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A Brief Review on the Knowledge Management and Data Mining for Marketing Decision

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Abstract: Knowledge management is an application that includes human, processes and technology for managing information and knowledge resources in an organization. With its variety of sophisticated techniques, data mining appears within the knowledge management process of knowledge creation in particular. Organizations make use of knowledge management application and data mining in multiple functional aspects such as manufacturing, finance and marketing. With respect to marketing, organizational products, marketing decisions are very critical to their profit generation. This paper reviews the application of knowledge management and data mining in marketing decisions. Using the scoping review technique, a number of 30 scholarly articles on knowledge management, data mining and marketing decision have been gathered and reviewed. The analysis of the retrieved articles found that clustering was the most frequent technique applied in marketing decision. It is also identified that sale and cash registers are marketing dimensions regularly reported to apply data mining. Scholars have also acknowledged that marketing decisions have effectively applied data mining.

Keyword: *Information Management, Knowledge Management, Data Mining, Marketing Decision*

Introduction

Information and knowledge management (KM) is a universal subject nowadays. KM can be defined as a process that used by the organization for creating new value from intelligent sources of knowledge-based sources (Bosilj & Jurinjak, 2009). Previous studies described KM as a process through which organizations generate value from their intellectual and knowledge-based assets (Girard and Girard, 2015). KM also refers to the planning, organizing, motivating and controlling people, process and system in the organizations in order to ensure their knowledge-related asset is improved and successfully employed (King, 2009). This implies that KM is one of the important tool or application used to manage resources and valuable asset in the organizations in order to assist

them to reach its goal and objective. The application of KM within have helped in ensuring the company's growth and also assist them to keep the competitive advantages as well as to support decision making especially on the marketing side.

Organizations operates with many functions such as human resources, production and marketing. All organizational functionalities require timely and accurate decisions. With respect to marketing, organizational products, marketing decisions are very significant for any companies to raise their profit. It is because marketing decision will help organizations determine the customers' needs and wants of the target markets and also produce or modify the product in an attempt to respond to market demand (Fejza and Asllani, 2013). Ali and Bach (2014) mentioned that marketing database will assist marketer to recognize the pattern of customer behavior and preferences within finer segments. Application of marketing database, therefore enables the marketer to produce the best decision for making profit, reducing costs and increasing productivity (Fejza and Asllani, 2013).

Since the business environment becomes more complex, marketing decision should be improvise in order to assist marketers to make the right marketing decision (Aylmer, 1970). It is because the marketing decision normally based on demographic data and their decisions are restricted by the surrounding and the society (Ali and Bach, 2014). The improvisation of marketing decision is significant to the decision maker, because it will help companies or organization to gain and increase their profit and also improve their job performance with effectively.

KM that deals with systematic management of organizational information and knowledge in the database can significantly contribute to and relate with marketing decisions. It is because the KM tool like data mining will help decision maker to fully utilize the organizational memories (knowledge and information) for marketing decision by discovering the hidden knowledge in the numerous amount of data (Silwattananusarn and Tuamsuk, 2012). In practice, several of marketing activities require the use of proper knowledge management practice to help achieving the organizational objective and goal. It can be considered that KM is a key practice that contributes to the advantage of corporation and also produce the best decision marketing through effective way.

Within the KM, data mining (DM) exists as a method to extract the pattern. Data mining has been recognized as an important technique or tool that can be used to extract and analyze the useful information that can be used to support the decision making in the companies (Ali and Bach, 2014). The application of DM techniques enables analysts to find hidden and unknown information for the organization in order to gain knowledge, that result in the delivery of business (Lawal, Odeniyi and Kayode, 2015). Zekic-Susac and Has (2015) suggested the framework for KM in the marketing context and concludes that the systematic application of DM technique can increase the KM process and enable marketers to know and understand their customer better and also improve customer services. In this way, the application of DM in KM process gives immense support to business decision making and the resultant effect of the interaction creates business intelligence. Herein, DM appears within KM as a tool for extract organizational hidden knowledge usable for marketing decision.

As presented in the prior paragraphs, the linear connection between KM, DM and marketing decision has been available in the literature. However, the degree in which the connection occurs has been limited as the way and the success of application of DM for marketing is not adequately highlighted. This concept paper reviews the knowledge management and data mining application related to marketing decision. The goal of this review is to investigate how KM and DM can assist the decision maker in providing a good marketing decision in order to support the organization or companies achieve their business goal and increase their profit effectively.

In achieving such goal, this paper is arranged to include the following section emphasizing critical components. The next section briefly review the knowledge management. The data mining and its relation with KM is presented in the literature review section. Some theoretical foundation pertaining to Knowledge management and data mining it roles in marketing is highlighted. The methodology that this paper was adopted is presented in next coming section in the Methodology section. The KM and DM impact on marketing decision is thoroughly discussed. The last section concludes the paper.

Literature Review

As outlined earlier, this concept paper presents the review of the following components.

Knowledge Management

The concept of knowledge management was developed in mid 80's by Davenport and Prusak. Since it's establishing, knowledge management has had its ups and down, but currently it has been declared as of the most valuable tool in modern management that can be applied by any organization and companies (Bosilj, Jurinjak, 2009). In modern business, KM plays an important role in the business environment that can support the organization achieve their business target and improve their business activity performance. Lawal, Odeniyi and Kayode (2015) explained that KM is about capturing data and revolving into useful and suitable knowledge in a business environment. According to Hlupic, Pouloudi & Rzevski (2012), KM contains a various definition that results from the multidisciplinary nature of KM and the perspective.

KM can be defined as a process that applied by organization for creating new value from the intelligence knowledge-based sources (Bosilj, Jurinjak, 2009). From a human resources perspective, is described as the process of identifying, collecting, and organizing and distribute the intelligence asset that are valuable to the organization's long term performance (Swan et al. 1999). According to Chaffey and Wood (2005) KM represents the capability of community within an organization to make records on any valuable knowledge, increases it and in a best potential way of shares and distributes this knowledge among those members of the organization that want it and might use it in their work.

Data Mining

Data mining (DM) deals with knowledge discovery. From the perspective of KM process, DM appears as a tool for knowledge creation. In other words, the discovery of new knowledge and hidden pattern of organizational memories that aimed by knowledge creation is made possible with DM. DM can be described as a process that allow users to identify knowledge design, statistical, mathematical, artificial intelligence and machine learning technique to extract and identify useful information and appropriate knowledge from large databases (Lawal, Odeniyi and Kayode, 2015). Silwattananusarn and Tuamsuk (2012) describes data mining as a step in the knowledge discovery in databases process that produces suitable design or model from data. The literature suggests many DM techniques as tools for knowledge creation from organizational data and memories.

For instant, association rule is one of the best data mining techniques that has been practiced in various industries that contain a big amount of data such as supermarket, telemarketing, insurance fraud and others. According to the previous studies as cited by Buttar and Kaur (2013) highlighted that association rule can be considered as a strong tool for market analysis to investigate the behavior of customers, what product regularly purchased by the customer and others. Thus, this data and information may be useful for decision maker in producing a good strategic decision. Association and classification rule discovery are similar, except that association rules discovery can forecast any

attribute in the data set while classification involves the forecasting of only one attribute. Classification concentrates on data mining techniques that are being used for such purposes (Harshna and NavneetKaur, 2013). Fayyad et al. (1996) defined classification as a finding models that analyze and classify a data into various predefined classes. The classification task is characterized by the well-defined classes and also training set containing of predefined examples.

Data mining is a powerful new technology with a great potential that can be used to extract the hidden predictive information from big databases. DM tools forecast the future business trend in order to allow business to make proactive knowledge-driven decision (Folorunso and Ogunde, 2004). Bora (2011) claimed that data mining can be a technique or tool for decision support that can be practiced in different areas as well as in marketing. In addition, Ding (2010) also mentioned that DM can play a vital function in improving the marketing decision in any success companies. According to the previous study, as cited by Ali and Bach (2014) state that DM become more popular due to the offerings that can be made in transforming information to knowledge and also can assist marketer to predict in order to make a good decision for marketing. Thus, it can be summarized that DM is a unique technique or tools that can be used to transform the information into knowledge in preparing decision making to support an organization or companies achieve their business goal and increase their performance.

The KM and DM are widely applied in many segments of human activities. Data mining has been established in various areas such as in finance, manufacturing engineering, retail industries, DNA analysis and others (Ruhaizan, Zalinda, and Azuraliza, 2009). As far as the literature concern, a confined number of scholarly works focusing on the application of KM and DM with respect to marketing decision. The work presented in this paper attempts at exploring the application of the KM and its respective tools i.e DM with an aim at enriching the literature with regard to marketing decision. The discussion of marketing decision and KM and DM will be made in the next section as outlined earlier.

Knowledge Management, Data Mining and Marketing Decision

KM and DM are important elements required to assist the decision makers to provide a better marketing decision to increase the profit the companies. Shaw et al., (2001) acknowledged that one of the important factors that can affect the marketing decision is knowledge management. KM should become the key provider of knowledge for marketing communication, knowledge supporting precise pointing of customers and decision making preparation as well as the foundation of answer promoting material (Bosilj, Jurinjak, 2009). According to the Alavi and Leidner (2001) last few years, there has been a growing interest in treating knowledge as an important resource of companies or organization. KM as the process of creating and utilizing knowledge (Palacios, Gil and Garrigos, 2009) can be integrated with the corporation system which can assist the marketers to easily get the knowledge that required (Singh, Iyer, and Salam, 2003). According to the Shaw et al (2001), knowledge management is resources for marketing decision and also contribute to the advantages of any corporation in the companies or organization. KM allows marketer to obtain more useful information and knowledge and prepare the marketing decision in an efficient way (Palacios, Gil and Garrigos, 2009). All these acknowledgements indicate that KM has a close relationship with marketing decision in the way it provides companies with a good, reliable and useful marketing decision.

Data mining relies on databases and artificial intelligence techniques to produce valuable and useful information including marketing decision. Nowadays, marketing decisions are considered important for each organization or companies. It is because it can be used as a medium or strategy to support

the organization to increase their profit. According Bruggen and Wierenga (2009) marketing decision concern about the marketing tools that affect the marketing process in the companies or organization. The marketing decision refers to a broad kind of topics that cover how to market, which product, which is the best channel, customer satisfaction and which moment in time for what prices and others. Shaw et al. (2001) state that, to support marketing decision, each organization should use data mining as a technique and tool to extract the useful information and knowledge in their organization. This implies that organizations may increase their profit and performance, if they have a good marketing decision triggered from effective DM initiative.

Methodology

In establishing this paper, the approach of scoping was adopted. Following this approach, fifteen (15) number of articles on knowledge management and data mining tailored into marketing decision have been gathered and reviewed. All these articles were obtained or gathered from the Mendeley academic literature and an online database that was subscribed by Library of University Teknologi MARA. Besides that, some selected keyword have been used for searching or retrieving the relevant article in order to support this study. There are example of keywords that has been used for retrieval such as “knowledge management”, “data mining”, “marketing decision”, “decision support”, “data mining technique” and “hidden information”.

Discussion

The result of review effort is divided into three items, namely the linear connection among KM, DM and marketing decision, the way the DM is used in extracting the pattern of organizational data related to marketing decision and lastly the level of success in applying the DM for extracting organizational knowledge for marketing decision.

The Connection among KM, DM and Marketing Decision

KM is a universal domain where numerous organization has adopted it in many ways and degree of adoption. With respect to the KM process point of view, there exists knowledge creation in which organizations make use of organizational memories to produce a new knowledge. Creation of new knowledge requires specialized tool to ensure the worthwhile outcome. Many tools have been adopted by organizations in order to manage their tacit and explicit knowledge. One of the tools that can be used to capture explicit knowledge is a data mining (finding patterns in large bodies of data and information) and text mining (text analysis to search knowledge, insight etc.). DM tool is appropriate for extracting explicit knowledge in the databases because its sophisticated machine learning capabilities.

On top of the application of DM in the established domains such as public healthcare, construction industry, food Company and finance (Silwattananusarn & Tuamsuk 2012), DM has also been applied in marketing decision. To provide a good marketing decision, the organization will try to identify the demographic characteristics of customers based on the analysis of categorical data by using data mining clustering technique. According to the previous studies as cited by Ornek and Abdulhamit (2014) mentioned that clustering is a task of grouping objects into classes of similar objects. However, this techniques involve identifying a finite set of categories and grouping together objects that are similar to each other and dissimilar to the objects belonging to other clusters (Silwattananusarn and Tuamsuk, 2012). This technique has been applied in various fields. For example, in retailing, this technique has been used for clustering the segmentation for the possible product line and brand

extension to identify a market to customers (Liao, Chen and Wu, 2008). In addition, this technique will help marketing manager to extract knowledge in order to implement relevant strategies over certain customer group. Thus, it can be concluded that any organization can use clustering techniques in order to obtain the interesting information with more efficient and faster way.

The Application of Data Mining in Extracting the Knowledge for Marketing Decision

Data mining, composed of multiple techniques falls under association, classification and segmentation categories. All these techniques with their unique algorithms capable of identifying the connection and trend, pattern in large databases to promote and produce marketing decision. (Anderson, Kotsiopoulos, 2002). Organizations use different techniques of DM to extract the pattern and discover the knowledge that they need for marketing decision depending on their business environment and situation. For example, in retailer field the way/ method of data mining normally using manual and computerized. According to Anderson and Kotsiopoulos (2002) mentioned that to gather and extract data with no computerized, the retailers need to track their sales and promotional effectiveness and information manually.

The cash registers, for example, provide general information like total of sales and department sales, but to extract this pattern of information, the retailers need to do manually. The manual method will take longer time to analyze and produce the marketing decision. Thus, the technologies such as computerized DM is required in gathering data because it's available to retailers and make this easier with high level of accuracy. The ability to transform raw data into a workable and predictable solution to complex merchandising and retail or marketing problems have become a reality with the overwhelming presence of the internet, intranet and data files in the Giga and tera byte ranges (Anderson and Kotsiopoulos 2002). By using computerized data mining, the analytical tasks on stock, sale ration, gross margin, and customer can be made timely and efficiently. This in turn will help their marketing manager to forecast the suitable and relevant marketing decision and strategy.

The Impact of Applying Data Mining in Marketing Decision

Many researchers realized that applying and practicing DM techniques in the organization will help in achieving the best marketing decision. Liu and Qi (2013) claimed that DM can improve the decision support system especially in marketing part. The marketing decision could be positive or negative decision that give impact to support highlights unique and curious issues such as customer relationship management, customer profiling and cross-organizational knowledge management. Rashidi et al., (2015) admitted that in marketing decision, behavior pattern can be used to evaluate marketing plans or forecasts of future sale. It is because through the application of DM tools which is visualizations will help the organization to discover the behavior pattern that always hidden in the database.

Data mining techniques will allow the marketer to go deeper into the database to create some knowledge discovery or decision. Through the success in DM application it will help organizations to plan and improve direct marketing campaign (Flici, 2017). DM can be used to improve targeting by seeking which people to contact for direct marketing required a tiny bit of additional information like name and address. Thus, it accomplished that through the application of DM the problem that face by organizations can be managed, filter, analyze and sorting in order to extract the relevant information to the user and the organization itself. DM application also plays an important role in forecasting the future sale where marketers are interested to understand the how marketing strategy and plan for future sale affects their product (Rashidi et al., 2015). Without DM process, it can make

difficult to the marketer in data analyzing and also critical to provide marketing decisions in the short term. This tool is useful and contain a significant value that will help marketer to get better answers about their customer behavior and hidden data and information such as purchase pattern, in order to provide a good and best marketing decision.

Conclusion

Knowledge management and data mining are a good practice and tools to extract the hidden information allowing the knowledge discovery in the organization. The systematic application of knowledge management and appropriate data mining techniques may produce significant products and services for customers. In this paper, the application of knowledge management and data mining in marketing decision has been presented. The paper concludes that clustering is a most regular technique used in marketing decision. The sale and cash registers are frequent elements of marketing decision taken into data mining application. Data mining is also found the have positive impact on the process of planning and producing the best decision in order to generate more innovative marketing and competitive advantage of an organization.

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