

# Customer Purchase Intention mediated by Customer Satisfaction – Using Machine Learning Techniques in Industry 4.0

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## Abstract

Nowadays, internet purchasing is a rapidly developing phenomenon. The internet has grown as a valuable marketing tool for both domestic and international transactions. Artificial intelligence (AI) has been extensively applied to online shopping platforms in order to give consumers with more accurate and tailored services. The paper aims to find out the elements that influences Customer delight in Online buying. The study identifies factors like Machine Learning, System elements, Information Elements and Service elements which leads to Purchase Intention. The study also tries to find out the mediation effect of Customer Satisfaction towards online shopping behaviour. The study used online questionnaire survey to collect 230 responses from customers who do regular online shopping. The results indicated that Customer satisfaction is more when the online shopping is made user friendly using Technologies.

## Key words:

**Online shopping, Customer Purchase Intention, Machine Learning techniques**

## Introduction

Many Businesses have shifted from Brick-and – Mortar to Brick – and - click Business models including powerhouses such as Alibaba, Tencent, Amazon, Groupon and others.

Purchase intention is a topic of critical attention to strategy creators and commercial experts, and it is vital to recognize the different variables in a certain Consumer group which impacts purchase thinking (Halim and Hamed, 2005). It is considered to be a prime input that Businesses utilize to project forthcoming sales (Morwitz et al., 2007) and manipulate actions to impact purchasing behavior. Online retail will force Traditional model shops to shift to online presence and offer online shopping (NCSC, 2013). Purchase intention can be seen as “the probability that the consumer will purchase the product” (Sam et al, 2009). The notion intention refers to the “antecedents that stimulate and drive consumers’ purchases of products and services” (Hawkins and Mothersbaugh, 2010).

## Machine Learning and purchase Intention

It is increasingly becoming challenging to understand the purchase intention of Customers in real – time. For analyzing the past data, Data mining techniques are useful to understand the enterprises for knowledge discovery and taking decisions. Classification algorithms and clustering are used. The beliefs of the customers intention were classified and the clickstream of the customers is listed.

Nave Bayes: The concept of Naïve Bayes works on the aspect of estimating the availability of appropriate action in a class and it cannot relate to the availability of some other action.

J48 Decision Tree: Classification concept to build a tree -like structure. Using this, the data can be split into small subsets in every step and rules of breakdown are also written.

Logistic Regression: A machine learning algorithm for classification, which is used for prediction analysis and relay on the concept of probability.

## Objectives of the Study

1. To understand the factors influencing Customer Repurchase Intention in online shopping.
2. To develop a theoretical model to measure Purchase Intention mediated by Customer Satisfaction.
3. To understand theoretically how Machine Learning Techniques will help predict the purchase intention

## Review of Literature

According to DeLone and McLean (2003), System quality is determined by a number of criteria, including usability, availability, dependability, flexibility, and the system's response time. The simplicity of use and trustworthiness of the shopping system, in particular, influence a consumer's decision to make a purchase via the Internet. One of the most essential issues pertinent to Internet buying is system security, according to consumers (Hui and Wan 2007, Pavlou et al. 2007). Another important aspect of system quality is accessibility. The term "accessibility" refers to the ability to operate in a reliable and accurate manner while also being responsive and convenient (Doll et al. 2004, Schaupp et al. 2009). Based on the research done by Verma (2016) in their study stated that security was the main concern of online shoppers as there is the risk of misuse of personal information.

The level of user satisfaction with an Internet shopping website's information content is referred to as information quality (Schaupp et al, 2009). Nusair and Kandampully (2008) according to the study, "includes the amount, accuracy, and form of information about the products and services offered on a website." Previous research has found a strong correlation between information quality and satisfaction. This is also supported by the DeLone and McLean (2003) and stated in their study that a higher degree of satisfaction will result from better information quality. Furthermore, customer pleasure has been shown to increase customer retention. (Tran et al., 2018). Similarly, while information quality is suggested to be significant to satisfaction, it is less important than other characteristics. (product quality, delivery quality and system quality) (Lin et al., 2011).

It is difficult to build loyal customers in the online business without effective quality control from its systems employees and suppliers, as retailers are unable to give the proper service quality (Cox and Dale, 2001). According to Nurdani and Sandhyaduhita (2016), responsiveness is one aspect of express delivery service quality that is linked to online purchasers' happiness, which has a favourable impact on repurchase intention. DeLone and McLean (DeLone and McLean, 2003, 2004) Six factors influence e-commerce success: system, information, and service quality; utilisation, user satisfaction, and net benefit.

One of the most crucial factors in a company's success is customer happiness. Customer satisfaction, after all, is defined as the difference between pre-shopping expectations and post-shopping results (Duarte et al., 2018; Jun et al., 2004; Kim & Stoel, 2004; Oliver, 1980, Giao et al., 2020). According to Liao et al. (2017), customer happiness is linked to profit and competitive advantage. This is due to the fact that the more satisfied customers the firm has, the better the company's results will be. These results aid in the company's reputation and image development.

Online repurchase intention refers to buying products or using services from the same E-shop again in future (Fornell,1992). According to Daugherty et al. re-purchase intention used as a degree of behavior reaction and consumer response to previous purchase experiences. In their study, Brady et al. (2001), stated that the repurchase intention of the online consumer can massively have affected by the satisfaction of online consumer. investigated the effects of six mentioned factors on customer satisfaction and repurchase intention. All the elements framed in Hypotheses are found to be correlated good with satisfaction of the Customer. The Greater impacts on Satisfaction is found from information quality and delivery.

The conclusion is firms trading in online commodities should improve their customer satisfaction level. The firms should ensure the accuracy, understandability, completeness, and timeliness of the product information (Lan NGUYEN et al, 2021).

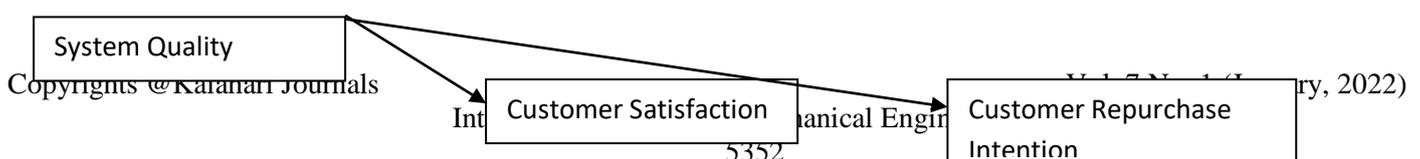
### Hypothesis tested:

- H1: System Quality positively correlates with Customer Satisfaction
- H2: Information Quality Influences Customer Satisfaction positively.
- H3: Service Quality positively correlates with Customer Satisfaction
- H4: System Quality positively Influences Customer Repurchase Intention
- H5: Information Quality is related positivelywith Customer Repurchase Intention
- H6: Service Quality positively Influences Customer Repurchase Intention
- H7: Customer Satisfaction positively Influences Customer Purchase Intention

## Methodology

This study has two objectives examine the factors influencing on repurchase intention of the customer and to examine the mediator (customer satisfaction) effect between the predictors and the outcome variable.

Based on the literature review, this study develops a theoretical framework as shown in figure 1. The framework examines the effect of the various factors like system quality, information quality and service quality on customer repurchase intention with customer satisfaction as a mediator.



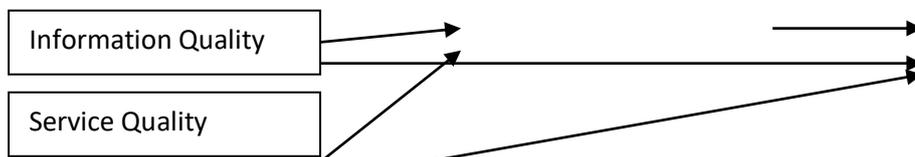


Figure 1: Model Diagram

Research Method

### Sample

The Present study is inclined to be tested the customer repurchase intention through online. Simple random sampling was used to determine the study sample. Out of the distributed questionnaires, 255 questionnaires were retrieved, only 229 of them were useful for the study. So the sample for the study was 229.

### Procedure

Questionnaire was used to collect the data. Questionnaire was developed based on the literature of related subjects. The questionnaire was distributed randomly to the respondents through personal visits to get accurate response and through online. JAMOVI was used to analyze the collected data.

### Measures

For the purpose of this study, four constructs were used to assess the customer's intention to repurchase through online. The factors such as system quality, information quality, service quality and the mediator i.e., customer satisfaction included 28 items. To measure these items five point likert scale was used: 1=strongly Disagree;2=Disagree;3=Neutral;4=Agree;5= Strongly Agree.

### Empirical Findings & Discussions

Table 1

Contents	Frequency	Percentage	Contents	Frequency	Percentage
<b>Gender</b>			<b>Age</b>		
Male	90	39%	21-30	98	42.8%
Female	139	61%	31-40	117	51.1%
			41-50	14	6.1%
<b>Profession</b>			<b>Education Qualification</b>		
Student	90	40%	B.Tech	7	3.1%
Professional	65	28%	Diploma	7	3.1%
Home maker	75	32%	PG	124	54.1%
			Ph.D	14	6.1%
			UG	77	33.6%
<b>Marital Status</b>					
Married	117	51%			
Unmarried	112	49%			

To describe the demographic characteristics of the respondents descriptive statistical methods have been used. From the Table 1, most of the respondents were female (61%), and only 39% male respondents. Maximum respondents were postgraduate and their percentage was 54.1% and under graduates was 33.6%. Maximum Respondents were students and their percentage was 40%. Out of 229 respondents, 51% were married.

### Correlation Matrix

	M	SD	Sys.qlty	Info.qlty	Serv.qlty	Cust.sats	Cust.R epur
Sys.qlty	3.57	0.564	(0.736)				

Info.qlty	3.74	0.495	0.300 ***	(0.695)		
Serv.qlty	3.75	0.562	0.586 ***	0.521 ***	(0.814)	
Cust.sats	3.59	0.516	0.635 ***	0.365 ***	0.665 ***	(0.775)
Cust.Repur	3.86	0.647	0.308 ***	0.471 ***	0.550 ***	0.553 *** (0.860)

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$  Alpha Values appear diagonal in the parentheses.

Correlation analysis used in order to find the strength of relationship between the study variables. Among the factors influencing customer repurchase intention service quality and customer satisfaction have significant positive relation with the outcome variable (repurchase intention). Among those factors service quality has a significant positive correlation with customer satisfaction i.e., 66.6% at .001 level of significance. This means that when sellers deliver effective service to the customers then the satisfaction level of the customers will increase in turn it leads to increase the repurchase intention.

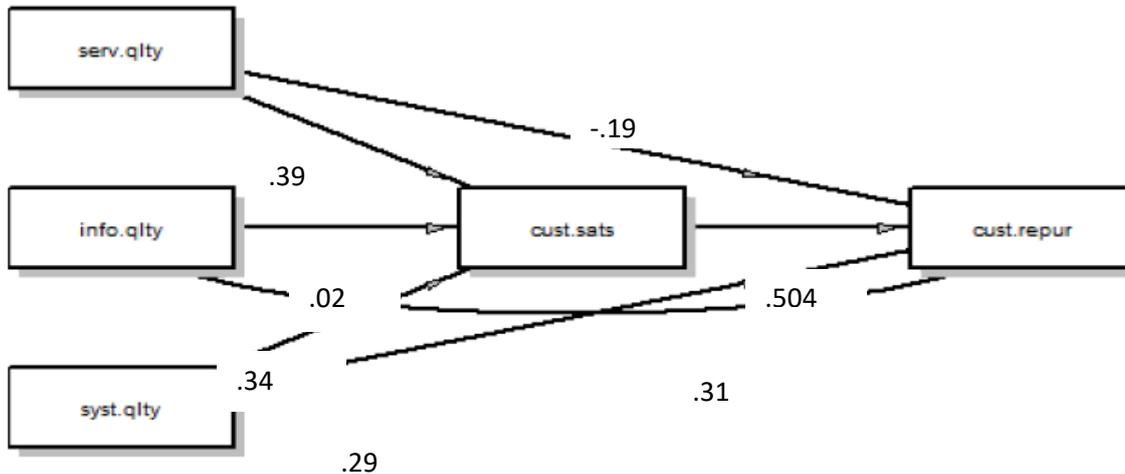


Figure 2: Path Coefficients between Predictor, Mediator and Outcome variable.

The path coefficient (figure 2) illustrates the mediation effect. Here, system quality, information quality and service quality are the predictors, cust.sats is the mediator and cust.repur is the outcome variable. From the above table there is an indirect effect but very less direct effect, this indicates full mediation between predictors and the outcome variable.

Table 3: Multiple Regression Analysis

Model Fit Measures		
Model	R	R <sup>2</sup>
1	0.651	0.424

Model Coefficients - cust.repur				
Predictor	Estimate	SE	t	p
Intercept	0.457	0.2975	1.54	0.126
syst.qlty	-0.195	0.0785	-2.49	0.014
info.qlty	0.316	0.0776	4.06	< .001
serv.qlty	0.295	0.0885	3.33	0.001
cust.sats	0.504	0.0931	5.42	< .001

Indirect and Total Effects

Type	Effect	Estimate	SE	95% C.I. (a)		$\beta$	z	p
				Lower	Upper			
Indirect	serv.qlty $\Rightarrow$ cust.sats $\Rightarrow$ cust.repur	0.1998	0.0465	0.1087	0.2909	0.1736	4.298	< .001
	info.qlty $\Rightarrow$ cust.sats $\Rightarrow$ cust.repur	0.0147	0.0279	-0.0400	0.0694	0.0112	0.526	0.599
	syst.qlty $\Rightarrow$ cust.sats $\Rightarrow$ cust.repur	0.1725	0.0406	0.0929	0.2521	0.1505	4.245	< .001
Component	serv.qlty $\Rightarrow$ cust.sats	0.3961	0.0571	0.2841	0.5081	0.4312	6.931	< .001
	cust.sats $\Rightarrow$ cust.repur	0.5044	0.0921	0.3239	0.6848	0.4025	5.478	< .001
	info.qlty $\Rightarrow$ cust.sats	0.0291	0.0551	-0.0788	0.1370	0.0279	0.528	0.597
	syst.qlty $\Rightarrow$ cust.sats	0.3420	0.0509	0.2422	0.4418	0.3739	6.718	< .001
Direct	serv.qlty $\Rightarrow$ cust.repur	0.2946	0.0876	0.1230	0.4663	0.2560	3.364	< .001
	info.qlty $\Rightarrow$ cust.repur	0.3155	0.0768	0.1651	0.4660	0.2415	4.110	< .001
	syst.qlty $\Rightarrow$ cust.repur	-0.1950	0.0776	-0.3471	-0.0429	-0.1702	-2.513	0.012
Total	serv.qlty $\Rightarrow$ cust.repur	0.4944	0.0849	0.3281	0.6608	0.4295	5.826	< .001
	info.qlty $\Rightarrow$ cust.repur	0.3302	0.0818	0.1699	0.4905	0.2528	4.038	< .001
	syst.qlty $\Rightarrow$ cust.repur	-0.0225	0.0756	-0.1707	0.1256	-0.0196	-0.298	0.766

Note. Confidence intervals computed with method: Standard (Delta method)

Note. Betas are completely standardized effect sizes

### Regressions Results

Total effects predicting: cust.repur

Names	Effect	Estimate	SE	Lower	Upper	$\beta$	df	t	p
serv.qlty	serv.qlty	0.4944	0.0854	0.326	0.663	0.4295	225	5.788	< .001
info.qlty	info.qlty	0.3302	0.0823	0.168	0.492	0.2528	225	4.011	< .001
syst.qlty	syst.qlty	-0.0225	0.0761	-0.172	0.127	-0.0196	225	-0.296	0.768

### Mediator Model

Dependent variable: cust.sats

Names	Effect	Estimate	SE	Lower	Upper	$\beta$	df	t	p
serv.qlty	serv.qlty	0.3961	0.0577	0.2825	0.510	0.4312	225	6.871	< .001
info.qlty	info.qlty	0.0291	0.0556	-0.0804	0.139	0.0279	225	0.524	0.601
syst.qlty	syst.qlty	0.3420	0.0514	0.2408	0.443	0.3739	225	6.659	< .001

Full model predicting cust.repur

Names	Effect	Estimate	SE	Lower	Upper	$\beta$	df	t	p
cust.sats	cust.sats	0.504	0.0931	0.321	0.6878	0.402	224	5.42	< .001
serv.qlty	serv.qlty	0.295	0.0885	0.120	0.4691	0.256	224	3.33	0.001
info.qlty	info.qlty	0.316	0.0776	0.163	0.4685	0.242	224	4.06	< .001
syst.qlty	syst.qlty	-0.195	0.0785	-0.350	-0.0404	-0.170	224	-2.49	0.014

The main hypothesis predicted that the information quality has significant impact on customer repurchase intention when customer satisfaction acts as a mediator. Multiple linear regression analysis is used to test the relation between the factors influencing repurchase intention of the customer, customer satisfaction and intention to repurchase. The result of stepwise multiple linear regression showed that the information quality and customer satisfaction on customer repurchase intention with its standardized beta coefficients ( $\beta=0.242$ ;  $p<.001$ )(  $\beta=0.402$ ;  $p<.001$ )(  $\beta=0.892$ ;  $p<.001$ ) are significant determinants and service quality also influences the repurchase intention of the customer. But System quality has negatively correlated with the repurchase intention.

### Conclusion & Discussion:

Based on the results it was identified that customer satisfaction is essential to make them to purchase the product again and again. That will be possible and enhanced by providing on time information about the new products, offers, and update the information along with this offering effective service like quick delivery, clear guidelines to exchange and fast service also very important to retain and influence the repurchase intention of the customer. Whereas Machine learning techniques like Naïve Bayes, decision Tree, Logistic Regression and Simple K – mean techniques helps understanding the purchase prediction of customers better in Industry 4.0.

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