

Recommender System Model for Marketing Strategy in Small Medium Enterprise

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Abstract - Small and Medium Enterprises in Indonesia, have a vital role in financial and business development. In expansion, SMEs also have other advantages, having the speed of development, flexibility, and low work costs. However, in its development, SMEs in Indonesia also experience several obstacles, including barriers to marketing. Recommender systems are applications that purpose to provision workers in their decision-making although cooperating with huge information. System recommends things of attention to users based on preferences they have communicated, either clearly or indirectly. The purpose of this research is to help SME marketing activities using a recommender system. The research method uses a qualitative approach to identify SME problems and design solutions with a recommender system. The results of this study are a model of a marketing recommender system for SMEs.

Index Terms - Marketing, Information, recommender system, SMEs, model.

INTRODUCTION

Indonesian SMEs have several limitations that prevent SMEs from increasing their business. SMEs have problems in almost every part of their business processes and this research focuses on marketing issues. Marketing in SMEs is a supporting activity to increase sales. Thus, SMEs that have an effective marketing strategy can increase sales. Technology is very important factor to support marketing strategy. One of the factors that causes the low sales of SMEs is because SMEs have not done online marketing either through websites or social media. Perhaps, some SME actors have marketed their products online through social media, marketplace sites, and others [1][2]. However, in

practice it is still not optimal so that the results obtained are not optimal. Lack of knowledge, adaptation to the internet and technological developments are challenges and problems that must be faced by SMEs. Marketing activities in SMEs is a set that creates the congregation, handling, choice, storing, and spread, synchronized and endless presentation of internal and external information. It involves of experts, apparatus, and processes for gathering, categorization, exploration, assessment, and dissemination of essential information, properly and on time, to the choice makers in marketing. The recommender system has been used to support marketing activities in higher education [3][4]. The recommender system has also been used for store product placement, which is a part of marketing activities [5]. As a continuation of some research on recommender systems, this research aims to build a recommender system to support SME marketing activities. The results of this study are a model system recommendation to support SME marketing activities

LITERATURE REVIEW

The use of recommender systems to support marketing activities will combine two scientific domains: marketing and recommendation systems

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1. Marketing Information Systems

Marketing Information System (MIS) is a system designed to backing or support decision making in marketing. MIS is a system where marketing information is properly collected, kept, analysed, and disseminated to managers permitting to their information requirements on a regular foundation.

So, marketing information systems have an important role in an organization or company because it can help companies develop their products. In addition, with this information system, companies can find out consumer needs [6].

Creating an MIS framework is getting to be amazingly imperative as the quality of economies depend on administrations and to way better get it the needs of clients. MIS characterized it more broadly as "individuals, gear, and strategies to assemble, sort, analyse, assess, and disseminate required, convenient, and exact data to showcasing choice makers [7]. Insofar as an economy centres on administrations, marketing is vital to "screen the promoting environment for changes in buyer behaviour competition, innovation, financial conditions, and government policies [8]. In this sense, the part of marketing is getting to be significant for an organization to adjust to changes within the advertise environment [9]. As an economy depends on the procurement of information, MIS frameworks are essential to be able to characterize and separate the esteem suggestion that one organization gives with regard to another, as well as to characterize their competitive advantage [10].

The best thing about MIS frameworks is to coordinated market-monitoring frameworks with technique improvement and the vital execution of arrangements and forms that help capture and act on client administration applications with showcasing choice bolster frameworks. This range constitute Promoting insights that underpins the investigation and advertise based exercises that bolster client relations and client benefit with genuine time data with genuine time applications that back advertise based approaches.

II. Recommender Systems

Recommender systems are applications that purpose to support users in their decision-making while interacting with large information spaces. They prescribe things of intrigued to clients based on inclinations they have communicated, either expressly or certainly. The ever-expanding volume and expanding complexity of data on the Net has subsequently made such frameworks basic apparatuses for clients in an assortment of data looking for or ecommerce exercises. Recommender frameworks offer assistance overcome the data over-burden problem by uncovering clients to the foremost curiously things, and by advertising oddity, astonish, and pertinence [11].

Another definition of a recommender system, or a recommendation system (in some cases supplanting 'system' with an equivalent word such as stage or motor), could be a subclass of data sifting framework that looks for to foresee the "rating" or "inclination" a client would provide to an item [12]. Recommender systems are utilized in a combination of zones, with commonly seen cases taking the outline of playlist generators for video and music organizations, thing recommenders for online stores, or

substance recommenders for social media stages and open web substance recommenders [13]. These frameworks can work employing a single input, like music, or numerous inputs inside and over stages like news, books, and look inquiries. There are too prevalent recommender frameworks for particular themes like eateries and online dating [14]. Recommender frameworks have moreover been created to investigate inquire about articles and experts, collaborators [15], and budgetary services [16].

Related Works

Research of recommender system for SME already in Cyberattacks on Small and Medium Enterprise (SMEs). In any case, they often need compelling techniques to avoid dangers such as malware, phishing, and others. Their powerless defence framework is often an alluring road for programmers to investigate escape clauses. There's a need of cybersecurity activities in SMEs, and a few past assaults have uncovered the weak frameworks [17]. The ponder anticipates to create an application for Small and Medium Enterprises (SME's) that finds eateries through worldwide situating framework, and ranks restaurants and posts the most excellent performing in see of social media responses with recommender system [18], demonstrate how SMEs can overcome fundamental barriers to adopting recommendation systems [19].

THE PROPOSED MODEL

SMEs need to understand customer needs in depth based on several considerations such as customer tastes that continue to change according to changes in their individual lives, changing customer needs due to technological developments and all the above considerations must focus on what customers want, about what customers need to buy and needs considering that what customers want. customers are constantly changing.

SMEs need preparation to evaluate consumer needs based on the consumer environment and significant changes in the consumer environment. SMEs need to plan marketing strategies to meet all consumer needs. By recognizing priorities for future action, SMEs can generate and retain profitable customers. The proposed model is to integrate a marketing database with a recommendation system as depicted in Figure 1.

SME database marketing is basically an activity of collecting consumer data with the aim of understanding the needs of SME customers and providing solutions through personalized communication which will then be combined. with a recommendation system that will produce a marketing recommendation system for SMEs. In other words, this model can be used by companies that already have a marketing strategy because the marketing strategies that are already available will be juxtaposed with the recommendation system to produce a reliable marketing strategy for the company.

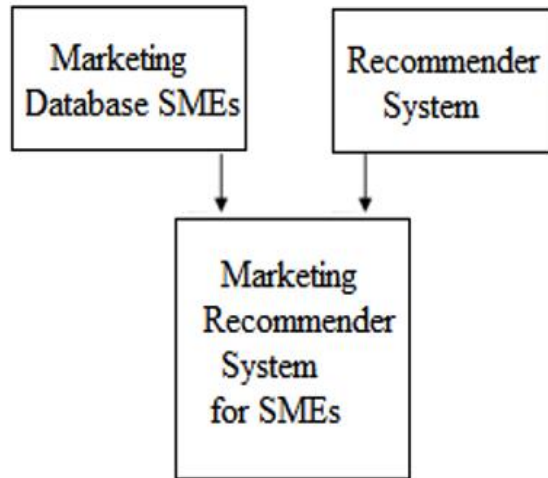


FIGURE 1
MARKETING RECOMMENDER SYSTEM FOR SMEs

The results of the above process can be used by customers to buy SME products. The results of the recommender system can also be used by SMEs in building marketing strategies.

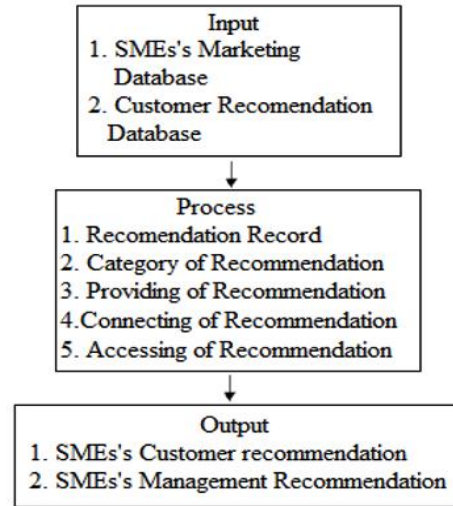


FIGURE 2
INPUT PROCESS OUTPUT MODEL

Marketing Recommender System for SMEs purposes are revealed in three stages: input goals, objectives, and goals of data processing yield, and as a set they are reflected in quality of product of SMEs and SMEs customer requirement.

Input process and output of this model explained in Figure 2. The input section consists of 2 components: the SME marketing database and the recommender system. Data and information from the input section will go through several stages of the process, namely:

- Recommendation record is the process of records of marketing data and information include all marketing activities: marketing planning, marketing budget, marketing sales force etc.
- Category recommendation is the next process that classifies recommendations. Classifies recommendation base on strategic and operational approach, external and internal approach, or long/short time approach.
- Providing recommendation is the process of providing recommendations to customers and management. The result of this step is system can offer the alternative recommendation more than one recommendation. User can chose the best one base on their subjective perception.
- Connecting recommendation is the final stage that will connect the recommendation with customer needs. At the of this process that system can provide SMEs to offer the customer need product

Recommender system must be integrated in all parts and customer needs become one part of the system.

The SME recommender system model is a model that describes the user as a target, the most frequently purchased items, payment method and customer preferences. Conceptual modelling describes the structure and solution functional, independent of computing resources and software resources. The purpose of this model is to increase user satisfaction, increase user loyalty and increase SME sales. Technical modelling changes the conceptual model and information modelling into software and resources by describing the techniques used in information filtering, system design, system interfaces.

At the conceptual level we propose to make a database, product, price, customer, stock, orders, sales, recommendation and criticism information, information from research marketing. The results of the process are used for reports on marketing research and marketing decision making. The technical model consists of collaborative filtering, content base filtering, datamining methods, context aware methods and web mining methods. Then usefulness, user's quality, confidentiality, and flexibility.

I. Stages Developing Model

The introductory information comprises of the usual of Customer c and the usual of items i . Planned model for deliberate a sole customer and the set of items and at that opinion the set of customers and a sole item. Then determine the grade of usefulness of the customer for the item I as a effort $R(c, i)$.

Figure 3 describe components of good endorsement in situation of a sole customer and a set of items. The situation of a sole user and a set of items. The endorsement of the good (a set of m components) will be a vector with m components $R(c, i_j), j=1, m$.

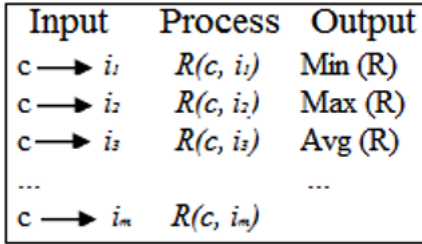


FIGURE 3
THE CASE OF SINGLE USER AND A SET OF ITEMS

Min (R) will explain which the fewer favourite of the customer c . Max (R) will explain the most favourite item for the customer c . The system will endorse the items with the major expected usefulness.

The situation of a set of customers and a sole item. Figure 4 explain a set of n customer and a single item. The endorsement of the goods will be a vector with m components $R(c_k, i), k=1, n$.

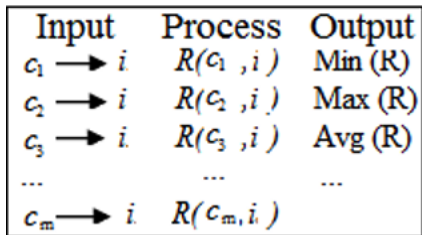


FIGURE 4
THE CASE OF A SINGLE ITEMS AND A SET OF CUSTOMER

Figure 5. Explain the aggregation with two functions above customer and product item

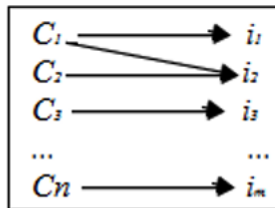


FIGURE 5
THE AGGREGATION WITH CUSTOMER AND PRODUCT ITEM

Figure 6 explain aggregation with two functions. The functions $R, R1$, distinctly, will be kept as array components in rows and columns, lines will store customer and columns will store items. The component (u, i) the matrix component will be the combined function to the user u and the item i .

Marketing relationships can be symbolized by using graphs and matrices. Marketing relationships can use graphs that involves of points (nodes) to symbolize actor and lines (or edges) to symbolize ties or associations.

In the next example is the case of an online shopping SMEs Product with 5 products available and the online shopping was stayed by 5 possible customers. Those 5 products have numerical rating, from 1 to 3, conferring the favourite of the users. The users can also have a coefficient of significance from 1 to 3, such as 1 is not a significant customer, 2 is significant and 3 is very significant.

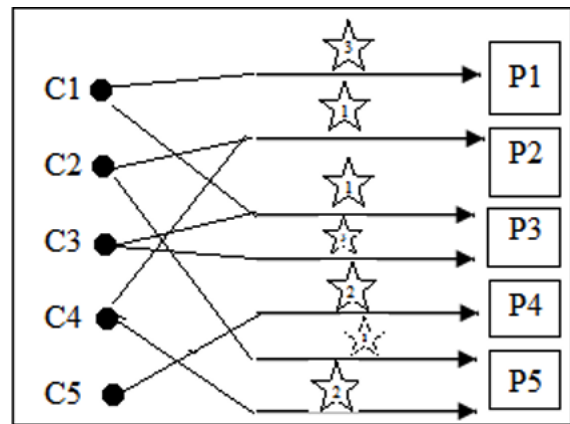


FIGURE 6
AGGREGATION WITH TWO FUNCTIONS

II. Flow Recommender System for SMEs Indonesia Marketing

SME sales transactions through the SME website is the initial process of getting data and information for the recommender system. Figure 7 shows the Indonesian SME sales website by offering several products.



FIGURE 7
SMALL MEDIUM ENTERPRISE WEB

Figure 8 explains the next stage where the customer will choose the product offered then the system will display detailed information on the selected product and the payment process until the delivery of the goods to the customer.



FIGURE 8
PRODUCT DETAIL

The next stage, the customer will give a rating for the SME goods after the customer receives the goods. Figure 9 is an example of displaying customer ratings for SME products.

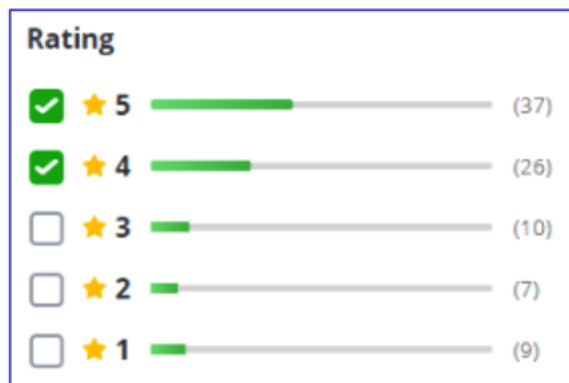


FIGURE 9
EXAMPLE RATING SMES PRODUCT

Figure 10 shows the database design where the recommended product which is the result of the recommendation system marketing will be one of the information offered to customers and relation with marketing strategy. Recommended products are an important part of the marketing database where the marketing database is a source of information to create a marketing strategy. Marketing strategies that can be created from the recommender system are content marketing, search engine optimization, web site engaging, email marketing, social marketing, pay per click.

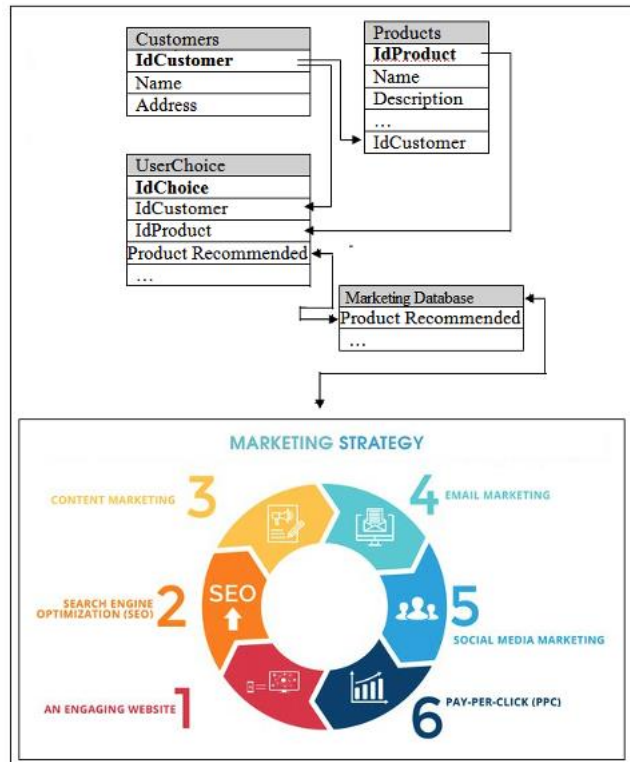


FIGURE 10
DATABASE DESIGN AND RELATION WITH MARKETING

CONCLUSION

Recommender system marketing can help SMEs determine the products that customers need. By combining customer and product data as well as customer satisfaction ratings will produce product information that is in accordance with customer needs. On the other hand, the information generated from this recommender system can be used by SMEs to create marketing strategies.

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