

Intelligent Digital Intermediation Solution: Exploring Growth Potential with Analytics

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Abstract

Purpose: To understand the factors that affect the choice of payment intermediation solution on an e-commerce website and use data analytics to proactively suggest the appropriate payment solution which can enhance user experience.

Methodology: The study was conducted by reviewing literature on payment methods, customer preferences, data analytics and artificial intelligence. The gaps identified in literature review were studied to find the application of analytics for suggesting appropriate payment intermediation solution. Survey of customer payment preferences in different use cases was conducted on sample basis using questionnaire. The relationship of user demographics, product type and payment transaction characteristics with payment preference through use of analytics was studied in the paper.

Findings: The analysis conducted on responses received from sample suggest that there exists a pattern of selection of payment method for given use cases. The same can be intelligently predicted using data analytics to suggest appropriate digital payment intermediation solution.

Research Implications: Since the customer payment preference under given use case can be predicted with the application of data analytics, payment service providers, banks and e-commerce websites can improve the user experience by intelligently offering appropriate digital payment intermediation solution. Further, using the factors which influence the most, they may determine their strategies to improve acceptance and usage of their own digital payment intermediation solution.

Originality / Value: Although various studies exist with respect to analytics for personalized up-selling or cross-selling, the personalization in the area of intelligent customer payment preference is yet to be exploited and implemented.

Keywords; *Analytics for Digital Transformation, Customer Payment Preference, Cards, Mobile Wallets, Intelligent Digital Intermediation Solution*

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I. INTRODUCTION

E-commerce, the sector which deals with trading of goods and services and remittance of funds over an electronic platform, has grown by leaps and bounds in the recent years throughout the world.

According to India Brand Equity Foundation (IBEF), Trust established by the Department of Commerce, Ministry of Commerce and Industry, Government of India, “The Indian E-commerce market is expected to reach US\$ 200 billion by 2027 from US\$ 38.5 billion in 2017” i.e. almost five-fold growth is expected. Further, online shoppers in India are expected to reach 120 million in 2018 and eventually 220 million by 2025.

Average online retail spending in India was US\$ 224 per user in 2017.”

The unprecedented growth in number and value of e-commerce transactions can be attributed to increased access to internet, use of smartphones and Government initiatives such as Digital India. This growth in the area of digitalization coupled with the fact that Indian population lies in the demographic dividend has led to an impetus in the growth of e-commerce.

The emergence of giant players such as Amazon, Uber, Airbnb depict the increasing popularity e-commerce websites amongst consumers of all age groups. Some of the main reasons for e-commerce players gaining acceptance and popularity include:

- a. Quick and convenient way of doing a transaction
- b. Personalized product recommendations
- c. Secured and fast electronic payments
- d. Enhanced user experience

Despite this, the study of cart abandonments (i.e. items added to online shopping cart but transaction not completed) in United States as per article published in ‘Business Insider’ shows that 46.1% of cart abandonments take place at the payment stage. It was also identified that consumers prefer least manual intervention while shopping online.

Speaking about the Indian scenario, Indian payment & cards industry offers the following payment solutions for e-commerce transactions:

- Debit and Credit cards
- Net banking
- Immediate Payment Service (IMPS) / Unified Payments Interface (UPI)
- Mobile wallet
- Cash on delivery

(The above options have been referred to as “digital payment intermediation solution” in this paper)

India has shown a tremendous progress and evolution from end to end paper-based transactions to electronic banking transactions. Prior to 2010, only the National Electronic Funds Transfer and Real Time Gross Settlement service were available to users for payment of e-commerce transactions. As a result, the merchants were unable to receive funds beyond the banking hours resulting in inability to do e-commerce transactions beyond the banking hours except with the use of cards.

The introduction of Immediate Payment Service (IMPS) by National Payments Corporation of India (NPCI) in 2016 and emergence of digital wallets provided the customers with a robust and real time fund transfer offering an instant, 24x7, easy to use service that can be accessed on multiple channels and helped these payment channels to gain a widespread adoption. According to the National Cyber Security Coordinator in the PMO, the mobile wallet transactions have increased 40 times in the last five years in India.

As per the data published by NPCI, the value of yearly retail payment transactions using NPCI platform was approx. Rs. 13.6 lakhs crores (FY 2018-19) as against Rs. 11.35 lakhs crores in FY 2017-18 (YoY growth of 20%). Out of this, transactions worth Rs. 36,600 crores (26% by value) took place using RuPay cards through e-commerce alone. (Source: Data published by National Payments Corporation of India)

Considering the magnitude of the online payments made for e-commerce transactions, the study of this factor becomes extremely important.

Identifying the right target audience is important. The study of e-commerce websites depicts that many of the e-commerce websites offer personalized product recommendations based on

transaction history or customer’s intention to buy a product (through search, products in cart) using data analytics (popularly known as market basket analysis). In order to achieve this, there is a need to understand the characteristics of the targeted customer and understand the following aspects:

- **Demographic segmentation:** The segmentation could be based on age, sex, education, marital status, religion etc. By using age as one of the target marketing strategies, marketers can reach the audience in a way that is most relevant to the segment such as millennial, teenagers, fifty-plus people and so on. An example of demographic segmentation-based marketing could be targeting youngsters by marketing the product on online gaming channels.
- **Psychographic segmentation:** This segmentation is based on the values, beliefs, interests, personality, lifestyle of people. It is become important for marketers to target the audience based on their interests and personalities in addition to segregating them based on demographics.
- **Behavioral segmentation:** Behavioral segmentation could be done by analyzing habits of user (product purchases as well as services procured), user status, brand interactions, etc. By looking at the purchases and spend of the audience, one can determine the products and services which the person may be interested to buy. Most of the e-commerce website suggest the products to the customers based on their behavioral pattern in the past.

Despite this, the use of analytics in providing personalized payment options is unexploited even as of today by giant e-commerce merchants.

Literature Review

The literature review on payment systems, customer preference, analytics, artificial intelligence revealed the following:

1. **Customer preference towards payment methods**
There are various methods for payment that can be used by customer for making payment. Various features provided under payment methods determine their usage by the customers. Based on the review conducted by the authors, various factors impacting the customer payment preferences were determined. Using the understanding in these papers, the proposed area of research tries to identify the pattern in which these factors influence the selection of electronic mode of payment by customers while making payments on e-commerce websites and the application of analytics to explore the business growth potential. The same is indicated in table 1 below:

Table 1: Use of payment method and customer satisfaction

Payment method	Factors influencing preference	Papers
Debit and credit card	Features of card products Safety Incentives for customers Credit facility	T. Foscht, C. Maloles, B. Swoboda and S. Chia (2010) King and King (2005)
Mobile wallets / payment banks	Ease of use Security and trust Loyalty benefits Cashbacks and schemes Discounts Freebies	D. Chawla and H. Joshi (2019) N. Singh, S. Srivastava and N. Sinha (2017) S. Mittal, A. Panta and S. Bhadauria (2017) Rowland and Shrauger (2013)
Internet banking	Service Performance Customer Care Quality Information Quality	R. Vinayek and P. Jindal (2011)

Further, results in A. G. Abdul-Muhmin (2010) suggest that it may be possible to persuade consumers to use electronic payments for small-value transactions by invoking and making salient considerations that drive preferences for cash payment for such purchases.

2. Use of analytics and artificial intelligence (AI) in banking & commerce

The study of literature indicates that analytics and AI can be used in the domains of banking and commerce in various areas such as customer profiling, sentiment analysis, marketing of products and services by building customized marketing campaigns. The summary of the areas is depicted in table 2 below:

Table 2: Application of analytics & AI

Technique	Areas	Papers / References
Big data and data analytics	Profiling customer base	P. Song, C. Zheng, C. Zhang, X. Yu (2018) U. Srivastava and S. Gopalkrishnan (2015) J. Coumaroset al.(2014)
	Spending pattern of customers	
	Sentiment analysis	
	Building marketing campaigns	
Predictive analytics	Developing personalized products	Joe F. Hair Jr (2007)
	Product development	
	Advertising Distribution and retailing	
Artificial Intelligence	Tools for enhancing customer experience	S. Joshi, A. Das and M. Matta (2019) (Wirth, 2018) and (Adams, 2004)
	Marketing	

The available literature does not address the use of analytics for digital intermediation solutions through study of customer preference for method of online payments made on e-commerce websites. Therefore, through this article, we make an effort to understand the following:

- a. Factors influencing decision making of customers in selection of payment method on e-commerce websites
- b. Whether there is a pattern in selection of a payment method depending on the factors such as product category, price of the product, discounts / offers / cashbacks, convenience fees / costs involved, availability of EMI facility, safety of transaction or time or number of steps involved in payment transaction.
- c. Use of analytics to gather the customer preferences so that businesses can provide digital intermediation solutions appropriately and showcase the most preferred payment option to the customers based on:
 - i. customer transaction history
 - ii. customer demographics
 - iii. type of product selected
 - iv. transaction ticket size
 - v. discounts / offers / schemes available.

Methodology

The study of the customer preferences in selection of payment methods on e-commerce websites was conducted using a primary survey research through sampling technique. The respondents were a focused group of customers falling in age bucket of 18 to 60 years who tend to be more informed about the payment methods available for making payments online.

A well-structured questionnaire was framed and circulated to 500 customers with the use of random sampling technique. Out of above, 353 people filled the questionnaire. The conclusions of the survey are drawn by studying various factors affecting the customer's preference in the method of payment with the use of percentages, frequencies, and trend analysis.

Hypothesis

The null hypothesis is as follows:

- a. There is no association between price and payment method preference
- b. There is no association between product category and payment method preference
- c. There is no association between gender and payment method preference

- d. There is no association between age and payment method preference

Hypothesis Testing and Findings

We conducted our study for 353 respondents. The sample consisted of 235 males and 118 females. The data about the sample selected has been presented below:

Table 3: Composition of sample

Gender	Age group (years)		Total
	18 to 40	41 to 60	
Male	185	50	235
Female	102	16	118
Total	287	66	353

The respondents were asked to select their payment preferences when they make payments through e-commerce websites which is depicted in Table 4 below. The questionnaire used for survey is appended at the end of the paper.

Table 4: Customer payment preferences

Customer Preference (Ranking)	Debit card	Credit card	Net banking	IMPS / UPI	Mobile wallet	Cash on delivery
Age group '18 to 40' years						
1	87	45	35	114	60	62
2	75	31	48	61	62	38
3	65	43	64	36	68	33
4	37	23	42	25	35	58
5	13	20	38	24	17	39
6	8	26	18	12	18	40
Don't use	2	99	42	15	27	17
Sub-total	287	287	287	287	287	287
Age group '41 to 60' years						
1	25	29	18	9	7	14
2	14	8	17	11	12	12
3	10	7	12	11	11	14
4	5	4	3	9	9	8
5	1	0	5	5	6	4
6	3	5	5	3	5	4
Don't use	8	13	6	18	16	10
Sub-total	66	66	66	66	66	66
Total	353	353	353	353	353	353

The primary analysis of data collected revealed:

- The most preferred option of 40% of the respondents in the age group of '18 to 40' is the usage of IMPS / UPI. Whereas, the percentage of respondents preferring the usage of IMPS / UPI drops to 14% for respondents in '41 to 60' age group.
- The most preferred option of 44% of the respondents in the age group of '41 to 60' is usage of credit cards.

- As far as usage of cards (both debit and credit) is concerned, 76% of the respondents in the age group of '41 to 60' preferred using cards whereas this percentage preference for cards drops to 44% in the lower age group of '18 to 40'.
- Further it was noted that 34% of the respondents from age group of '18 to 40' do not use credit cards. However, 99% of total respondents of the same age group indicate their access to use of debit card.

In addition to above, the respondents were asked about to select the most influencing factors that decide their choice of payment method. We studied the top 3 ranked factors provided by the respondents. The results of the same are indicated in table 5 below:

Table 5: Most influencing factors selected by respondents

Age group	Product category	Price Range	Discount / Offer	Costs	EMI	Safety	Steps / Time	Default option
18 - 40	80	67	120	80	33	96	66	23
41 - 60	24	27	23	26	6	56	26	11

The study of the responses received from respondents reveal the following as indicated in figure above:

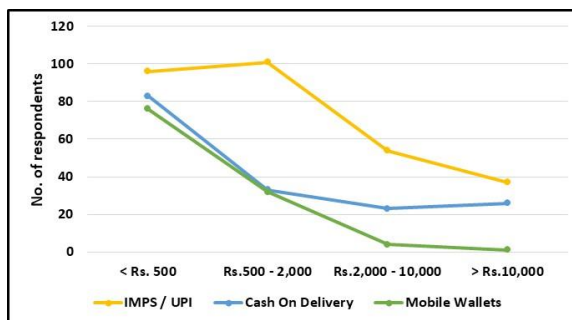
- In the age group of '18-40', total 120 out of 287 (42%) respondents have chosen discount / offers / cashback as the most influencing factor followed by 28% of respondents having chosen convenience fees as the most influencing factor.
- On the other hand, in the age group of '41-60', safety is perceived to be the most influencing factor by 84% of the respondents.

We further analyzed the top payment preferences and studied the factors perceived to be top influencers for the same set of respondents and observed in table 6 below:

Table 6: Inference drawn from selection of payment method preference

Preference	Inferences drawn
Net banking	Influencing factor of people preferring the usage of net banking is clearly seen to be that of safety (78%) over the discounts offered or price of the product. The apparent reason of perceived safety in case of net banking could be the fact that many financial institutions have two-factor authentication of net banking. For e.g. use of password and generation of

	one-time password (OTP) on registered mobile number.
IMPS / UPI and Wallet payment	The people who preferred use of IMPS / UPI or payment wallets responded that the most influencing factor for them is the discounts / offers / cashbacks that they receive. This also holds true as the providers of these retail payment systems attract the customers by providing a number of offers and cashback schemes. These people also had safety as their next influencing factor.
Cash on delivery	The respondents choosing cash on delivery clearly reflected safety as their most influencing factor (81%) in making a payment choice. That is because of the fact that the chances of the bank account being hacked and the chances of online fraud are entirely removed.
Card payment (debit / credit)	Multiple influencing factors having equivalent degree of influence were chosen by the respondents for this category. This may be due to the fact that cards provide a dual benefit as regards the discounts / offers along-with price and safety being taken care of. Further, the credit facility provided in case of credit cards tends to increased use of credit cards for doing high value purchase transactions.
All payment methods	Selection of first seen default option was ranked as the least influencing factors by the respondents in all types of payment methods. Having said that, first seen default option is considered to be an influencing factor by the respondents. This thereby indicates that though the default option is not the reason for the respondents to select a particular payment method, it is an essential factor that drives their satisfaction.

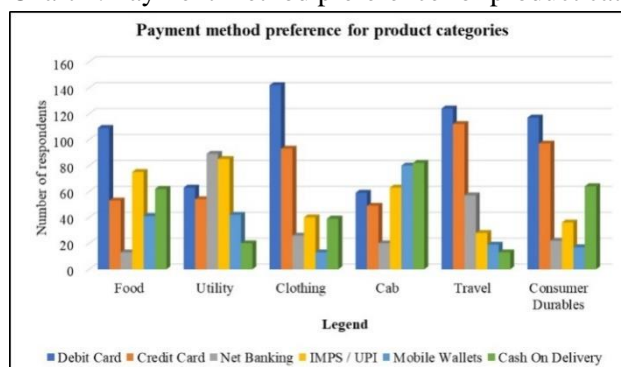


The pattern indicates that there is a positive correlation between transaction price and preference towards selection of card payment and net banking. Whereas, there is inverse correlation between transaction price and preference towards selection of IMPS / UPI, mobile wallets and cash on delivery option. This indicates that as the transaction prices increase the use of cards payments and internet banking increases whereas the use of retail payment systems such as IMPS / mobile wallets comes down considerably

b. Trends in product categorization

The respondents were asked to select their most preferred payment option in different product categories such as Food, Utility, Clothing and Fashion Accessories, Local Travel (Cab), Tour and Travel and Consumer Durables. Chart 2 below shows respondents' preference for payment method in each of the above product categories

Chart 2: Payment method preference for product category

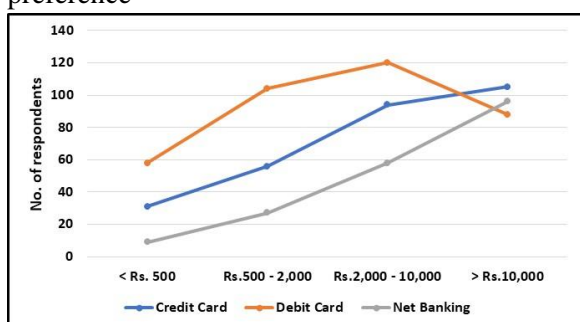


Patterns observed from study of data

a. Trends in transaction price range

The respondents were asked to select their payment preferences for 4 different price buckets: Less than Rs.500, Rs. 500 to Rs.2,000, Rs.2,000 to Rs.10,000 and above Rs.10,000. The analysis of responses showed the following pattern as depicted in Chart 1:

Chart 1: Relationship between price range & payment preference



The computation of p-values for product categorization and select of payment method preference was done to verify whether there is any association between the product category and the payment preference selected. The results of the statistical computation are indicated in table 7 below:

Table 7: P-values for payment preference & product category

Payment Method	Food	Fashion	Utility payment	Local Travel	Travel & Tour	Consumer durables
Debit Card	0.84680	<u>0.0000</u>	<u>0.0093</u>	<u>0.0011</u>	<u>0.0028</u>	0.29270
Credit card	0.49470	0.73280	0.49470	0.08782	<u>0.0021</u>	<u>0.0405</u>
Net banking	<u>0.0027</u>	0.25360	<u>0.0014</u>	<u>0.0175</u>	0.30860	0.59990
IMPS / UPI	<u>0.0257</u>	0.26480	<u>0.0257</u>	<u>0.0018</u>	0.18090	0.37240
Mobile wallet	0.11410	<u>0.0114</u>	0.11410	<u>0.0000</u>	0.11410	0.20630

The table above shows p-values < 0.05 for certain combinations, which indicates that the test is significant and that there exists a significant degree of association between product category and payment method selection. The same is explained as below:

The analysis of the pattern indicates the below:

- In case of IMPS, the p-values are less than 0.05 in case of food, utility payments and local travel. This indicates that the customers prefer IMPS / UPI for making payments for food, utility payments and local travel. Whereas, the preference tends to move towards usage of cards in case of products such as clothing & fashion accessories, tour and travel and consumer durables.
- In case of mobile wallet, the p-values are less than 0.05 in case of payment for clothing / fashion and local travel. This indicates that few customers prefer mobile wallet for making payments for clothing and local travel using their mobile wallets. One of the reasons could be the fact that many clothing / fashion and local travel companies such as Ola, Uber allow the customers to link their wallets for payment of transactions.
- Further, it is noticed that the usage of cards is preferred in case of products such as clothing & fashion accessories, tour and travel and consumer durables i.e. typically items of higher value.

The potential reasons for this pattern may be perceived to be as follows:

- Utility Payments:**
 - Many merchants/ banks provide services to customer wherein customer may allow direct debit to his account by creation of mandates. In India, the mandates are presented by the debtor to the

creditor and are ultimately stored at National Payments Corporation of India (NPCI) wherein every mandate is given a unique mandate reference number (UMRN) by NPCI. On the due date, money is automatically pulled from the debtor's account and gets credited to the creditor's account.

Alternatively, the bill can also be paid using Electronic Bill Presentment and Payment (EBPP) reflected by p value of 0.0014 as seen in table above. In case of EBPP, which is also called as collaborative method of payment, the bill is presented by the biller to the customer. On approval of the billed amount by the customer, the amount of transaction is pulled from the customer's account and is credited to debtor's account. This is thereby a combination of push payment method and pull payment method as seen in paragraph above. As a result, net banking is also seen to be one of top preferred options in case of utility payments.

- The respondents may also prefer use of IMPS / UPI as many of the mobile applications store the account ids and provide reminder services prior to the due date of payment of utility services. Further, the steps involved in the transactions are relatively less (scanning QR codes) and the payment service providers provide offers/ cashback schemes which attract the customers.

- Consumer Durables and Tour and Travel:**

- In this product category, the average ticket size / price is expected to be relatively higher than other product categories such as food, local travel. Also, various discounts / offers / EMI facilities are available for such products on use of specific cards. Thus, respondents tend to prefer use of cards.

- Local Travel (Cab):**

- In this product category, the average ticket size / price is expected to be relatively lower than other product categories. Thus, cash on delivery and mobile wallets get the highest preference. In addition to this, net banking gets the least preference due to the number of steps involved such as 2 factor authentication, creation of beneficiary and then the payment.

c. Demographic trends

Using the data received, the degree of association between the gender and customer payment method preference was calculated using the chi-square test and the p-values and are captured in table 8 below:

Table 8: Chi-square & p-values for gender & payment method

Test	Debit card	Credit card	Net bankin	IMPS / UPI	Mobile wallet	Cash on

			g			deliver y
Chi-square	6.515	15.747	9.906	3.341	5.97	7.332
p-value	0.3680	0.0151	0.0129	0.7649	0.4266	0.2912

The p-values under all the categories except net banking are > 0.05 which indicates that the null hypothesis is accepted and that there is no association between gender and the payment method except in case of credit card and net banking.

In addition, the degree of association between the age and customer payment method preference was calculated using the chi-square test and the p-values and are captured in table 9 below:

Table 9: Chi-square & p-values for age & payment method

Test	Debit card	Credit card	Net banking	IMPS / UPI	Mobile wallet	Cash on delivery
Chi-square	30.661	29.958	17.976	41.025	15.233	17.751
p-value	0.0000	0.0000	0.0060	0.0000	0.0180	0.0068

The p-values for all the payment methods are < 0.05 , which indicates that the test is significant and that there exists a significant degree of association between age and payment method.

Application of payments data to reach target audience

The payments data – online as well as data generated through POS has core elements such as amount spent by the customer, the merchant category (identifying the merchant to whom the payment is made), type of product or services procured, location of purchases, manner of transaction (using POS, internet banking etc.). This payments data can be used to build customer profiles depending on the below details gathered from the payment transactions.

- Amount spent (transaction wise spent and trend)
- Frequency of transactions
- Merchant category (based on merchant category code issued by card acquirer or payment gateway)
- Products or services procured (based on the Harmonized System of Nomenclature – HSN codes)
- Geographical location
- Manner of purchases – physical spend through POS or online spend

Using the information gathered above, model can be built to analyze the customer behavior and personalize the targeted marketing strategies as they would result in eliminating the bottom feeders (people who are unlikely to get converted into buyers) and generating more quality leads.

With respect to technology to be used for gathering data, the study of literature identifies that the targeted marketing can be achieved by building customer profiles through various mechanisms such as website visits, items purchased, sentiment analysis etc. (Pousttchi, 2013) in the paper has examined various methods of data collection and its usage to analyze the preferences of customers thereby enabling evidence-based marketing. Further, (Maji, 2019) have used transaction logs sent to POS terminals to identify payment-related financial data of customers to plan business strategy and promotional campaigns by way of targeted marketing.

The challenge in implementing the strategy lies in the fact that before using the customer payments data, approval needs to be obtained from the customer to use the information for the purpose of targeted marketing.

Conclusion

The study of all the above factors indicate that the factors do influence the selection of payment method chosen by respondents.

If the data such as customer transaction history, customer demographics, type of product selected, transaction ticket size and discounts / offers / schemes available are analyzed, it may be possible to identify trends / patterns and intelligently suggest appropriate digital payment intermediation solution.

The merchants, e-commerce websites, payment aggregators, fintech companies, wallet service providers, banks can transform the user experience by intelligently offering appropriate digital payment intermediation solution using data analytics.

Expected benefits of the study

This study is expected to have the following benefits:

- Reduced transaction turn-around time by predicting the most preferred payment option for the given use case, thereby improving the user experience.
- Help the businesses in introducing the aspects which are most preferred by the customers, thereby increasing their revenues.

Practical application

The results of the study can be applied by the payment service providers such as banks, card companies, wallet service providers. They may develop an analytical application which can identify the patterns of customer payment preference and intelligently suggest the most preferred digital payment intermediation solution. They may also enhance their product offerings in line with the factors that influence the customer behavior.

The merchants may also study the customer payment preference for their own product category and may try to strategically partner with the payment services providers to offer add-on services that can benefit both the merchant as well as the payment service provider. This kind of targeted marketing is expected to have following benefits as observed in table 10 below

Table 10: Benefits of targeted marketing

Benefits of targeted marketing	Papers / Reference
Speak directly to a defined audience	(Oliveira, 2019), (Maji, 2019), (Yu-Qian Zhu, 2015), (Schmitt, 2012),
Generate more quality leads	(Sahai, 2018), (Stelzner, 2013),
Eliminate the bottom-feeders	
Narrow to targeted market	

Scope and Limitations

- The study would be based on random sampling method instead of census method
- Most of the findings on customer's perception on selection of payment method on ecommerce website would be arrived at Pune; the findings may not give overall view of customer perceptions and preferences.
- Due to explosive growth in the features of electronic payment methods and the features / offers by service providers and enhancements offered by the service providers, the factors influencing the decision making of customer may undergo a change.
- In the absence of a common aggregator across all payment channels, the test results can be applied on a single website offering variety of products to customers.

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