IMPACT OF RECOMMENDER SYSTEMS IN CUSTOMERS E-COMMERCE PURCHASES

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INTRODUCTION

The massive adoption of the Web as an e-commerce platform has led to a fundamental change in the way that businesses of all sizes interact with their customers. Whereas potential access to a larger, more diverse customer base is generally viewed as an opportunity, this can also represent increased competition. The stakes are high and businesses have to develop sophisticated strategies to attract and retain customers. Rather than focusing on "touch points" during the marketing and sales processes, businesses are using intelligent algorithms and social technologies to form meaningful, ongoing relationships with customers; these can involve frequent online interactions, often employing social channels. Engaging with customers is no longer a series of one-off experiences; it's an ongoing dialogue. Surprisingly, these ongoing dialogues resemble dialogues between people: they usually express intent and achieve their goals by building on trust and open relations.

Recommender systems explained

Recommender systems have the effect of guiding users in a personalised way to interesting objects in a large space of possible options. To realise this, recommender systems use a number of different technologies. We can classify these systems into two broad groups:

1. Content-based recommenders

Content-based recommenders make recommendations by matching a description of an item (a general term for any kind of content or information, e.g. a book, video, or event) and a profile of the user'sinterests.

2. Collaborative filtering systems

Collaborative filtering systems produce user specific recommendations of items based on patterns of ratings or usage (e.g. purchase) without need for exogenous information about items or users. Detailed explanations of workings of recommender systems are beyond the scope of this project

The Added Value of Recommendation in e-commerce

The use of recommender systems in an e-commerce environment can impact financial performance as well as the intensity of the dialogue with customers. More specifically, recommender systems can enhance e-commerce dialogues in three ways:

1. *"Conversion": Turning Browsers into Buyers*

Increasing the proportion of visitors to a Web-site that make a purchase. Recommender systems help consumers find items that best fit their interests and inclinations; these may include unplanned purchases driven by serendipity from the recommendations made.

2. *By increasing Cross-sell*

Recommender systems improve cross selling by suggesting additional products or services to customers. If the recommendations are good, the average order size increases. For instance, a site might recommend additional products in the checkout process, based on those products already in the shopping cart.

3. *By building loyalty*

In a world where competitors are only a click away, building customer-loyalty becomes an essential aspect of business strategy. Recommender systems can improve loyalty by creating a value-added relationship between the site and the customer.

Each time a customer visits a website, the system "learns" more about that customer's preferences and interests and is increasingly able to operationalise this information

to e.g. personalise what is offered. By providing each customer with an increasingly relevant experience, a corresponding improvement in the likelihood of that customer returning is achieved. Ultimately, the depth of insight gained into a customer's preferences and interests can be so great that even if a competitor were to launch an identical, or even superior system, the customer would need to spend an inordinate amount of time and energy "teaching" the competitor to offer a similarly attractive experience.

Statistics on Recommender systems

Recommendation engines are significant contributors to your online store's ability to activate and retain customers.

-56% of customers are more likely to return to a site that offers product recommendations, and

-75% of digital natives, the generation of people who are born and raised around social media, expect personalized shopping experiences from e-commerce websites.

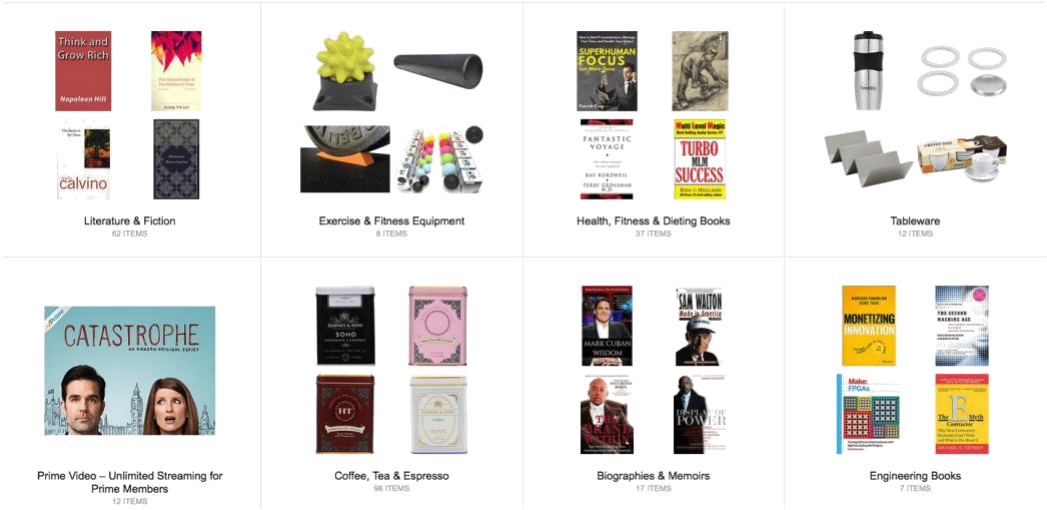
Recommender System Examples

Amazon.com

Customers Who Bought:

Like many E-commerce sites, Amazon.comTM (www.amazon.com) is structured with an information page for each book, giving details of the text and purchase information. The Customers Who Bought feature is found on the information page for each book in their catalog. It is in fact two

Recommended for you, Thomas



Separate recommendation lists. The first recommends books frequently purchased by customers who purchased the selected book. The second recommends authors whose books are frequently purchased by customers who purchased works by the author of the selected book.

Your Recommendations:

Amazon also encourages direct feedback from customers about books they have read. Customers rate books they have read on a 5-point scale from "hated it" to "loved it." After rating a sample of books, customers may request recommendations for books that they might like. At that point, a half dozen non-rated texts are presented that correlate with the user's indicated tastes. These ratings are used as input to a recommendation engine to help the customer find other items that she is likely to like. Customers are asked to invest effort in rating, in exchange for which they get more useful recommendations.

Eyes:

The Eyes feature allows customers to be notified via email of new items that have been added to the Amazon.com catalog. Customers enter requests based upon author, title, subject, ISBN, or

publication date information. One of the interesting variations of the Eyes system allows requests to be directly entered from any search results screen, creating a persistent request based on the search.

Amazon.com Delivers:

Amazon.com Delivers is a variation on the Eyes feature. Customers select checkboxes to choose from a list of specific categories/genres (Oprah books, biographies, cooking). Periodically the editors at Amazon.com send their latest recommendations by email to subscribers in each category.

Customer Comments:

The Customer Comments feature allows customers to receive text recommendations based on the opinions of other customers. Located on the information page for each book is a list of 1-5 star ratings and written comments provided by customers who have read the book in question and submitted a review. Customers have the option of incorporating these recommendations into their purchase decision. Furthermore, customers can “rate the comments.” With each comment is the question “Did this comment help you.” Customers may indicate yes or no. Results are tabulated and reported such as “5 of 7 people found the following review helpful.”

Purchase Circles:

The Purchase Circles feature allows customers to view the "top 10" list for a given geographic region, company, educational institution, government or other organization. For example, a customer could request to see what books are the best sellers for customers at Oracle, MIT, or residents of New York City. Purchase Circles provide another “fellow customer” form of recommendations by allowing customers not only to see what others are reading but also to personalize the recommendations by allowing them to select a “domain” with which they associate themselves. Customers can view Purchase Circles by navigating to the Circle that interests them.

E-Commerce service sites:

Netflix

Netflix is another data-driven company that leverages recommendation systems to boost customer satisfaction. 75% of Netflix viewing is driven by recommendations. In fact, Netflix is so obsessed with providing best results for users that they held data science competitions called Netflix Prize where one with the most accurate movie recommendation algorithm wins a prize worth $1,000,000.

Spotify

Every week, Spotify generates a new customised playlist for each subscriber called "Discover Weekly" which is a personalised list of 30 songs based on users' unique music taste. Their acquisition of Echo Nest, a music intelligence and data-analytics startup, enable them to create a music recommendation engine that uses three different types of recommendation model:

- **Collaborative filtering:** Filtering songs by comparing users' historical listening data with other users' listening history.

- **Natural language processing:** Scraping the internet for information about specific artists and songs. Each artist or song is then assigned a dynamic list of top terms that changes daily and

  is weighted by relevance. The engine then determines whether two pieces of music or artists are similar.

- **Audio file analysis:** The algorithm each individual audio file's characteristics, including tempo, loudness, key and time signature and makes recommendations accordingly.

Linkedin

Just like any other social media channel, linkedin also use "You may also know" or "You may also like" type of recommendations.

E-commerce Recommender System functions

RSs have big impact on users and on e-commerce providers. However, e-vendors and users' incentives to use RS may vary. The motivations behind introducing RS to customers by service providers as follows:

1) *Acceptance helps to increase the conversion rate.*

The primary goal of implementing a RS in e-commerce is to increase the conversion rate i.e. being able to sell more recommended items compared to those usually sold without any method of RS.

2) *Accuracy yields increase in the user satisfaction.*

Accuracy is one of the major functions of RS. If a user finds recommended items relevant and interesting, the probability of the recommended items' acceptance will be high.

3) *RS increases user loyalty by providing personalised services.*

RS helps to gain user loyalty, which in turn increases the conversion rate. Subsequently, loyal users' preferences will be easier to predict, as a result, the recommended items accuracy will increase. Moreover, the system should also be able to recognise new users and accurately provide services in order to gain new user's loyalty.

4) *RS helps to sell more diverse items.*

Recommending diverse, yet relevant items is considered to be one of the premises that the user enjoys using the RS. Hence, diversity increases user loyalty and the number of diverse items sold.

Benefits of recommendation systems

Increased sales/conversion

There are very few ways to achieve increased sales without increased marketing effort. Once you setup an automated recommendation system, you get recurring additional sales without any effort.

Increased user satisfaction

Shortest path to a sale is great both for you and your customer reducing their effort. Recommendation systems allow you to reduce your customers' path to a sale by recommending them an appropriate option sometimes even before they search for it.

Increased loyalty and share of mind

By getting customers to spend more on your website, you can increase their familiarity with your brand and user interface, increasing their probability to make future purchases from you.

Reduced churn

Recommendation system powered emails are one of the best ways to re-engage customers. Discounts or coupons are other effective yet costly ways of re-engaging customers and they can be coupled with recommendations to increase customer's probability of conversion.

RECOMMENDER SYSTEMS AND UNPLANNED PURCHASES

There are four types of unplanned purchases:

(1) Pure impulse: These are purchases that are made for purely hedonic reasons and are usually characterised by; (a) spontaneity; (b) power, compulsion, and intensity; (c) excitement and stimulation; (d) disregard for consequences .

(2) Reminder effect: A stimulus reminds the consumer to buy a product he needs.

(3) Suggestion effect: The customer purchases a product because of a promotion.

(4) Planned impulse: The customer shops without any specific product(s) in mind.

Unplanned purchase includes products such as durable goods like jewelry, wearing apparel, hardware items, furniture, drugs and toiletries and grocery products. In addition, to the different products unplanned purchase behaviour has been found to happen in settings such as drugstores, supermarkets, department stores, and variety and specialty stores including gift shops, florists, book, barber, hardware, auto supply, lumber and furniture stores.

Another factor that is claimed to influence unplanned purchasing is recommendations of various kinds. There are three broad categories of online recommendation sources:

(1) other consumers (e.g., relatives, friends and acquaintances),

(2) human experts (e.g., salespersons, independent experts), and

(3) expert systems such as recommender systems.

The installation of the Recommender system in online retailers' shops is common practice to offer alternative or cross selling products to customers which is claimed to dramatically increase unplanned purchase of consumers' with a limited effort to acquire more relevant product information by the help of recommender system, consumers′ efficiency of decision making is improved. This in turn, increases the consumers' satisfaction with the retailers' website, as well as substantially raises the likelihood and magnitude of impulsive purchases.

OBJECTIVE OF THE STUDY

1. Consumer awareness about Recommender Systems in e-commerce

2. Impact of recommender systems in customer's e-commerce purchases

3. Impact of demographics on purchases influenced by Recommender Systems

4. Impact of Recommender Systems on unplanned purchases

5. To find out various factors that influence customers' perception about recommendations/ personalisations

NEED FOR STUDY

The sale and purchase of goods are now starting to move from being offline to online using the internet, or what is known as e-commerce. With the development of the internet and intelligent computing technology, e-commerce is increasingly being used. The products offered through e-commerce platforms is a matter that needs to be considered because it can influence the user's decision in buying a product. This study aims to find out the impact product recommendation systems have on the purchases of customers using various e-commerce sites.

SCOPE OF STUDY

I. The study can help to find whether product recommendations are reaching the target customers or not.

II. The study aims to find the gap between product recommendations and the needs of customers.

III. The study can help customers find about various factors about customers that influence purchases through recommendations.

RESEARCH METHODOLOGY

This study aimed to find data about customer's awareness about recommender systems and their responses to various factors relating to recommender systems. Quantitative study was undertaken to get numerical data to establish various factors relating to this study. The quantitative methodology is the most commonly used approach to various studies exploring the value and effect of certain factors.

The survey data was collected through questionnaire which compromised mostly of multiple choice questions and basic demographic questions.

The data collected was checked for errors and usable responses were used for analysis. Data collected was analysed using Statistical Package for Social Sciences (SPSS) and Microsoft Excel.

Secondary data was mostly used for theoretical framework and review of literature. Secondary data was collected from websites such as google Scholar and research gate.

PRE-QUESTIONNAIRE TEST

The above reliability of table shows that the Cronbach's Alpha as, which shows that the data is reliable. It also shows that the data are based on all the variables in the procedure.

DATA COLLECTION

Based on the techniques identified the data collection methods will be chosen to fit the research. There are two types of data collection methods Primary and secondary data collection methods and discussed in the following paragraphs

PRIMARY DATA

For this study, Primary data collection mode was used.
Questionnaires are often used when a survey strategy is used, and some of the main advantages are that it can handle large sample sizes and it is possible to generalise the result into a population.
The survey was conducted through questionnaires made by using google forms and circulated through e-mail and WhatsApp.

SECONDARY DATA

Secondary data is data that already has been collected for others purposes than what it is used for. It is very common that companies and organisations store their data for supporting their operations. And when the answers on the research questions are available in that sort of data it is secondary data that is used. Secondary data in this study was used for comparison, theoretical framework and in review of literature.

SAMPLE SIZE

The study mostly consists of populations in cities Chennai , Bangalore and Coimbatore.

The population size is of 120 respondents.

STATISTICAL TOOLS

For the purpose of organising data and analysing relationship between various variable the following statistical tools were used:

PERCENTAGE ANALYSIS

This tool was used to organise and categorise various factors of the responses collected.

The data calculated as percentages were represented in pie charts.

CORRELATION

Correlation is a statistical measure that expresses the extent to which two variables are linearly related. It's a common tool for describing simple relationships without making a statement about cause and effect.

CHI-SQUARE

The chi-squared statistic is a single number that tells you how much difference exists between your observed counts and the counts you would expect if there were no relationship at all in the population.

LIMITATION OF THE STUDY

The data is restricted only to cities in India. Hence the results cannot be related to other places. Sample size was confined to little over 100 respondents keeping in view time constraints

The data collected from the respondents are subjective in nature and can be influenced from time to time.

PRIOR WORK

I.Li & Karahanna (2015) provide a comprehensive research on e- commerce RSs addressing three major areas: understanding consumers, how recommendations work and the impacts of RSs.

II.Lu et al. (2015) review the latest application developments of RSs in several application domains such as e-government, e-business and e-commerce through recommendation methods, software, and application platforms.

III. Adomavicius and Tuzhilin (2005) reviewed the RSs, such as content-based, collaborative filtering-based and hybrid approaches; and discussed their limitations and possible solutions to enhance recommendation performance.

IV.Chau & Lai, 2003; Kumar & Benbasat, 2006; Liang et al., 2012 -recommendations increase consumers' perceived usefulness, perceived benefits, and positive attitude toward the system.

V.Chau & Lai, 2003, Kumar & Benbasat 2006 and Liang et al., 2012 - positive attitude towards the system may be direct or mediated by other variables such as transaction costs and perceived care

VI.Liang et al. (2012) found that the presence of personalized recommendations significantly increased consumers' perceived care and reduced consumers' time and effort (i.e., transaction costs) in searching for products, which increased perceptions of usefulness.

VII. Greer & Murtaza, 2003; Thongpapanl & Ashraf, 2011-When consumers perceive the RS to be useful and have positive attitudes towards it, they are more likely to use it.

VIII.Awad & Krishnan, 2006; Sheng et al., 2008-Another important consumer perception discussed in the literature is privacy concerns.

IX.Dinev & Hart, 2006 - consumers weigh the benefits of using RS against the negative consequences of releasing personal information. If the negative consequences outweigh the benefits, consumers are less likely to use RS.

X.Komiak and Benbasat (2006) found that perceived personalization had significant direct effects on cognitive trust and indirect effects on emotional trust, and that the two types of trust further influenced consumers' intention to adopt a recommendation agent.

XI.Ho et al., 2011 - focused on the effect of RS on consumers' decision making process. Users are more satisfied with the recommendations and more likely to accept them if the personalised recommendations are presented at the early stage of an online session.

XII.Tam and Ho (2006) examined the effect of recommendations on all four decision stages (attention, cognitive processing, decision, and evaluation) of purchasing a product. They found that the presence of personalized offerings and content relevance of recommendations (i.e., recommendation accuracy) significantly affected consumers' cognitions and perceptions in all four decision stages. In particular, personalized recommendations were perceived by consumers as more useful than random offerings and they reduced consumers' cognitive load in making a purchase decision.

XVI.According to Hostler at el. (2011), with a limited effort to acquire more relevant product information by the help of recommender system, consumers′ efficiency of decision making is improved. This in turn, increases the consumers' satisfaction with the retailers' website, as well as substantially raises the likelihood and magnitude of impulsive purchases.

XV.Abbas et al. (2008), state that Recommender System provides natural motivation to attract customers' attention; it increases sales cross sales as well as the number of customers for the online companies. Hostler at el. (2011), also indicated that the use of personalised recommendation enhances online consumers' satisfaction and provides a vehicle for better product promotion, a more effective product search process, and increases consumers' unplanned purchases.

XVI. West, Ariely, and Bellman (1999), disclosed that a recommendation source providing personalized information to consumers (e.g., recommender system) is more influential than a recommendation source providing non-personalised information (e.g., other consumers and human experts). Senecal (2004), also noted that the recommender system used by online retailers' is the most influential recommendation source for

consumers even if it is perceived as possessing less expertise than human experts and as being less trustworthy than other consumers.

CHAPTER 3 - ANALYSIS AND INTERPRETATION

DEMOGRAPHIC PROFILE

The demographic profile expresses the socio economic characteristics of a population that is expressed statistically.

The initial part of this chapter will include interpretation of various demographic factors of the respondents.

The demographic details collected were :

I. Age

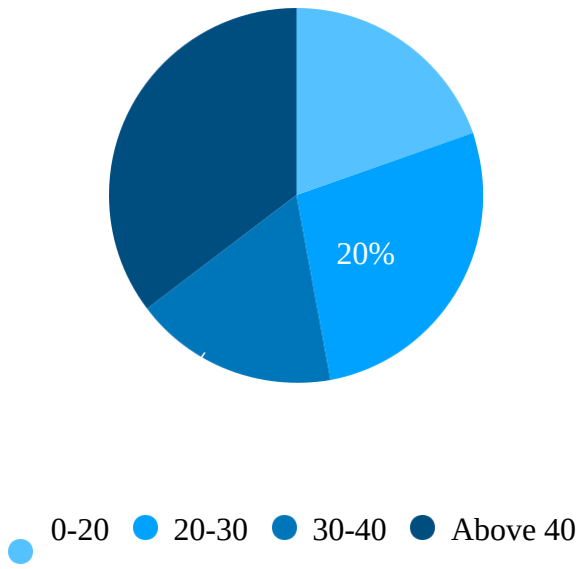
II. Occupation

III. Income

NUMBER OF RESPONDENTS : 120

CHART 3.1

AGE OF SAMPLE RESPONDENTS



INTERPRETATION

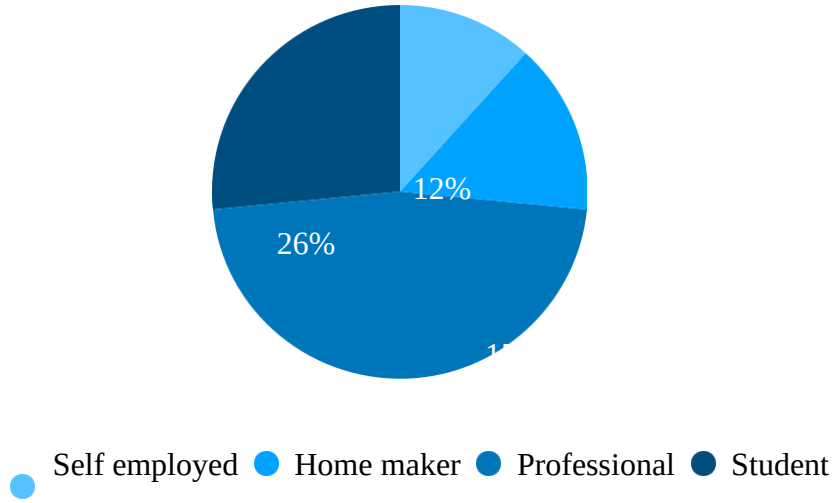
The age of sample respondents have been represented as percentages in a pie chart.

The highest age group is of respondents who are over the age of 40 (35%) which is then followed by the groups of 20 - 30 (27%) and 0 - 20 (20%).

The group with the least number of respondents is of the group 30 - 40 (18%)

CHART 3.2

OCCUPATION OF SAMPLE RESPONDENTS



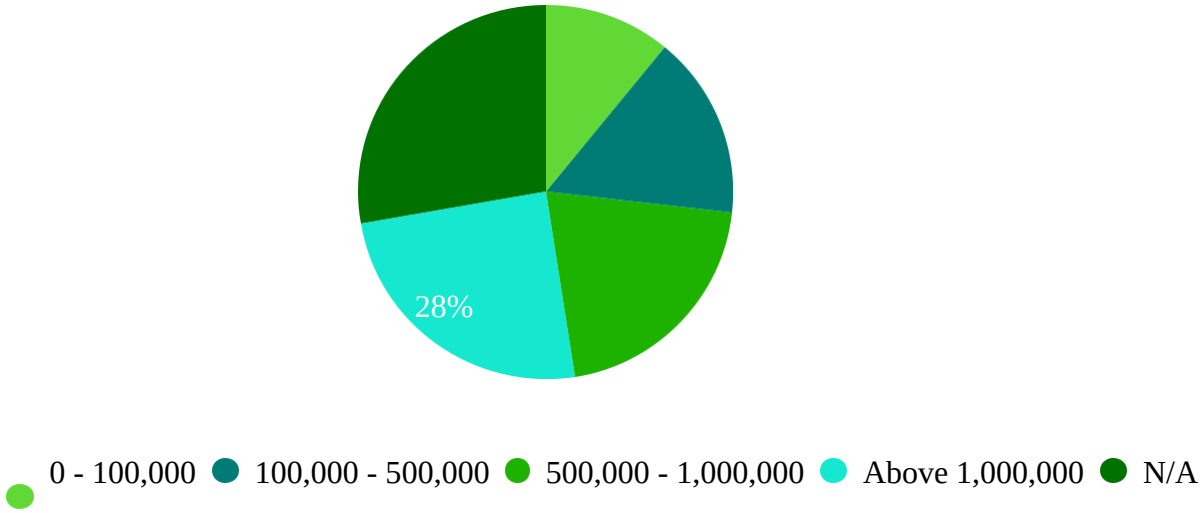
INTERPRETATION

The occupation of sample respondents have been represented as percentages in a pie chart.

The highest occupation group is of respondents who are professionals (40%) which is then followed by the groups of students (26%) and home makers(15%). The group with the least number of respondents is of the group of self employed respondents (12%)

CHART 3.3

INCOME OF SAMPLE RESPONDENTS



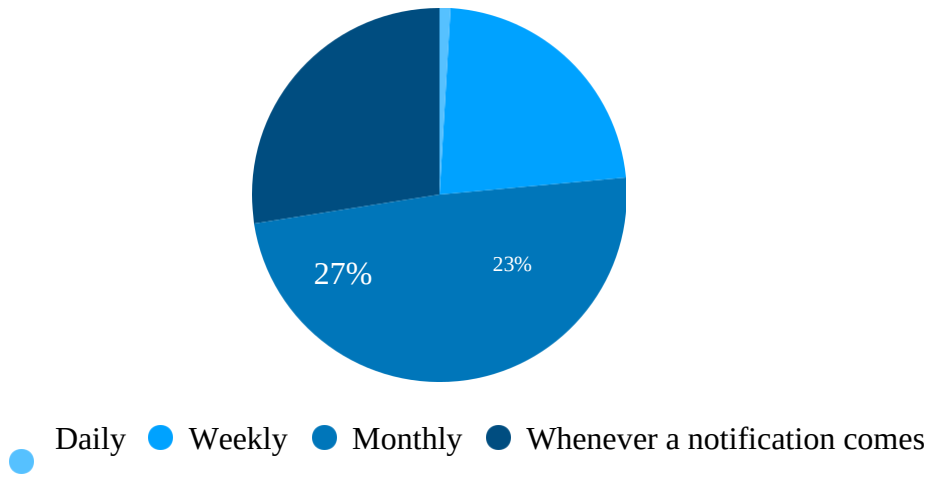
INTERPRETATION

The income of sample respondents have been represented as percentages in a pie chart.

The highest income group is of respondents who have no income (28%). This is mostly because of the high number of students and home makers in the sample set. Followed by the groups of above 1,000,000 (25%) and 500,000 - 1,000,000 (21%). The group with the least number of respondents is of the groups with income between 0 - 500,000

CHART 3.4

How often do you shop online?

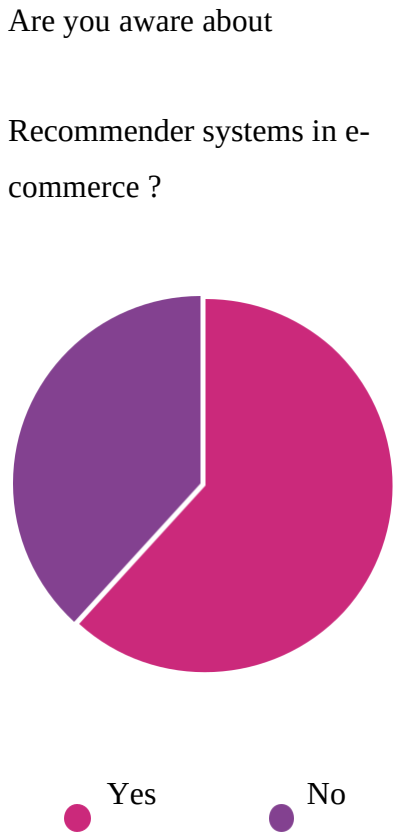


INTERPRETATION

Almost half of the respondents (49%) shop online monthly and 27% shop whenever they receive a notification. 23% shop weekly and only a percent shop daily.

The number of times the respondents shop online may have considerably increased because of the COVID-19 pandemic.

CHART 3.5



INTERPRETATION

More than half of the respondents (62%) have responded that they are aware of Recommender Systems in e-commerce.

Whereas only 38 % are not aware of Recommender Systems.

TABLE 3.1

TYPES OF RS' RESPONDENTS ARE FAMILIAR WITH (MULTIPLE OPTIONS WERE ALLOWED TO BE SELECTED)	FREQUENCY
Pop up saying ' Related to the items you've viewed'	76
Advertisements of products searched in one website appearing on another website	62
Consumers who bought this item also bought …	62
Email notifications for products you've saved or wish-listed before	51
Notifications reminding that you have products in your cart that hasn't been checked out yet	50

TABLE 3.2

Have you ever purchased anything recommended by the websites?	%

YES	61%
NO	39%

CHART 3.6

What is the unit price of the product purchased through recommendations?

CHART 3.7

Products purchased through recommendations

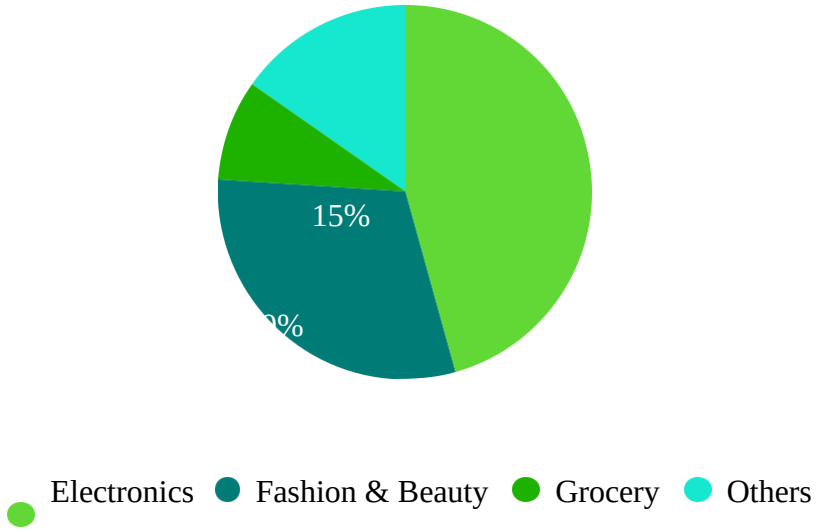


TABLE OF RESPONSES FOR PRODUCTS PURCHASED THROUGH RECOMMENDATIONS.

TABLE 3.3

GROCERY & FMCG	ELECTRONICS	FASHION & BEAUTY	OTHERS
Baking products	Mobile	Sarees	Books
Essential items	Mobiles accessories	Sports wear	Car mobile holder
Soap	Electronic tablet	Shoes	Travel baggage
	TV	Clothes	Cutlery items
	Electric whipper	Cosmetics	Organizers
	Home appliances		Pet case
	Laptop		Baby clothes hanger
	Headphones		

INTERPRATION

More than half of the respondents (61%) have purchased products recommended by the websites. This proves that recommender systems have a positive effect on the purchases of the respondents.

The unit price of products purchased through RS are majorly between the range of Rs. 0 - 5000. From the table of products it is evident that recommendations through RS have mostly induced purchase of low priced products.

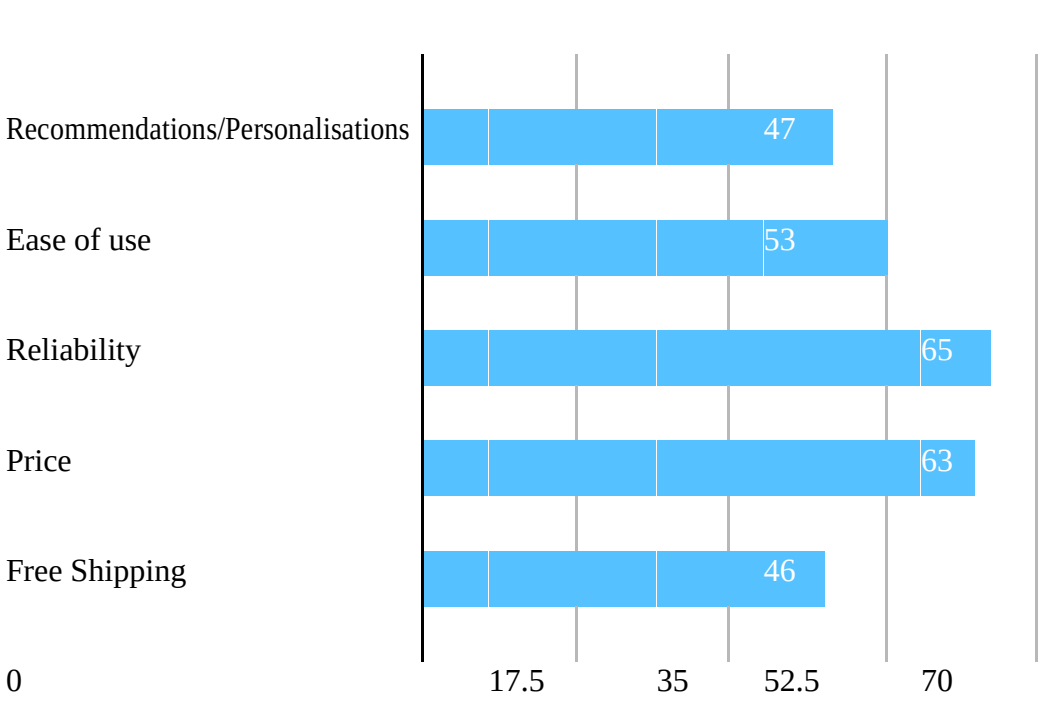
TABLE 3.4

RATINGS OF DIFFERENT OPINIONS RELATED TO RS	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE
Recommendations are necessary to enhance customer experience	21	44	23	13	1
Recommendations provide a diverse range of options to purchase from	24	57	16	5	0
Recommendations result in purchasing of products that were not intended to be purchased initially.	33	42	18	8	1
Recommendations increase brand royalty towards a particular site	14	71	31	8	2

TABLE 3.5

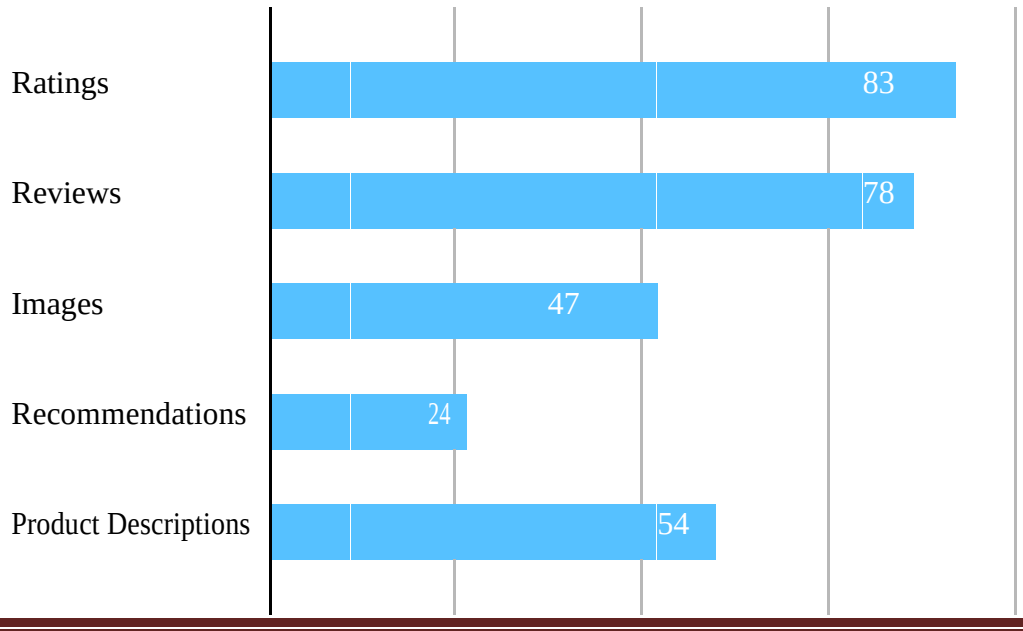
RATINGS OF DIFFERENT LIMITATIONS OF RS	STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE
Recommendations based on purchase history increases privacy issues	29	47	15	11	0
Recommendations result in purchase of unnecessary additional products	36	43	18	4	1
Recommendations are irrelevant to ones needs	18	35	29	20	0
Recommendations are not necessary and customers' behaviour would be the same whether or not it exists.	15	38	28	20	1

CHART 3.8 What is most important to you when shopping online?



Rank of factors
4
3
1
2
5

CHART 3.9 Which kind of factors do you consider before placing the order?



0

Rank of factors

1

2

3

4

5

INTERPRETATION

Recommendations and personalisations ranked 4 out of 5 when the responses were ranked for the question " What is the most important when you shop online?"

Recommendations ranked last when the responses for the question 'What kind of factors do you consider before placing the order?"

This also coincides with the fact that 53 respondents agreed to the statement "Recommendations are not necessary and customers' behaviour would be the same whether or not it exists."

This shows that Recommender systems have still not gained much importance to other factors related to e-commerce purchases.

CHART 3.10

How often do you Plan before you shop online?

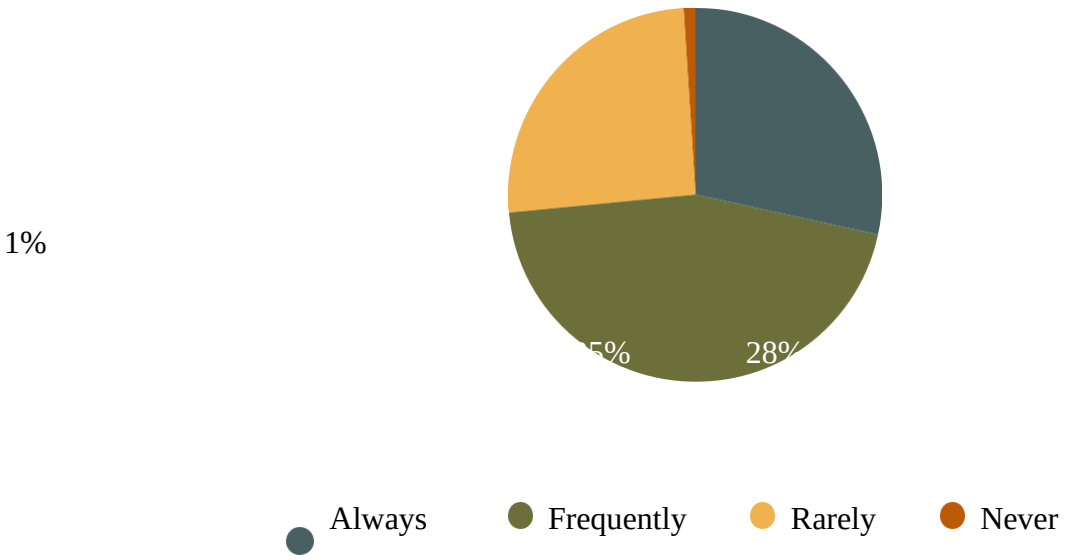


CHART 3.11

Have Recommendations/ Personalisations ever affected your unplanned purchases ?

INTERPRETATION

The responses from the respondents show that only 28% always plan before they shop online.

Moreover 53% of the respondents say that recommendations through Recommender Systems have affected their unplanned purchases.

Recommender Systems thus has a significant effect on affecting customers unplanned purchases.

Since 25% and 1% of the respondents rarely and never plan for their online purchases , it is more likely that they would have been affected by the recommendations since they do not have in mind specific products they want to

ASSOCIATION BETWEEN AGE AND RECOMMENDER SYSTEM

Correlation coefficient =0.05055246575

This shows that there is no significant relationship between age and need and use of recommender systems in e-commerce

ASSOCIATION BETWEEN FREQUENCY OF PURCHASE AND RECOMMENDER SYSTEM

		USED RS		
		YES	NO	Total
FREQUENCY	DAILY	1	0	1
	MONTHLY	26	24	50
	WEEKLY	19	4	23
	NOTIFICATION	16	12	28
Total		62	40	102

Pearson Chi- Square test -

P-value = 0.071

There is significant relationship between frequency of purchase and use of recommender systems.

It is evident that frequency of purchase largely influences the use of recommender systems in purchases by e-commerce sites.

ASSOCIATION BETWEEN FREQUENCY OF PLANNING BEFORE PURCHASE AND RECOMMENDER

SYSTEMS' EFFECT ON UNPLANNED PURCHASES

		RS AFFECTING UNPLANNED PURCHSES		
		YES	NO	Total
FREQUENCY OF PLANNING	ALWAYS	20	30	50
	FREQUENTLY	16	9	25
	RARELY	17	9	26
	NEVER	1	0	1
Total		54	48	102

Pearson Chi- Square test -

P-value = 0.069

There is significant relationship between frequency Planning Before Purchase And Recommender Systems' Effect On Unplanned Purchases. It is evident that frequency of planning before purchase factor largely affects customers'

SUMMARY

The massive adoption of the Web as an e-commerce platform has led to a fundamental change in the way that businesses of all sizes interact with their customers. Whereas potential access to

a larger, more diverse customer base is generally viewed as an opportunity, this can also represent increased competition. The stakes are high and businesses have to develop sophisticated strategies to attract and retain customers.

Rather than focusing on "touch points" during the marketing and sales processes, businesses are using intelligent algorithms and social technologies to form meaningful, ongoing relationships with customers; these can involve frequent online interactions, often employing social channels. Engaging with customers is no longer a series of one-off experiences; it's an ongoing dialogue. Surprisingly, these ongoing dialogues resemble dialogues between people: they usually express intent and achieve their goals by building on trust and open relations.

This study aims to make a modest findings about impact of recommender systems and various factors that are related to it and affects recommender systems.

The sale and purchase of goods are now starting to move from being offline to online using the internet, or what is known as e-commerce. With the development of the internet and intelligent computing technology, e-commerce is increasingly being used. The products offered through e-commerce platforms is a matter that needs to be considered because it can influence the user's decision in buying a product. This study aims to find out the impact product recommendation systems have on the purchases of customers using various e-commerce sites. The study aimed to find whether product recommendations are reaching the target customers or not and to find the gap between product recommendations and the needs of customers.

FINDINGS OF THE STUDY

Demographics:

1.The highest age group is of respondents who are over the age of 40 (35%) which is then followed by the groups of 20 - 30 (27%) and 0 - 20 (20%).

The group with the least number of respondents is of the group 30 - 40 (18%)

2. The highest occupation group is of respondents who are professionals (40%) which is then followed by the groups of students (26%) and home makers(15%). The group with the least number of respondents is of the group of self employed respondents (12%)

3. The highest income group is of respondents who have no income (28%). This is mostly because of the high number of students and home makers in the sample set. Followed by the groups of above 1,000,000 (25%) and 500,000 - 1,000,000 (21%). The group with the least number of respondents is of the groups with income between 0 - 500,000 (11% and 16%)

Interpretations:

4.Almost half of the respondents (49%) shop online monthly and 27% shop whenever they receive a notification. 23% shop weekly and only a percent shop daily.

The number of times the respondents shop online may have considerably increased because of the COVID-19 pandemic.

Objective 1: Consumer awareness about Recommender Systems in e-commerce

More than half of the respondents (62%) have responded that they are aware of Recommender Systems in e-commerce.

Whereas only 38 % are not aware of Recommender Systems. An increasingly high number of respondents are aware of recommender systems in e-commerce. This is a high number when compared to statistics from older researches.

Objective 2: Impact of recommender systems in customer's e-commerce purchases

More than half of the respondents (61%) have purchased products recommended by the websites. This proves that recommender systems have a positive effect on the purchases of the respondents.

The unit price of products purchased through RS are majorly between the range of Rs. 0 - 5000. High awareness of recommender systems could have also attributed to a high number of positive

respondents. However findings from Chapter-3 also noted that that Recommender systems have still not gained much importance to other factors related to e-commerce purchases.

Objective 3: Impact of demographics on purchases influenced by Recommender Systems

From findings in Chapter-3 it was found out that there is no significant relationship between age and need and use of recommender systems in e-commerce

It was also studied that there is significant relationship between frequency of purchase and use of recommender systems. It is evident that frequency of purchase largely influences the use of recommender systems in purchases by e-commerce sites.

Objective 4:Impact of Recommender Systems on unplanned purchases

The responses from the respondents show that only 28% always plan before they shop online.

Moreover 53% of the respondents say that recommendations through Recommender Systems have affected their unplanned purchases.

Recommender Systems thus has a significant effect on affecting customers unplanned purchases.

Since 25% and 1% of the respondents rarely and never plan for their online purchases , it is more likely that they would have been affected by the recommendations since they do not have in mind specific products they want to purchase.

Through the Chi-square results it was noted that frequency of planning before purchase factor largely affects customers' unplanned purchases through recommendations.

Objective 5: To Find Out Various Factors That Influence Customers' Perception About Recommendations/ Personalisations

Major Attributes:

A Large number of respondents felt that Recommendations provide a diverse range of options to purchase from and that Recommendations increase brand royalty towards a particular site. They also felt that Recommendations are necessary to enhance customer experience

Major limitations:

A large number of respondents responded that Recommendations result in purchase of unnecessary additional products and that Recommendations based on purchase history increases privacy issues.

SUGGESTIONS

A lot of respondents felt that recommender systems are necessary to enhance customer experience and increase brand royalty toward a site. So recommender systems are almost becoming a necessary part of e-commerce requirements from user. So websites should start making use of recommender systems.

A major number of respondents felt that recommendations based on purchase history increases privacy concern. So business should use recommender system techniques that do not increase privacy issues.

It was noted that that Recommender systems have still not gained much importance to other factors related to e-commerce purchases but customers still felt a need for its existence. So extensive use of recommender systems must be made to bring it own par with other important factors related to e-commerce sites.

CONCLUSION

The sale and purchase of goods are now starting to move from being offline to online using the internet, or what is known as e-commerce. With the development of the internet and intelligent computing technology, e-commerce is increasingly being used. The products offered through e-commerce platforms is a matter that needs to be considered because it can influence the user's decision in buying a product. This study aimed to find out the impact product recommendation systems have on the purchases of customers using various e-commerce sites.

It was evident that a lot of respondents were aware about recommender systems. However recommender systems have not gained much importance yet.

Significance can be gained by making sure recommendations meet customers' needs and is reaching the target market. A major number of respondents felt that recommendations based on purchase history increases privacy concern. So business should use recommender system techniques that do not increase privacy issues. It is however noted that recommender systems have a positive effect on purchases and customers need it to enhance their experience while shopping online.

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