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Impact of Recommender Systems on E-customers Buying Patterns in Nigeria a Tool for Predicting Future Purchase

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Abstract: Due to the huge amount of data available to buyers, the use of sophisticated algorithms can increase the revenue of ecommerce stores with modern recommender systems. The study was designed to investigate the impact of recommender systems on e-buyers online purchasing behaviors, and predict purchase patterns of buyers. The result of the study revealed how recommender systems affect shopping experience, increase sales for business owners and reach efficient product stocking and delivery. This research proposes an approach of increase in sales and the possibility of purchase prediction based on recommender systems. A survey of e-buyers was taken to determine the impact of recommender systems on past and future purchases. Results show that recommender systems improve shopping experience, increase purchase and can be a good tool to remind buyers of what they need to buy. It shows that recommender systems have the ability to predict what a buyer may be interested in purchasing. Based on the obtained user behavior and e-buyers satisfaction with recommender systems, e commerce stores can take advantage of this to send personalized recommended items to buyers' emails to increase their sales. As e commerce shopping becomes more accepted globally, findings in this study have benefits to both shopping experience and sales enhancement.

Keywords: Ecommerce, Artificial Intelligence, Purchase Patterns, Purchase Prediction, Recommender System

1. Introduction

Artificial intelligence (AI) is changing online shopping globally; it is also creating a new way for e-commerce stores to offer better services to buyers. AI has made it possible to offer buyers virtual shopping assistants and offer personalized shopping experience. AI is ever-changing the internet shopping experience for both sellers and buyers by providing new ways to utilize big data available and enable e-commerce stores interact with their buyers on a new level and build outstanding buyer experiences. Through AI, e-commerce stores can analyze shopper data to predict future buying patterns and make product recommendations, using buyers browsing patterns. Considering, the growing influence of smart phones, emails, and chats, being controlled by machine-controlled systems, the impact of AI on ecommerce customized experience becomes necessary to research.

Recommender systems can be defined as a software algorithm which finds products from the catalogue which may interest buyers. It is basically a data filtering tool which analyzes the data imputed, makes use of its core algorithm and generates output in terms of recommended products [1-3].

Yeung C. H. stated that almost all popular websites employ recommender systems to match users with items. For instance, news websites analyze the reading history of individuals and recommend news which matches their interests; online social networks recommend new friends to individuals based on their existing friends [4]. Very often, ecommerce stores analyze buying history of buyers and recommend products to them to grow sales. This demonstrates an increasingly key role recommender systems can play in impacting our various choices.

Amazon invented an algorithm which looks at the products itself. It selects recommendations by buying or rated items from the consumer and pairs them to similar items, using metrics and a list of recommendations. The algorithm is called collaborative; item based filtering [5]. The recent

research on recommender system is majorly on content-based, collaborative-based, and hybrid recommendation approaches. Content-based approach makes use of the profiles of the buyer and product descriptions to recommend products. Collaborative technique makes use of buyers behavior and historical preferences. Hybrid recommendation systems include the strategies of content-based and collaborative based on effective recommendations [6].

A lot of research has been done on predicting buyers behavior, such as mining techniques neuroscience and Human Computer Interaction (HCI). The results generated from these techniques are sent to recommendation systems that integrate data mining procedures to offer recommendations using facts gathered from the actions and characteristics of users. Recommendation systems could be developed to recommend interesting links to products, which could be interesting to users [7]. There are many ecommerce business owners who have incorporated recommender systems to their operations to increase sales and buyer satisfaction. Marketers have been exploring various techniques to forecast buyers buying pattern.

Recommender systems are expected to improve shopping experience and offer buyers a wide range of options at a click. Basically, recommender systems are helping to improve buyers experience and assisting them to improve decisions from recalling buyers' tastes and favorites, to observing their search patterns and offering each individual with custom selection of products. Recommender systems are redefining the approach of shopping online. It is assisting buyer to make better decisions by properly understanding what is desired by buyers and determining their preferences correctly. AI can help e-commerce stores observe surfing patterns of buyers; note the pages and websites which they frequently visit. The result of this can be used to recommend products which a

buyer is likely to purchase. According to [8], 85% of buyer interactions will be handled without human intervention by 2020.

Recommender systems and AI are pushing competence and assisting buyers make better buying decisions. AI is redefining e-commerce engagement for many buyers powered by new technologies such as machine learning, virtual reality, robotics, etc. Futuristically, it can be predicted that lots of recommender systems will be used to generate multi-layer data on each buyer based on their historic and present purchase behavior, and almost precisely predict buyers' future behavior. The future of e commerce will certainly be reliant on recommender systems amongst other technologies.
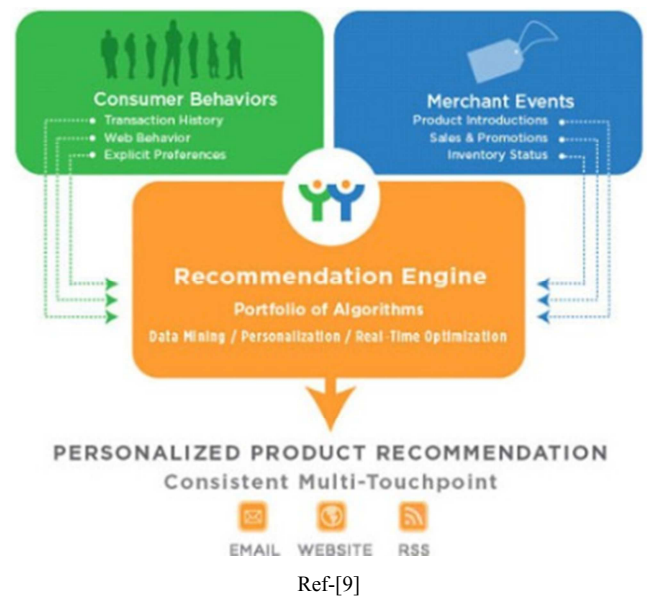
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Figure 1. Recommender systems.
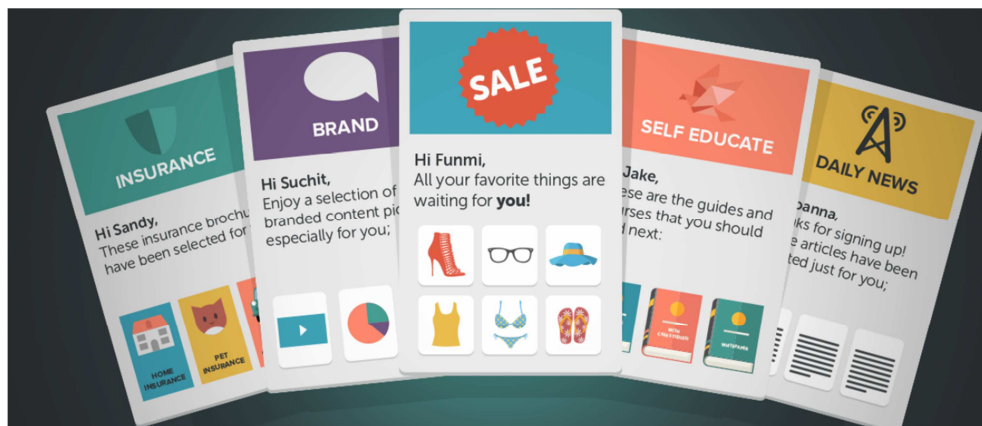
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Figure 2. Sample of customized newsletter for ecommerce customers.

Electronic commerce (e-commerce) is concerned with such diverse activities as marketing, servicing, developing, delivering, selling, and expending for services and products by using online platforms [10].

The huge amount of data that is generated on e-commerce

websites creates numerous difficulties for buyers to decide which products they would buy. Employing recommender systems can greatly address the problem [11, 12] Studied the impact of user preference, geographical convenience, and friends and put forward a group purchase discount coupon

recommendation system to promote the commodity with sensitive locations.

Previous studies have focused primarily on enhancing recommender algorithm performance using customer purchasing history or preferences [13-15]. The effect of recommender systems on product customization in e-commerce have been widely examined in the IS literature [16-18].

Purpose of the Study

The main purpose of the study was to investigate the impact of recommender systems on e-buyers online purchase and predict future purchase patterns of buyers the study determined:

i. If recommender systems have any impact on e-buyers online purchase.
ii. If recommender systems can increase e-buyers purchase, satisfaction and predict possible future purchase.

Research Questions

i. What is the impact of recommender systems on e-buyers online purchase.
ii. Can recommender systems increase e-buyers purchase, satisfaction and predict possible future purchase.

2. Methodology

2.1. Design and Area of the Study

This study adopted a survey research design. Survey design involved the use of questionnaire to gather opinion of respondents [19]. The study was carried out in Federal Capital Territory (FCT).

2.1.1. Population of the Study

The population of the study comprised of 120 e-commerce buyers within the FCT. According to [20], 60 per cent of Nigerians buy items online every few months which are about 90 million Nigerians out of these figure 120 e-commerce buyers within the FCT were randomly selected.

2.1.2. Validation and Reliability of Instrument

The instrument was validated by experts in the field of Computer Science from African University of Science of Technology Abuja. Reliability of the instrument was determined using Crombach Alpha and the reliability co-efficient of 0.84 and 0.78 were obtained for part A and B respectively.

2.2. Method of Data Collection

The data collected for the study was gathered with a questionnaire titled: Impact of recommender systems on e-buyers buying pattern based on previous purchase patterns.

Questionnaire was structured based on a 4 point scale of Strongly Agreed (SA), Agreed (A), Disagreed (D), and Strongly Disagreed (SD). The instrument had two sections A and B. Section a dealt on what impact recommender systems have on e-buyers online purchase and section B was on if recommender systems can increase e-buyers purchase, satisfaction and predict possible future purchase.

3. Result

Table 1. Mean Responses of recommender systems have any impact on e-buyers online purchase.

S/N	Questions	Mean	Decision
1	Have you ever made a purchase online	4.22	Agreed
2	Are you aware of recommender systems	4.00	Agreed
3	When buying from an ecommerce website do you click on recommended products on the website.	4.20	Agreed
4	Does the recommender system present irrelevant products	3.94	Agreed
5	Are you willing to fill simple and short surveys that will help the recommender system improve your shopping experience	4.12	Agreed
6	Did you purchase beyond your list because you bought based on the recommender system	4.67	Agreed
7	Will a weekly personal email with personalized recommendations encourage you to purchase more often	3.62	Agreed

N=120 X=Mean

Table 1 Reveals that all items above were agreed on. This shows that all the 7 Points were agreed on by e-buyers that recommender systems have any impact on e-buyers online purchase.

Table 2. Mean Responses of if recommender systems can increase e-buyers purchase, satisfaction and predict possible future purchase.

S/N	Questions	Mean	Decision
1	Are the products recommended on the recommender system what you want to purchase	4.13	Agreed
2	Did you purchase any product from the recommender system	4.60	Agreed
3	Do you find it difficult to purchase when there is no recommender system on an ecommerce website	3.90	Agreed
4	Do ratings affect your decision to purchase on an ecommerce website	3.85	Agreed
5	Were you satisfied with the shopping experience after using a recommender system	4.00	Agreed
6	Would you prefer if every e-commerce store had recommender system	3.83	Agreed
7	Do you agree that the recommender system improved your shopping experience	4.22	Agreed

4. Discussion

Findings from the study reveals in tables 1 and 2, that respondents agreed on all the items on e-buyers experience as recommender systems improve shopping experiences, increase sales and has the possibility of predicting future purchase and this is in line with [21] who suggested that Recommender systems have big impact on users and on e-commerce providers. The results also indicates an increase in purchase because of recommender systems which is in line with [4] who noted that Recommender systems are present in many web applications to guide our choices and they increase sales and benefit sellers. The result also revealed the possibility of predicting what buyers will want to buy as most agreed that they have made purchase of items from the recommender systems which were not on their purchase list.

5. Conclusion

Customization of buyers experience is becoming ever more important in ecommerce marketing, to make shopping experience easier for buyers [22]. The result of this paper revealed that rather than clicking through many products to find the right one, buyers prefer recommender systems that can pre-select products to exclude irrelevant ones so that the products presented to the buyer are the most suitable ones. The study similarly, showed that recommender systems have the ability to give buyers satisfaction while purchasing, predict what a buyer may be interested in purchasing.

Based on the obtained user behavior and e-buyers satisfaction with recommender systems, e commerce stores can take advantage of this to send personalized recommended items to buyers' emails to increase their sales. Getting the recommended products right can have a huge impact on sales and the growth of an e-commerce store. The use of algorithms may not always be perfect many, human factors can slip through the crack when it comes to recommended products. An area for further research should be how to make recommender systems adapt to the almost negligible but relevant human behavior.

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