking with data mining. Shahin and Salehzadeh (2011) presented a combination of the Kano model and Association rules to classify the needs of customers and analyze their behavior. Their results showed that the demographic characteristics of the customers clearly influenced their needs (Shahin and Salehzadeh, 2011).

According to Hasangholipor yasory & Torabi, (2022), it has been emphasized to focus more on marketing research using new methods such as data mining. One of the best ways to extract significant relationships among data is to use data mining algorithms. Given the importance of market orientation, this study tries to address the relationship between learning and market orientation. In this sense, the notion whether learning orientation leads to market orientation is focused.

Therefore, some studies have been conducted on market orientation and its relevance to learning orientation. However, it seems that there has been no research on the relationship between learning and market orientation using data mining. In the present study, the relationship between the learning orientation components (commitment to learning, open-mindedness and shared vision) and market orientation (customer orientation, competitor orientation and inter-functional coordination) are explored using Association rules. Then the theoretical foundations of the research are expressed and finally the methodology of the research is presented. According to the research methodology, a case study is conducted and the results are analyzed.

1. Theoretical framework of the research

2-1. Market orientation

Market orientation is related to the expansion of market understanding and its use for marketing activities. For this reason, market orientation can be understood as the acceptance of the concept of marketing as a business philosophy that guides the competitive strategies of the organization (Hutahayan, 2021; Pratono et al., 2019). Market oriented organizations have intelligence in relation to current and future customer needs, intelligence dissemination among the organization's sectors and the global accountability to that intelligence. Market orientation is not only focused in internal markets of the organization or domestic markets of a country, but also considered in the international and global markets (Rua & Santos, 2022;). Concept of market orientation defined as creating awareness about market to predict the current and future needs of customers with the aim of disseminating this insight into all organizational units and extensive responsiveness to it (Newman, Prajogo and Atherton, 2016). Sin et al (2005) also consider market orientation as a degree to which a business unit collects information from customers and uses it (Sin et al, 2005). market orientation is a highly efficient organizational culture that creates behaviors that establish more value for customers and enhances the company's business performance (Wilson & Liguori, 2023). market orientation including customer orientation, competitor orientation and inter-functional coordination (Phorncharoen, 2020). customer orientation will assist in the provision of products that meet customers' needs. It is the core of the market orientation and

creating more value for customers. in a market-oriented business, employees spend considerable time with their customers (Newman, Prajogo and Atherton, 2016). According to Tse et al. (2003), in the customer orientation dimension, attention should be paid to customer commitment, value creation for customers, understanding their needs, customer satisfaction measurement and after sales services (Tse et al, 2003). Based on Martin-Consuegra and Esteban (2007), competitor orientation is an attempt to collect and disseminate information about the competitors of market-oriented firms (Martin-Consuegra and Esteban, 2007). Companies should have a marketing strategy in any situation, whether they are market leaders or not. A strategy that can strengthen its position against competitors will strengthen the company's position. Companies must consistently align their policies with the changing circumstances of the competitive environment. A competitor-oriented company is the one that regulates its actions and activities under the influence of its competitors' reactions. In such a situation, a competitor-oriented company focuses its time on pursuing the actions of competitors and the market's important category and it will strive for policies to use against them (Wahyuni and Sara, 2020). Inter-functional coordination facilitates the transfer of experiences and organizational learning more appropriately and is a fundamental requirement for both customer and market-oriented organizations. Accordingly, the process involves three dimensions of the collection, dissemination and use of market information (Alerasoul et al., 2022). Inter-functional coordination also facilitates disseminating information about customers and competitors among all individuals and sectors of the organization to provide an accurate insight into customer needs and requirements (Alerasoul et al., 2022).

2-2. Learning orientation

A learning organization is designed based on systems, mechanisms and processes that enhance individual and collective abilities of employees; new thinking patterns grow in organizational cultures that enable quick and effective response to the external changes (Mahmoud and Yusif, 2012). Learning orientation consists of three components of commitment to learning, open-mindedness and shared vision (Ibidunni, Agbi, & Kehinde, 2023; Hutahayan, 2021). Commitment to learning refers to the extent to which an organization values learning and enhances it; in this regard, the organization attempts to acquire new knowledge. Open-mindedness refers to the tendency of the

organization to fail to learn the methods of thinking and change in mental models and the shared vision refers to the focus of all individuals on learning (Kandemir and Hult, 2005).

2-3. Data mining

Serious research on data mining has begun since the early 90's, and since then, many studies have been done in this field (Hand, 1998). In today's organizations, the use of data mining is increasingly important (Muata & Bryson, 2010). Given the ever-increasing intensity of competition, companies need to understand the knowledge that is hidden in their data more than ever; therefore, in recent years, more resources are invested in data mining projects. Data mining is the extraction of information, knowledge and discovery of hidden patterns from a very large and complex database (Berry & Linhoff, 1999). Data mining is a continuous process and includes the following steps: 1- Definition of the problem; 2- Data preparation; 3- Data mining and constructing model; 4- Model analysis and evaluation; 5. Interpretation and extraction of knowledge; and 6- The use of discovered knowledge (Dzeroski, 2008).

2-4. Association rules

The most important tasks in data mining are the discovery of association rules (Shankar and Purusothaman, 2009). Association rules facilitate the discovery of interdependences and associations between data in a database (Mitchell, 1999). Association rule is an $X \rightarrow Y$ inference; where X and Y are sets of disjoint items. This Association rule carries the notion that transactions involving X would possibly include Y . Each associative rule has two criteria of assurance and support. Assurance of Association rule $X \rightarrow Y$ is the ratio of the number of transactions including X and Y to the number of transactions including X and the support of Association rule is the ratio of the number of transactions involving X and Y to the total number of transactions (Telikani et al., 2020).

Telikani, A., Gandomi, A. H., & Shahbahrami, A. (2020). A survey of evolutionary computation for association rule mining. *Information Sciences*, 524, 318-352.

3- Empirical framework of the research

A learning oriented organization that focuses on the commitment to learning, openmindedness and shared vision complement a market-oriented culture (Wilson & Liguori, 2023). Previous studies have suggested that market orientation enhances performance only when combined with a learning orientation (Phorncharoen, 2020; Mahmoud et al., 2016; Hamzah et al, 2020) learning oriented organizations collect and process market information and response to the market environment fast(Beneke et al., 2016). In other words, learning orientation is an antecedent that possibly contributes to the market orientation(Cho & Lee, 2020; Fang et al., 2014; Mahmoud et al., 2016). Multiple studies have shown that there is a relationship between learning orientation and market orientation (Kaya & Patton, 2011; Cho & Lee, 2020; Hamzah et al., 2020; Choi, 2014; Mahmoud et al., 2016). Based on Cho & Lee, (2020) the higher the dimensions of learning orientation improve market orientation include customer orientation and competitor orientation. Choi, (2014) have studied the effects of learning orientation on market orientation and Innovation in nonprofit community centers and showed that Learning orientation and market orientation are catalysts for innovation and conclude that nonprofit organization with more focus on commitment to learning, shared vision, and openmindedness enables the organization to be more innovated and market oriented. In the following table 1 provides a summary of past research.

Table1: Summary of past research

Authors	Method	Finding	Industry of study	Country
Phorncharoen (2020)	SEM	There is a relationship between them	Real estate	Thailand
Hamzah et al., (2020)	SEM	There is a relationship between them	Banking	Malaysia
Choi, (2014)	SEM	There is a relationship between them	Social Welfare Centers	South Korea
Long (2013)	SEM	There is a relationship between them	MarCom	Vietnam

Authors	Method	Finding	Industry of study	Country
Santos-Vijande et al., (2005)	SEM	There is a relationship between them	across the industris	Spain
Farrell & Oczkowski, (2002)	Regression analysis	There is a relationship between them	across the industris	Australia
Beneke et al., (2016)	SEM	Learning orientation has a moderating effect on the relationship between market orientation and organizational performance	across the industris	South Africa
Kaya & Patton, (2011)	Regression analysis	There is a relationship between them	across the industris	Turkey
Zhang et al., (2007)	SEM	There is a relationship between them	across the industris	Canada
Fang et al., (2014)	Regression analysis	Learning orientation does not moderate the relationship between market orientation and market capabilities	Services companies	Taiwan
Han et al., (2013)	Correlation	There is a relationship between them	Paper & packaging	Countries across the world

Authors	Method	Finding	Industry of study	Country
Mahmoud et al., (2016)	Regression analysis	There is a relationship between them	Banking	Ghana
Mavondo et al., (2005)	SEM	There is a relationship between them	Professional services and hospitality	Australia
Pett & Wolff, (2010)	SEM	There is a relationship between them	across the industris	USA

4- Methodology

This research is theoretical- applied in terms of purpose and descriptive-survey in terms of nature. The statistical population included the experts and managers of automobile manufacturing companies. Because of time constraints and other limitation, 12 companies were selected and after convenience sampling, 132 questionnaires were used to analyze the data. The research tool was two standard questionnaires in the fields of market orientation and learning orientation (Braunscheidel and Suresh, 2009). The validity of questionnaires was confirmed by the university experts after translation and the Cronbach's alpha was used to determine the reliability the results of which are observed in Tables 2 and 3.

Tables2. Reliability of market orientation questionnaire

constructs		Cronbach's alpha	
market orientation	customer orientation	0.81	0.73
	competitor orientation	0.76	
	inter-functional coordination	0.84	

Tables3. Reliability of learning orientation questionnaire

constructs		Cronbach's alpha	
learning orientation	commitment to learning	0.78	0.78
	shared vision	0.86	
	open mindedness	0.81	

As can be seen, the obtained values are above 70%, which indicates the reliability of the research tool. The conceptual model of research is presented in Figure 1.

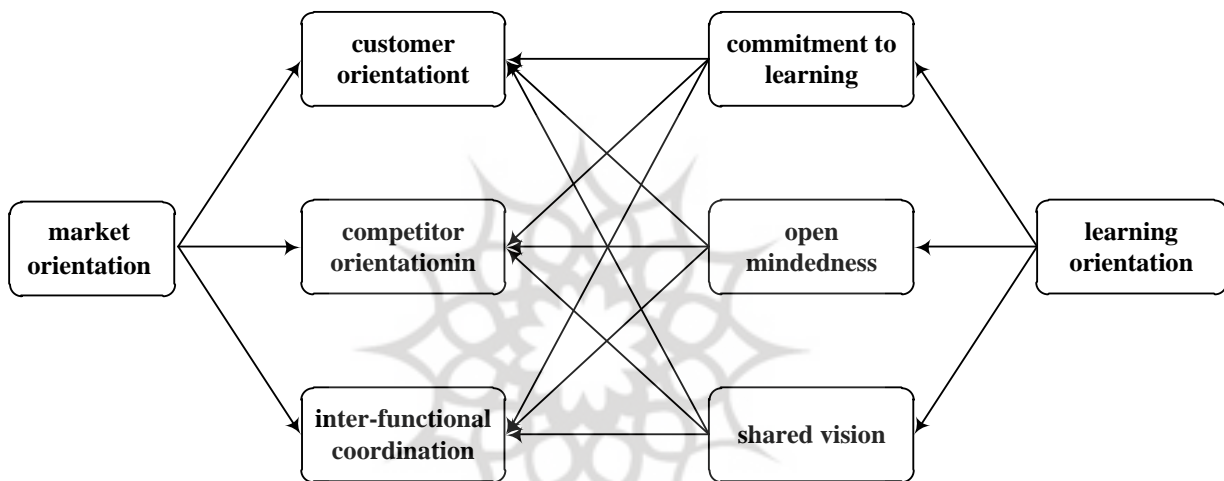


Figure 1. The conceptual model of research

This research follows Salehzadeh (2017)'s approach in using data mining methods with the following steps:

- 1- Define the problem: the purpose of this research is to investigate the effect of learning orientation on market orientation using association rules mining.
- 2- Define the variables: we use learning orientation dimensions (commitment to learning, shared vision, and open mindedness) as independent variables and market orientation dimensions (customer orientation, competitor orientation, and inter-functional coordination) as dependent variables.
- 3- Data collection and preparation: regarding the above mentioned variables and using a questionnaire, respondents are asked to fill out the questionnaire. After

the data collection and completion of the questionnaires, the data preparation process is carried out.

4- Data mining: the relationship between variables is explored using association rules and the discovered rules are analyzed and compiled. In the present study, the Apriori algorithm is used to discover association rules. For proper validity of the extracted rules, the minimum coefficient of confidence of 60% is considered. The SPSS, Excel and Weka data mining software programs are used in this study.

5- Knowledge extraction and using discovered knowledge: the discovered rules can be used as the basis for decision support to predict the effect of learning orientation's dimensions on market orientation's dimensions.

5- Case study

According to the research methodology, a case study was conducted among 12 active companies in the car parts manufacturing industry. According to the proposed method, the questionnaires were completed at first. The responses to each questionnaire included 5 options that the following five options were redefined for exploring Association rules as follows:

Very low = A; Low = B; Moderate = C; Good = D; Very good = E

Then the data was entered into Excel software and saved with a CSV extension to be used in Weka software. After calling the corresponding file by Weka software, using the Apriori algorithm, the relationship between variables was explored the results of which are shown in Table 3.

Table 4. Discovered rules

No.	Discovered rules			
1	If commitment to learning=A	Then	customer orientation=B	(26, 0.8)
2	If commitment to learning =D	Then	customer orientation=E	(25, 0.74)
3	If open mindedness=B	Then	customer orientation=B	(32, 0.76)
4	If shared vision=C	Then	customer orientation=D	(34, 0.69)
5	If commitment to learning =B	Then	competitor orientation=B	(41, 0.82)
6	If commitment to learning =A	Then	competitor orientation=B	(20, 0.61)
7	If open mindedness=C	Then	competitor orientation=B	(23, 0.86)

No.	Discovered rules			
8	If open mindedness=C	Then	competitor orientation=C	(19, 0.7)
9	If commitment to learning=D	Then	inter-functional coordination=D	(22, 0.65)
10	If shared vision=D	Then	inter-functional coordination=E	(28, 0.74)
11	If shared vision=D	Then	inter-functional coordination=D	(32, 0.83)

For example, the rule 1 means that if the commitment to learning is A (very low), customer orientation will be low with a probability of 80%, which is based on the backing of 26 replicates in the responses. In other words, in 26 cases, respondents who have chosen commitment to learning as very low have also considered customer orientation as low.

6- Discussion

As shown in Table 3, 11 rules have been obtained with a coefficient of confidence above 60%. Rule 1 means that if the commitment to learning is A (very low), customer orientation will be low with a probability of 80%, which is based on the backing of 26 replicates in the responses. Rule 2 states that if the commitment to learning is D (good), customer orientation will be E (very good) with a probability of 74%. It can be concluded from these two rules that commitment to learning affects customer orientation. Therefore, if an organization has low commitment to learning, one can expect a low customer orientation or if it has high commitment to learning, it will probably have a high customer orientation. This finding can be explained by the fact that organizations with low commitment to learning, do not struggle to learn new ways to meet and satisfy customer needs; therefore, their customer orientation is low and vice versa. Rule 3 means that if open mindedness is B (low), customer orientation will be low (B) with a probability of 76%, which is based on the backing of 32 replicates in the responses. The interpretation of this rule is such that an organization that does not promote open-mindedness is likely to have a low customer orientation. Rule 4 states that if the shared vision of the organization is C (moderate), customer orientation will be good (D) with a probability of 69%, which is based on the backing of 34 replicates in the responses. This rule also shows that shared vision affects customer orientation. In other words, by strengthening the shared vision in the organization, customer

orientation will be probably strengthened. Rules 5 and 6 show that a low commitment to learning leads to low competitor orientation. Rules 7 and 8 show that organizations with moderate open mindedness have moderate competitor orientation. Rule 9 states that good commitment to learning will lead to good inter-functional coordination and finally, rules 10 and 11 indicate that good shared vision will be followed by good inter-functional coordination. Therefore, it can be concluded that commitment to learning, open mindedness and shared vision lead to customer orientation. Commitment to learning and open mindedness result in competitor orientation and commitment to learning and shared vision bring inter-functional coordination. However, no specific rule was achieved in shared vision- competitor orientation and open mindedness- inter-functional coordination.

As the results of the research showed, there is a relationship between Commitments to learning and market orientation, which is consistent with the previous research e.g., Slater and Narver (1995) found a high degree of coordination between learning and market orientation at cultural and behavioral levels (Slater and Narver, 1995). Farrell (2000) by examining the relationship between market orientation and organizational learning showed that market orientation plays an important role in generating knowledge and learning in the organization (Farrell, 2000). Bell et al. (2002) demonstrated learning orientation as a key factor in developing market knowledge and market orientation (Bell et al., 2002). Mavondo et al. (2005) investigated the relationship between learning and market orientation and showed a positive relationship between learning and market orientation (Mavondo et al., 2005). The difference between the current research and earlier studies is that using association rules, a better insight than the previously achieved results is created and a better solution could be provided.

7- Conclusion

Different industries, including car part industries need market orientation to respond to customers, competitors and their partners. Therefore, paying attention to the factors involved in this matter is very effective. Learning orientation is one of the factors that play a role in organizations' market orientation. In this research, the relationship between learning orientation components including commitment to learning, open mindedness and inter-functional coordination was investigated using data mining. The results of the research showed that commitment to learning, open mindedness and shared

vision lead to inter-functional coordination. Related research has also been conducted in the context of the learning and market orientation that some of them are addressed. Bell et al. (2002) considered learning orientation as an important factor in developing market knowledge and market orientation of an organization (Bell et al., 2002). Slater and Narver(1995) found a high degree of coordination between learning and market orientation at cultural and behavioral levels and showed that market orientation is the basis for learning orientation (Slater and Narver, 1995). Santos-Vijande et al. (2005) showed that learning orientation supports market orientation (Santos-Vijande et al., 2005). By examining the relationship between market orientation and organizational learning, Farrell (2005) showed that market orientation plays an important role in knowledge production and learning orientation of an organization (Farrell, 2000). By addressing the relationship between market orientation and its role in innovation in the logistics sector of Turkey, Eris and Ozman (2012) showed that market orientation has a positive effect on learning orientation (Eris and Ozmen, 2012). Mavondo et al. (2005) investigated the relationship between learning and market orientation. The results of the research indicated a positive relationship between learning and market orientation (Mavondo et al., 2005).

According to the results, the following recommendations are presented: first, According to the results, commitment to learning will result in customer orientation, competitor orientation and inter-functional coordination. Therefore, considering the important role of commitment to learning in market-oriented components, managers should develop and implement the necessary programs and policies in order to strengthen this factor. Secondly, Open-mindedness leads to competitor and customer orientation. Therefore, it is recommended to the organization to adopt the necessary executive actions in the field of open-mindedness to promote the customer and competitor orientation. Finally, Shared vision will bring customer orientation and inter-functional coordination. Therefore, the necessary planning should be done to improve shared vision in the organization.

8- Limitations and future research

Some research constraints were as follows: More data and studies are needed to achieve accurate results and formulate rules with higher validity. The relationship between learning and market orientation was addressed in one way. Suggestions are also made for future research: Performing this research in other

industries and comparing the results with the results of this research. The relationship between learning and market orientation should be addressed bilaterally

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