Decision Support Systems for Customer to Buy Products with an Integration of Reviews and Comments from Marketplace E-Commerce Sites in Indonesia: A Proposed Model

Yakob Utama Chandra[#1], San Karya[#2], Manise Hendrawaty[#3]

[#]*Information Systems Department, School of Information Systems, Bina Nusantara University, Jakarta, 11480, Indonesia*
E-mail: [1]yakob@binus.ac.id; [2]xie_san@binus.edu; [3]mhendrawaty@binus.edu

Abstract—**Human has the need to shop. People are beginning to change the lifestyles of shopping by making purchases on e-commerce sites online. This makes companies offer their products not only in the market or shopping center but also through the e-commerce site. With e-commerce sites, people as potential buyers and regular customers will have many variations of products to purchase. They can shop anywhere and anytime by using an e-commerce site. Marketplace e-commerce sites have been equipped with reviews and comments from every expert and buyer who has purchased the product on the marketplace e-commerce site. The problems that occur are with the large number of products and merchants who can sell the same product, making potential buyers need more time in choosing the right product. They also need to see the review to choose the merchant that provides satisfactory service. The research question is whether the Decision Support System Model equipped with integrated review and comment can assist the customer to choose merchant with their expected product on marketplace e-commerce sites? The result for this model is customer can convenience to choose best merchant to shop in marketplace e-commerce site. This research is conducted by using qualitative research.**

Keywords— **decision support system; model; e-commerce; review; comment; marketplace.**

I. INTRODUCTION

One of the human needs is shopping. But in the modern age, customers do not have to come to the market or to the shopping centre anymore. Everyone can do online shopping activities on e-commerce sites. Even shopping centres such as department stores are now actively selling online and closing their stores physically.

For the example, one of the trusted news portals provides information that well-known department stores in Indonesia will further develop the retail product sales online and will start closing stores that are currently in the shopping centre (mall) [1]. It is becoming a phenomenon that has happened lately that physical stores will start to shift their business processes by using e-commerce sites.

Indonesia transportation, especially in Jakarta, causes access from and to the shopping centre to take more time due to the congestion. This makes people start changing lifestyles from going to shopping centres to opening e-commerce sites in Indonesia.

E-commerce sites are beginning to flourish so rapidly today. This provides an opportunity for companies to be able to sell products more widely, not only through the market but can also through the technology. In addition to useful to companies, e-commerce sites also provide opportunities to customers [2]. Customers can get many products that can be purchased to meet their needs and can provide time freedom to buy products without having to come to the shop [3].

Why do companies start switching to e-commerce sites? This is because the current business process begins to experience changes where the company is currently making better adjustments to facilitate customers with the consumer-centric business model. Companies need to invest in technology and build analytics capabilities to help integrate each sales path to be able to sell each product more quickly and match the targets to be achieved [4], [5], [6].

From the customer side, with the e-commerce site, the customers get more choices of products to purchase. Nowadays payments are more flexible, not just in cash, but can also via e-wallet, credit cards and online payments. This provides convenience for customers to shop in fulfilling human needs [7], [8].

Customers may decide to make purchases through marketplace e-commerce sites due to the various factors that determine the buyer. The most important thing is the trust between the buyer and the marketplace e-commerce site to ensure the customer is safe and comfortable in doing the transactions on the marketplace e-commerce site. In addition

to the existence of safe and comfort factors that support the trust, the customer can make a purchase because of the freedom to choose the product without any coercion and also with the existence of clear information about the product. Clear information on the product requires a valid and clear data to support the information on the product. One of them is done through the review and comments that have been provided by the marketplace e-commerce site. [7]

Reviews and comments on marketplace e-commerce sites may be filled by experts who understand the product information as well as the customers who have purchased the product. These customers provide new comments on the product page as a testimonial that he has used in the product. The existing reviews and comments on the marketplace e-commerce site provide a sense of comfort to a prospective customer who wants to buy a product. They can be ensured on the certainty of the goods which can be sent in accordance with the seller's information. The model provides information about the products well and truthfully. This brings about a sense of comfort to the certainty of information obtained by other customers in accordance with what has been agreed from the information of the seller [9], [10].

The research objectives are to achieve the ability of the prospective customers to be able to decide effectively and efficiently through the innovation of integration techniques from every marketplace e-commerce site located in Indonesia. The need for supporting apps helps prospective customers to be able to decide which e-commerce is appropriate and suitable to buy. The app can help the effective and efficient improvement of potential customers to easily read reliable reviews and comments and use it as a reference to make a decision. Innovation to the use of decision support application by integrating every comment of a marketplace e-commerce site in Indonesia assumed as empirically successful is the one using web application because it can decrease time in making a decision of prospective buyer who will buy a product at e-commerce site in Indonesia. With the increased effectiveness and efficiency of the prospective buyers, the sales on e-commerce sites in Indonesia can be faster and more items can be sold. Each seller is trying to sell their best and improve service as soon as possible.

Research question in this paper is whether decision support system model can provide convenience to prospective buyers to be able to choose a merchant in the marketplace e-commerce site for the product exactly as expected by the customer. In this case, the research will be presented with qualitative research to explain the model that can provide benefits for decision support system for e-commerce site in Indonesia.

II. MATERIALS AND METHOD

A. Preliminary Study

E-Commerce available at present has developed swiftly and is able to provide effectivity and efficiency to the companies, especially small and medium scale business in Indonesia. One example that we can see at the moment is from Tokopedia as one of the largest marketplaces in Indonesia which manage to attract the attention of almost every small scale, medium scale business until large scale business to market their product in the e-commerce site.

Based on the survey that we conducted in January 2018, it has been found that from 356 respondents in our data, 93% (331 respondents) conducts purchasing through an e-commerce website. While 7% (25 respondents) never made a purchase transaction on e-commerce site. In the questionnaire we have provided, there is a statement "I always see comments or reviews provided by other customers on the E-Commerce Site before making a purchase of the product", and of 93% (331 respondents) who have transacted 95% (314 respondent) agreed with the statement.

It can be said that almost all users of e-commerce sites before purchasing the product, they will first observe the reviews and comments contained on the e-commerce site. This is because usually in marketplace e-commerce site, a product can be sold by several merchants in the e-commerce site, so potential customer will usually compare which merchants provide good service and price when another customer already received the product. This gives confidence to the prospective customer to be able to buy the expected product at a merchant in an e-commerce site.

B. Commerce

As we all know that e-commerce today has been widely used by several companies and now e-commerce is becoming one of the alternatives for companies to develop existing technology to further accelerate their sales growth and can improvise from every condition they are in markets in both national and international markets today. Especially e-commerce is a very helpful technology for small and medium enterprises (SME) in Indonesia to be able to increase sales of small and medium enterprises using technology that has developed today.

10 years ago, e-commerce dominated by e-commerce model in the form of Business to Business (B2B), but starting lately, e-commerce is often found with e-commerce model of Customer to Customer (C2C) or known as the marketplace. It can be believed that with the e-commerce, the cost of expenditure required by the company especially for small and medium units in Indonesia is very small and very useful for businesses to be able to do business without having to spend a lot of money [11].

Using the adoption of e-commerce, company in particular small and medium-sized units in Indonesia can feel the great benefits of e-commerce and have a better strategy of using e-commerce to sell products more widely, effectively and efficiently. Mentioned widely because the existence of e-commerce to sell any product on e-commerce sites [11]. Even now there are already started mobile commerce that is used with through mobile apps. This provides very efficient and effective ease to humans to access shopping wherever and whenever [12]. In terms of payment was also facilitated at this time with the e-wallet that serves to convert money into digital to provide a fast and adequate means to mobile commerce users [13], [6].

C. Decision Support Systems

Decision support systems is a computer system that can be used to solve an existing problem with a framework that

explains each problem in a structured or unstructured. Decision Support Systems can help each of us to make decisions by presenting every data already available by the system. In this day and age, decision support systems not only on the computer alone but already can be accessed by using a mobile application that allows people to be able to make decisions with the decision support systems [14].

Decision support systems in marketplace e-commerce will give more value to every human being in need. Additionally, the use of decision support systems in mobile applications makes it easier for human beings to access decision support systems that support for e-commerce purchasing decisions [15], [2]. Mobile decision support system in e-commerce especially with customer review and comment can provide convenience and efficiency to human to access data that become information for consideration in purchasing an item in e-commerce sites [16]. In addition, the ease of providing decision support systems in e-commerce is accessible via mobile devices and can be used flexible [17], [18], [19].

D. Review and Comment on Marketplace E-Commerce Sites

Reviews and comments always exist on any marketplace e-commerce site in Indonesia, this is because as a reference for a potential customer of products to consider the thinking of the decision in buying the product. Reviews and comments are helpful as a measurement of the value received on the product.

Assessments made by the potential customer by looking at reviews and comments on marketplace e-commerce sites can see a level in the decision process to buy. Decision levels start from recognition, information search, evaluation of alternative needs, decision to buy when making a purchase until the phase after making a purchase.

The most important thing when making a decision to buy is to do recognition. This is due to the recognition, then the prospective customer can find the expected information and get the required things from the product with the truth. There are some buyers, searching for the information itself is a pleasure for prospective buyers to be able to clearly know the required information.

Once the customer has finally made a purchase, the customer will return to the website to enter the phase after purchase to make a comment so that other customers can understand about experienced by the customer. [20]
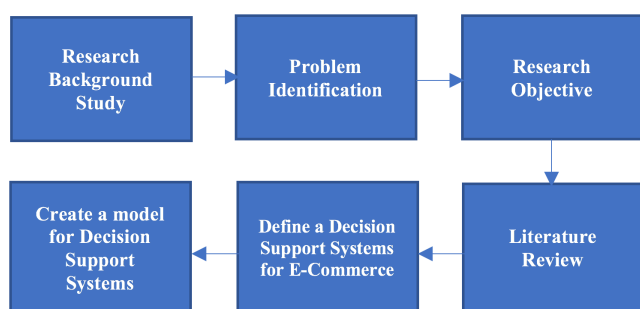
E. Research Method

Fig. 1. Research Methodology

Research begins with a study of the current research background, especially on users of marketplace e-commerce

sites that will purchase products. The background of research is raised by the existence of a condition of the buyer was confused because of the many marketplace e-commerce sites at this time and also added products from any marketplace e-commerce sites are also very much. This makes the prospective customer take a long time in choosing a product and choose a suitable merchant to make a purchase transaction.

After the collection of background research, then the research continued by clearly identifying problems that occur to solve existing problems. Problems identification found that when potential customer wants to choose products and merchants in marketplace e-commerce sites, the prospective customer takes a long time because there are many options merchants with the same product. Prospective customer needs time to select the merchant and view the existing reviews and comments to make sure the selected product fits customer needs and satisfaction of the customer.

With the identification of problems that have been decided, then the research continued by searching for research purposes. The purpose of the research is to determine the decision support system design model that can assist the prospective customer in marketplace e-commerce sites with the support of integrated data and information between the reviews and comments from each e-commerce sites.

The research continued with a study of literature to see how the process of a prospective customer to conduct transactions in e-commerce sites from finding the product until the product is well received by the customer and fill out reviews and comments for products that have been received. In addition to viewing the process on e-commerce, the study also conducted literature studies on how the ideal process for decision supports systems, especially on the integration of review and comment information on any existing marketplace e-commerce sites. Our literature review is to see the research that has been done before and try to see specifically how the decision support system in the marketplace e-commerce market works more effectively and makes customer make decisions faster. From several countries and make a comparison with the culture and users of Indonesia in Indonesia. With this decision, the decision support system will be more effective in Indonesia.

The research continued with defines a decision support system for e-commerce especially on the integration of review and comment from every marketplace e-commerce sites. With this define then the research gets clear about the decision support system for e-commerce. All customers, especially in the market in Indonesia, have difficulty finding the right product according to the necessary requirements. The decision support system to be constructed is to compare each merchant and qualification level that has been owned by merchants in each marketplace e-commerce. Therefore, customer will be easy to find and decide on quality merchants according to the rating that each e-commerce site has evaluated in terms of market. In this case, the decision support system will greatly help customers find merchants to buy.

The research continued by making the proposed model for decision support system on marketplace e-commerce sites, especially for integration on review and comment from

every marketplace e-commerce sites. The elaboration of the proposed model is based on the results that have been found from the decision support definition system for marketplace e-commerce sites in the previous stage. The model created consists of using a flow chart to facilitate the visualization of each process from the beginning, so that customer start looking for products in the decision support system until the customer makes a purchase directly in marketplace e-commerce sites. This makes it very convenience for users to find products and provide an effective decision support system.

III. RESULT AND DISCUSSION

A. The Proposed of Decision Support System for E-Commerce Processes

Fig. 2. Decision Support System for E-Commerce Processes

The process proposed for the activity from the beginning to the end of the process is as follows:

1) *Visit Decision Support System Application:* Customer opens the Decision Support System app at the beginning of the process. The customer does not need to open marketplace e-commerce sites one by one making it easier for customers to open one application only.

2) *Searching a Product:* Customer finds the desired product in the Decision Support System Application. A customer looks for products by filling in the searching product field in the Decision Support System Application and then the Decision Support System Application searches all e-commerce sites that have been integrated with the Decision Support System Application.

3) *Get a Result:* After the Decision Support System Application searches all e-commerce sites, the Decision Support System Application displays search results from a variety of e-commerce sites according to the product that customer is looking for. The Decision Support System Application will display the product with a column view for each e-commerce site.

4) *Sort by Rating:* Customer get some alternative merchant options that are displayed by the Decision Support System Application because each e-commerce site has more than one

merchant that sells products desired by the customer. As a default, the Decision Support System Application will sort by the rating of any existing merchant e-commerce sites. Thus, it has made it easy for the customer to see the order of the best ratings to the less good based on the previous customer. the Customer can do additional sorting expected by the customer such as sorting by price, the location of the merchant, discount, promotion, etc. This is done to fit the wishes and needs of the customer.

5) *Compare each Merchant:* After sorting, the choice of products for the customer to be less and up at this point prospective buyers will easily do the comparison in each merchant. The Decision Support System Application will display in the form of columns to facilitate user experience.

6) *Go to Merchant Site:* At this point, the customer has found the right choice to buy the product in one of the merchants that have been sorting by Decision Support System Application. With this case then the customer ordering transaction at a merchant where on one of marketplace e-commerce sites. Then the customer does one easy step is to press the "buy" button, and Decision Support System Application will direct the page to the e-commerce site with the intended product and immediately ready to order on the e-commerce site. Decision Support System Application has completed its task and then the customer orders as usual.

7) *Ordering a product:* Customers are ready to order products such as choosing how many products are ordered, product choices like colors, accessories, etc. Then fill the delivery form of goods addressed to customer address. If the customer already has a member on the e-commerce site, then the customer can login to the e-commerce site.

8) *Make a payment*: The stages that must be passed is the stage of making payments. Customer will make payment according to the payment options available on the e-commerce site.

9) *Waiting for Shipping:* After making the payment then the customer is just waiting until the product has been purchased come to the place that has been ordered when filling delivery form indicated to the customer address.

10) *Get a Product:* The product finally arrives at the customer and customer will assess the product matches what the merchant promised when ordering the product.

11) *Give rating, review, and comment:* Customer may rate merchants for purchased products and provide reviews and comments on products that have been purchased. Buyer performs rating, review, and comment on the merchant in the marketplace e-commerce site.

From the eleven points above shows that the Decision Support System Application starts from point 1 to point 6. For point 7 to point 11 is done in marketplace e-commerce site that has been selected by the customer. Decision Support System Application will greatly assist customers in starting product searching, sorting from every merchant in all e-commerce sites until the customer can choose merchant, which is right for the customer. This is from point 1 to point 6. Customer will order as usual on the marketplace e-

commerce site selected on the merchant from point 7 to point 11.

The Decision Support System Application gives customers the convenience to be able to select the merchant located in every marketplace e-commerce sites on the desired product. This provides convenience for customers so that customers do not need to visit e-commerce site one by one. In addition, also with Decision Support System Application allows customers in determining the product based on rating and sorting in accordance with the wishes of the customer. For example, customers will find cheap goods at the location nearest the customer, so the cost of shipping goods will be cheaper.

B. The Proposed of Decision Support System Model

If at point A talks about how the customer process to purchase a product with a decision support system, then in this section (B) will discuss the design model decision support system itself. Decision support system this model is a depiction of system process that can be done to guide application developer in making Decision Support System Application. Decision support system of the proposed model is in the following picture:
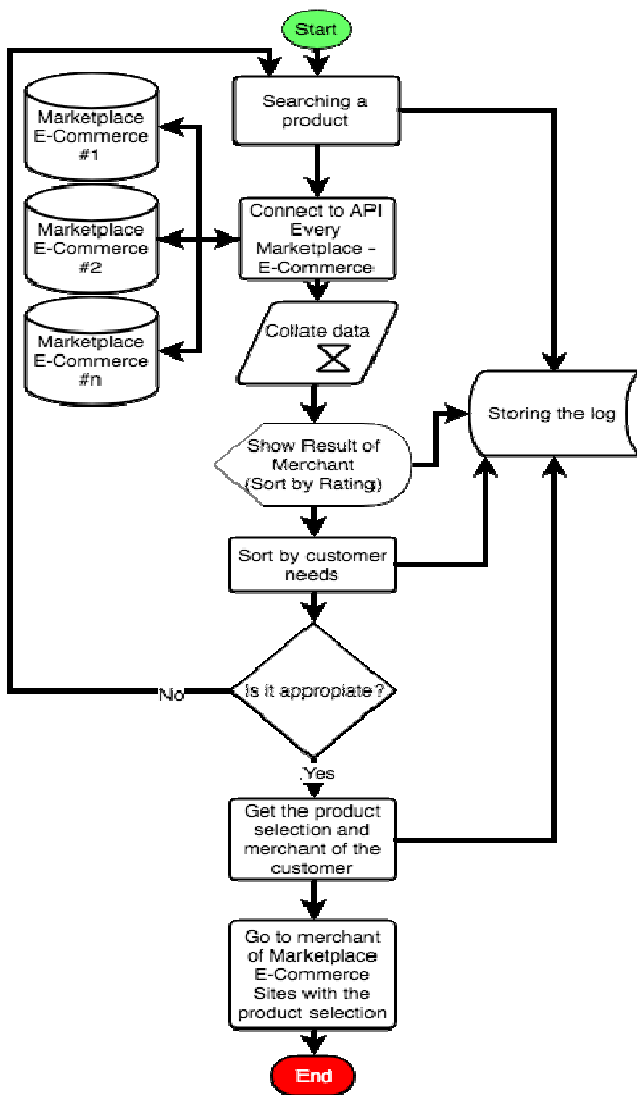

Fig. 3. Decision support system model for customer

Decision support system application will receive requests from customers to search the product. When a customer searches for a product, the product will be logged as a record for the application and for future needs.

Decision support system application will connect to the API (Application Program Interface) to each marketplace e-commerce site that has been registered on the decision support system application. In this case, before the decision support system is made, has an agreement between the decision support system with an existing marketplace e-commerce site and make agreements to perform API Connection for data in the e-commerce site can be read data. In this case, the API will only read the data without doing a write on the data.

After reading the data through the API to any existing marketplace e-commerce site it will display the data results by default is sort by rating. In addition to displaying to the customer, then the decision support system application also does store log to decision support system database. Views by sort by rating will be displayed every marketplace e-commerce site per each column. For to make sure the customer can read the data result easily and well.

Customer will see the result if customer not according to sort by rating, the customer can do sort by customer needs such as sort by price, location order, and also see every existing review and comment from every merchant at every marketplace e-commerce site in each column. If the customer is in accordance with the expected needs, then the customer can do the next process. However, if the customer does not want to continue then the customer can repeat from the beginning. Every customer does sort of customer need, then decision support system application will do storing the log for the next requirement.

Customer will determine the product selection on one merchant that is in one of the marketplace e-commerce sites. In this process, the decision support system application will perform the log of customer selection on the decision support system database. After the customer chooses the product, the decision support system application will lead to the e-commerce site that has been selected by the customer and then the customer continues to conduct transactions on the e-commerce site.

With this model, customer can begin the process of purchasing a product, without having to search for products in each existing marketplace e-commerce sites, but simply starting from the application of decision support systems to facilitate customers looking for a product. Product with the first criterion is the quality of the product. Merchant in each marketplace e-commerce site of the market are at the highest rating. This makes it easier for customer to find products with good commercial service quality based on the merchant's classification. Once the customer obtains a merchant with good quality of service, the user can make the classification according to the needs. This provides convenience and value for users to be more specific as necessary for the user.

IV. CONCLUSIONS

With the application of decision support system then allows customers to select products according to expectations and see by rating, review, and comment. Customers can be facilitated with the initial option to view desired products

easily from various marketplace e-commerce sites and various merchants that sell products on one application is decision support system application. Model made is expected to facilitate application developer in making decision support system application.

Limitations of this study are still not enough reference is very supportive of decision support system application. After doing the literature review, there is no similar application and similar research to support this research. It can be said that this research is a new research and needs to be developed for further especially on decision support system in e-commerce by focusing on the integration of review and comment from every e-commerce site in Indonesia.

Research that can be done for next research is to develop logs that have been stored in the decision support system database so that it can be developed as a big data for subsequent data processing. In addition, research can also be further developed into other e-commerce needs, not just for review and comment, but also for other needs.

REFERENCES

[1] "Debenhams dan Lotus Tutup, MAP Kembangkan Toko Online." [Online]. Available: https://finance.detik.com/berita-ekonomi-bisnis/3701031/debenhams-dan-lotus-tutup-map-kembangkan-toko-online. [Accessed: 29-Jan-2018].

[2] S. H. Ha, S. Y. Bae, and L. K. Son, "Impact of online consumer reviews on product sales: Quantitative analysis of the source effect," *Appl. Math. Inf. Sci.*, vol. 9, no. 2, pp. 373–387, 2015.

[3] E. Constantinides, "Influencing the online consumer's behavior: the Web experience," *Internet Res.*, vol. 14, no. 2, pp. 111–126, 2004.

[4] Y. Diao, Y. He, and Y. Yuan, "Framework for Understanding the Business Model of Social Commerce," *Int. J. Manag. Sci.*, vol. 2, no. 6, pp. 112–118, 2016.

[5] B. Perkins and C. Fenech, "Deloitte Consumer Review: The growing power of consumers," pp. 1–16, 2014.

[6] Q. Chen and N. Zhang, "Does e-commerce provide a sustained competitive advantage? An investigation of survival and sustainability in growth-oriented enterprises," *Sustain.*, vol. 7, no. 2, pp. 1411–1428, 2015.

[7] B. J. Corbitt, T. Thanasankit, and H. Yi, "Trust and e-commerce: A study of consumer perceptions," *Electron. Commer. Res. Appl.*, vol. 2, no. 3, pp. 203–215, 2003.

[8] R. Epstein, "The Truth about Online Consumers," *Sci. Am. Mind*, vol. 20, no. 3, pp. 54–61, 2009.

[9] J. Norcini, "The power of feedback," *Med. Educ.*, vol. 44, no. 1, pp. 16–17, 2010.

[10] A. Panagopoulos, E. Koutrouli, and A. Tsalgatidou, "Modeling and Evaluating a Robust Feedback-Based Reputation System for E-Commerce Platforms," *ACM Trans. Web*, vol. 11, no. 3, pp. 1–55, 2017.

[11] J. G. Vargas-hernández, "Strategies for the Adoption of E-commerce," vol. 3, no. 4, 2015.

[12] B. Shen and X. Han, "Factors Affecting Customer Experience in Mobile Social Commerce : A Conceptual Model," no. Icss, pp. 177–182, 2016.

[13] A. Upadhayaya, "Electronic Commerce and E-wallet," vol. I, no. March, pp. 37–41, 2012.

[14] X. Guo and A. López, "Mobile Decision Support System Usage in Organizations," *Proc. Ninet. Am. Conf. Inf. Syst. Chicago, Illinois, August 15-17, 2013.*, pp. 1–7, 2013.

[15] E. W. T. Ngai and A. Gunasekaran, "Mobile commerce: Strategies, technologies, and applications," *Decis. Support Syst.*, vol. 43, no. 1, pp. 1–2, 2007.

[16] Xin Li, J. Liu, and Fangfang Zhang, "Different effects of provider recommendations and consumer reviews on consumers' shopping efficiency for different product types," in *2016 13th International Conference on Service Systems and Service Management (ICSSSM)*, 2016, pp. 1–6.

[17] S. Gao, "Mobile decision support systems research: A literature analysis," *J. Decis. Syst.*, vol. 22, no. 1, pp. 10–27, 2013.

[18] P. D. Haghighi, "The new era of mobile decision support systems," *J. Decis. Syst.*, vol. 22, no. 1, pp. 1–3, 2013.

[19] K. Z. Zhang and M. Benyoucef, "Consumer behavior in social commerce: A literature review," *Decis. Support Syst.*, vol. 86, no. April, pp. 95–108, 2016.

[20] S. M. Mudambi and D. Schuff, "What Makes a Helpful Online Review? A Study of Customer Reviews on Amazon.com," *MIS Q.*, vol. 34, no. 1, pp. 185–200, 2010.