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**Abstract:** Large and medium-scale businesses have adopted online businesses and have benefitted. However, local vendors have hesitation to adopt online business due to the usability of an online platform. The purpose of this paper is to investigate empirically the need of an online business platform for local vendors and subsequently the development of it considering the usability perspective. In order to investigate the need of online business platform, a research model comprising two hypotheses, one related to psychological factors (hesitation to adopt online business) and the other related to risk factors (business loss) of local vendors, is developed. The data related to hypotheses is collected from 21 local vendors through a survey. The sign test is used for testing of hypotheses and it is revealed empirically, at the level of significance 0.05, that local vendors are losing their business due to the exponential growth in online business and have hesitation to adopt the online business due to the usability of an online platform. With due consideration for usability, the platform is developed and assessed statistically using the sign test and the ANOVA test.

Keywords: ANOVA, E-Commerce, Sign Test, Usability, Web application

## 1. Introduction

With the technological advancement of the IT Industry field in the 21st century, one cannot deny the fact that E-commerce Industry too is rising high <sup>1,2</sup>. One statistic predicts that it can cover approximately 24% of total retail sales throughout world by 2026 <sup>3</sup> and the market size of the online retail industry in India is likely to amount to 173 billion U.S. dollars in 2027<sup>4</sup>.

E-commerce can be defined as doing commercial activities like purchasing and selling services, products and information electronically through interconnected computing devices<sup>5</sup>. It has captured the market worldwide. Online Business Platforms like Amazon, Snapdeal, Flipkart, Alibaba, Ebay, Netmeds, Pharmeasy, Meesho etc., provide the opportunity for people to do business online.

Medium and Large-scale businesses adopted online business capability and maximize their gain. However, small scale businesses particularly local vendors (a person or business who operates its business in a specific city or region) are still doing their business in conventional mode (offline)<sup>6</sup>. Due to which they are losing their business as

the customers prefer to buy online for their time saving and convenience<sup>7</sup>. That too, during Covid-19, local vendors and other small-scale businesses lose their business <sup>8,9,10</sup>.

Local vendors face many challenges in transiting from offline to online through the available online business platforms<sup>11,12,13</sup>. One of the vital challenges faced is in-house fulfilment process (purchasing a warehouse for storing the inventory, recruiting the man-power for managing the warehouse, acquiring the license, etc.). Another important challenge is a lack of online/electronic business environment knowledge. Updating to the consumers about their orders; complex registration process with courier services and inaccessibility to certain pin codes; embarrassing digital payment processes; cybersecurity issues; brand building and customer retention; packaging anguishment; handling product returns; steady cash flow; biasness towards a seller; are other challenges.

The aforementioned challenges are related to the usability of the available online business platforms. Originally, the term "Usability" emanated from the term

“user friendly”<sup>14)</sup>. Various definitions have been proposed for the term usability in the literature<sup>15-22)</sup>. But, for the present purpose, the usability of an online business platform is defined as how comfortably a user is able to interact with the platform to achieve its goal. Due to these challenges, local vendors do not feel comfortable with the available online business platforms; consequently, they are losing their business and struggling to survive in the market. In order to sustain in the market, there is a need for the local vendors to run their business online.

The idea of the development of online business platform for local vendors is a novel one. The need of online business for local vendors is assessed empirically. In order to assess, a research model comprising of two hypotheses as shown with Fig. 2 and a questionnaire consisting of 7 questions as shown with appendix 1 are formulated. A survey is conducted using the questionnaire, and the responses are analyzed using sign test for the assessment of the hypotheses. As a result of the assessment, an online business platform considering the usability perspective is developed for the local vendors. The platform is assessed statistically using Sign Test and the ANOVA Test.

The rest of the paper is organized as follows. Section 2 describes the usability concept. Section 3 describes the online business platform architecture. Section 4 describes the hypotheses formulation along with the research model development. Section 5 describes the methodology comprising of the empirical investigation of the need of the platform and the technology used to design it. Section 6 describes the usability evaluation of the platform. Section 7 discusses platform usage. Section 8 discusses the benefits of using the platform and the future scope. Finally, the paper is concluded with the limitations.

## 2. Usability

The term “usability” has been used widely in the early 1980s. The other terms used for this was the “user friendliness” or “ease of use”<sup>23)</sup>. First time the term “usability” has been used in a research paper title “The Commercial Impact of Usability in Interactive Systems”<sup>24)</sup>. Since the first use of the term till-today there is no widely accepted definition of usability and its measurement<sup>25,26)</sup>. The difficulty in defining the usability might be attributed to multiple factors. Usability is not a characteristic of something which can be measured directly<sup>27,28,29)</sup>. Rather, it depends on the interactions between the users, products, tasks, and environments. The interactions result in various dimensions which are used for defining the usability. There are two conceptions about the usability: (i) it is related to the measurement of the accomplishment of the goals and (ii) it is related to the detection and elimination of usability problems, which makes defining the usability so difficult.

### 2.1 Usability Definition and Dimensions

There are various usability definitions. The extent to which (a product) may be used by specified users to achieve given goals with effectiveness, efficiency, and satisfaction in a particular context of usage has been characterized as Usability<sup>17)</sup>. Notably, effectiveness alludes to the correctness and exhaustiveness of the product as a service provider, efficiency alludes to the rate between the product service and the resource consumed (for example time) and satisfaction alludes to the degree of the product acceptance by the users.

According to<sup>16)</sup> there are five usability dimensions: satisfaction, efficiency, effectiveness, learnability, and memorability related to product usability. Specifically, satisfaction alludes that users should feel happy by the use of product, efficiency alludes that users should be able to complete the basic tasks in a less amount of time, effectiveness alludes that users should complete their tasks with low flaws, and if at all flaw occurs, they should be able to revive within a short span of time, learnability alludes that users should learn the product usage fast, and memorability alludes that users should easily get their normal pace of product usage after a long period of not using the product. There are other factors navigation system, reaction time, credibility and content which affects the usability of a website.

According to<sup>21)</sup>, the usability dimensions as effectiveness, learnability, flexibility, and attitude are proposed. Notably, effectiveness alludes that product should deliver its services with fastness and low flaw rate, learnability alludes that the product usage should be easy for the beginners as well as they should regain their normal pace of product use after a long period of not using the product, flexibility alludes the pliability of the product with respect to the specified range of tasks and the environmental scenarios, and attitude alludes to the users’ cost such as tiredness, disquiet, frustration, endeavors etc. during the product use. User satisfaction is the major cause of the users’ continuing use of the product. Security is added as the other usability dimension, which is incorporated by authentication procedures, encryption mechanisms, and data leakage prevention mechanisms with the product<sup>30)</sup>. According to<sup>31)</sup> ten usability dimensions: efficiency, effectiveness, production, satisfaction, learnability, security, accessibility (whether disabled people can access or not), reliability, universality (whether users with diverse background can use or not), and usefulness (suitability of the product) are suggested.

According to<sup>32)</sup> the quality in use integrated (QUIM) scheme consists of 10 factors, 26 subfactors, and 127 metrics related to product usability. A two-dimensional model has been suggested linking a wide range of product attributes to user actions<sup>33)</sup>. A preliminary taxonomy for the concept of usability is arranged under the main categories of knowability, operability, efficiency, robustness, safety, and satisfaction<sup>26)</sup>.

## 2.2 Evaluation Methods

Usability is a product feature which has been the focus of many researchers in the area of human computer interface and they emphasized that the success of a software product mainly relies on the quality of its human computer interface<sup>22</sup>). It is evaluated indirectly by assessing the various dimensions: effectiveness, efficiency, satisfaction, etcetera, during the product usage. The goal of usability assessment is to identify product usability issues that may be used to improve the product. For usability assessment, many approaches such as questionnaire surveys, website log analysis, focus groups, card sorting, cognitive walkthroughs, paper prototyping, and so on are employed as per <sup>34</sup>). Various researchers performed a mapping study to find out the suitable methods for the evaluation of website usability, and the issues related to usability research domain discussed by <sup>35,36</sup>). The methods for the usability evaluation are categorized as follows<sup>37</sup>.

### 2.2.1 User Investigation

This method conducts user interview using a questionnaire for assessing the product usability.

### 2.2.2 Expert Estimation

The product usability is evaluated by the experts in usability-related fields. Traditionally, these methods include heuristic evaluation and cognitive walkthroughs. Heuristic evaluation uses the heuristics, developed by researchers, for the product usability evaluation <sup>16,38</sup>). Cognitive walkthroughs employ a procedure for simulating a problem-solving process through interaction<sup>39</sup>).

### 2.2.3 Usability Test

In general, numerous performance measures such as task success rate, task completion time, and operation route length are used to evaluate product usability.

## 3. Online Business Platform Architecture

The online business platform has been developed for local vendors using the two-tier architecture<sup>40</sup>). It consists of three functional components as Security, Sales, and Customer-Inventory and a Repository Component. The platform architecture is shown in Fig. 1.

The sales component manages the order processing such as generating cash receipts related to the items being purchased by the customers, tracking, and informing to both the customers and the vendors. It provides the communication service (messaging system) for the customers to have communication (inquiries, feedback, and support) with vendors. It is integrated with the Paytm Payment Gateway<sup>41</sup>) which provides various payment methods such as credit and debit cards, UPI, Paytm wallet, net-banking, and cash on delivery. Paytm gateway offers various features such as real time payments, instant

payment, two-ways authentication, recurring payments, and refunds etcetera. A transaction fee is charged over the vendors at the time when a customer completes a transaction; there is no start-up fee or yearly maintenance fee.

The Customer-Inventory component maintains the information about the quantity of available items; manages and tracks inventory levels; produces low stock alerts; provides the communication service (messaging system) for the vendors to communicate with customers; performs addition, editing, and removal of items and uploading the images of items; maintains contact details, order details and order status (whether delivered, or not?) about the customers.

The Security component performs the task of authenticating the vendors and the customers and authorizing the access to information related to platform as per the roles and permissions. Only the authenticated users (admin, vendors, and customers) are allowed to access the platform and a user can access only that information for which the user is authorized.

The information related to the business is stored in the repository, which is processed by the Customer-Inventory component, Security component, and Sales component on behalf of Vendors, Admin, and Customer respectively.

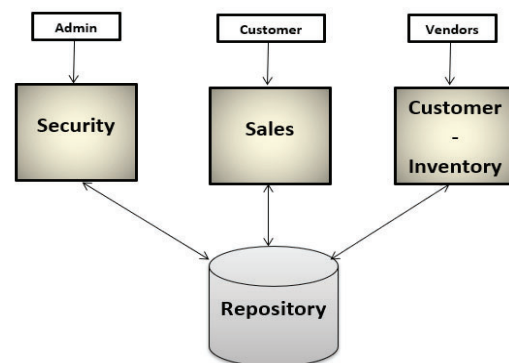


Fig. 1: Online business platform architecture

## 4. Hypothesis Formulation and Research Model Development

The facts related to online business and its adoption issues have been discussed, which are the basis for the hypothesis's formulation.

### 4.1 Rise of Online Business

Generally, people prefer to buy their daily need products online because of saving the time <sup>43</sup>). It is quite natural that online shopping is rising as people spends more time with social sites due to the availability of internet worldwide<sup>43</sup>). Actually, e-commerce sales at a recent time crossed \$1.14 trillion which is an all-time high<sup>44</sup>). There are many big online shops like Myntra, Amazon, Snapdeal, Homeshop18, Flipkart, etc. <sup>45</sup>) who are in favor of e-commerce for the businesses to survive in online market<sup>46</sup>). Moreover, customers are now more

inclined towards online shopping<sup>47)</sup>. Thus, the following hypothesis is developed:

Hypothesis 1:

*Local vendors are losing their business due to the increase in online business*

#### 4.2 Adoption Issues of Online Business

Generally, people are reluctant to adopt a new system. They face challenges related to online business such as setting up a digital infrastructure, lack of operational knowledge, security concerns, etc. Online business involves the new processes and the operational knowledge required for them to tackle with is more technical in nature<sup>48)</sup>. The cost of acquiring and maintaining the digital resources such as point-of-sale machines, signing up with a payments gateway provider, etc., is also another issue. Resolving the problems such as transaction failures, fuss in taking out money from bank/ATMs, bank failure stories, etc., consumes more time leading to loss of business<sup>49)</sup>. As per the India Risk Survey of 2018, there are two major concerns Information and Cyber Insecurity for the business operations. There is a need for the businesses to change their way of operations according to the existing platforms what they choose for running their business<sup>50)</sup>. Online business is mostly dominated by English Language but a 2017 study conducted by KPMG India and Google revealed that mostly Indians are comfortable with their local languages. Thus, the following hypothesis is developed:

Hypothesis 2:

*The usability of an online business platform is a hindrance for local vendors to go for online business*

Based on the discussion related to the rise of online business and its adoption issues, the two factors: risk factor and psychological factor have been emerged out. The psychological factor covers all the usability dimensions. For the local vendors, the risk factor is related to the loss of business due to online business and the psychological factor is related to hesitation in adopting the online business. A research model considering both the factors as shown with Fig. 2 has been developed, which is used for validating the need of online business for the local vendors.

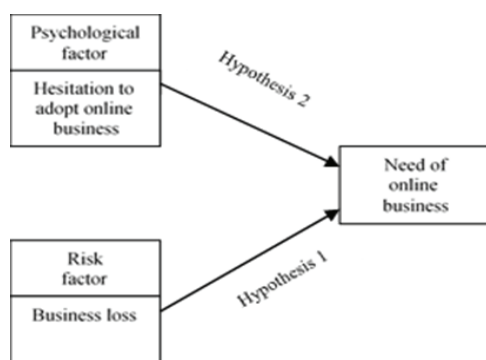


Fig. 2: Research model

## 5. Methodology

The methodology consists of empirical investigation of the need of the platform for local vendors and its technical development.

### 5.1 Empirical Development

The two hypotheses thus developed have been tested using the sign test in <sup>51)</sup>. These are restated as follows-

The hypothesis is denoted as  $H_{0|a, n}$ , where 0 means 'null' hypothesis, 'a' is an alternate hypothesis, and 'n' is the serial number of hypotheses. The statement of the hypothesis is represented as follows:

Hypothesis 1:

$H_{0,1}$ : *Local vendors are losing their business due to the increase in online business*

$H_{a,1}$ : *Local vendors are not losing their business due to the increase in online business*

Hypothesis 2:

$H_{0,2}$ : *The usability of an online business platform is a hindrance for local vendors to go for online business*

$H_{a,2}$ : *The usability of an online business platform is not a hindrance for local vendors to go for online business*

#### 5.1.1 Data Collection

A survey is conducted, in Murad Nagar, Uttar Pradesh, India, through a questionnaire consisting of 7 questions (see Appendix 1). For this, a sample of 21 local vendors is selected, interviewed, and their responses are recorded as shown in Table 1, where Q1..., and Q7 in Table 1 corresponds to Question 1..., and Question 7 in Appendix 1, respectively.

The meaning associated with the response of a local vendor respective to each question in Table 1 is defined in the appendix 1. Question 2: "Do you feel problems with online shopping?" and Question 3: "What impact is there over the local market due to online shopping?" are related to Hypothesis 2 and Hypothesis 1, respectively. The response for a hypothesis-related question is said to be favorable one if a local vendor opts for first option; an unfavorable one, if opted for the second option; and a neutral one if opted for third option.

Table 1. Vendor's response

Owner's name	Shop's name	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7
Pawan Kumar	Prakash General Store	3	1	1	1	1	1	1
Pankaj	Pushp General Store	1	2	2	1	1	1	1



<b>Naman Kanssal</b>	Kansal Kirana Store	1	1	1	1	3	1	2
<b>Sujeet Ram Vilas</b>	Hitkari Upbhokta Bhandar	1	2	3	2	3	3	2
<b>Arun Kausik</b>	Kaushik Cosmetic	2	1	1	1	1	1	1
<b>Sujata</b>	Riya General store	2	3	2	1	1	1	1
<b>Arun Sharma</b>	Arun Store	1	1	1	1	1	1	1
<b>Neha Sharma</b>	Neha Medical Store	4	2	1	1	1	1	1
<b>Akash Gaur</b>	Gaur Tiles	4	3	2	1	3	1	1
<b>Dheeraj</b>	Dheeraj General Store	1	2	3	1	3	1	1
<b>Krishna</b>	Grover Electronics	3	1	1	1	1	1	2
<b>Vidhi</b>	Woma n Centre	2	2	3	1	1	1	1
<b>Salekh Chandra Gupta</b>	Lalaji Ki Dukan	1	1	1	2	3	3	2
<b>Anil Kumar</b>	Kumar Electrical	3	2	3	1	1	1	1
<b>Amit Singhal</b>	Singhal Kirana Store	1	3	2	1	1	3	2
<b>Banti</b>	Banti Kirana Store	1	1	1	1	1	1	1
<b>Sumant Kumar</b>	Balalji general Store	2	2	2	1	3	3	1
<b>Nishu</b>	Nishu Electronic Service	3	1	1	1	1	1	1
<b>Muskan</b>	Muska	2	3	3	1	1	1	1

<b>Sharma</b>	n Cosmetic							
<b>Vijay</b>	Vijay Electrical Store	3	1	3	1	1	1	1
<b>Saurabh</b>	Pintu General Store	2	2	1	1	1	1	1

### 5.1.2 Calculations

The responses for Question 3 related to Hypothesis 1, as shown in Table 1, consists of 10 favorable ones, 5 unfavorable one and 6 neutral ones out of 21 responses. The 6 neutral ones are rejected. Hence the effective sample size is 15. Favorable ones are replaced with the “+ sign”, and unfavorable ones are replaced with the “- sign”.

The probability of getting less than or equal to 10 “+ signs” is 0.9408 using the binomial distribution function table for a sample size 15 and a probability 0.50 in<sup>51</sup>). Therefore, the probability of getting more than 10 “+ signs” is  $(1-0.9408) = 0.0592$ .

### 5.1.3 Analysis

Since 0.0592 is greater than .05, Hypothesis 1 (Null Hypothesis-  $H_{0,1}$ ) is accepted at the .05 significance level.

Similarly, for the responses of Question 2 related to Hypothesis 2, the probability of getting more than 9 “+ signs” is  $(1-0.6885) = 0.3115$ . Since 0.3115 is greater than 0.05, Hypothesis 2 (Null Hypothesis-  $H_{0,2}$ ) is accepted at the 0.05 significance level.

## 5.2 Technical Development

The fundamental issue in designing of E-commerce websites is usability<sup>15</sup>). Based on the discussion in Section 2 Subsection 2.1 about usability, Various factors such as learnability, memorability, effectiveness, efficiency, usefulness, satisfaction, attitude, and security are considered for the development of the online business platform. In order to test the platform, we consider the usability evaluation strategies such as User Investigation and Usability Test as discussed in Section 2 Subsection 2.2. The front end of the platform is developed using HTML, CSS, and JavaScript. The backend is developed using the Django net framework of Python. The database is managed using MongoDB.

## 6. Usability Evaluation

The online business platform thus developed has been evaluated for its usability. In order to evaluate usability, the aforementioned factors, as specified in Section 5 Subsection 5.1, have been considered.

## 6.1 Learnability, Efficiency, and Effectiveness Evaluation

These factors have been evaluated using the usability testing strategy. For the evaluation of the learnability and the efficiency of the platform, we consider the performance parameter (time required to complete tasks), and for the evaluation of the effectiveness, we consider the parameters (number of dangling links, number of errors that occurred during a task execution).

### 6.1.1 Learnability Evaluation

For the learnability evaluation, we conducted an experiment in which 4-participants (local vendors) without any experience of using such systems were called. These participants were asked to perform their tasks multiple times in order to collect the performance parameter “time required to complete tasks” measured in seconds. Each call to collect performance parameter data is termed a trial measured in days. As the system is to be used by the local vendors frequently, therefore the frequency of the data collection is set to 1 day. The data related to “time required to complete tasks” by a participant is shown with Table 2.

In order to evaluate the learnability, a learning curve in<sup>52)</sup> is used. The learning curve is drawn by plotting the mean value of the performance parameter “time required to complete tasks” for a trial (day-1 up to day-6) as shown in Fig. 3. The portion of the curve from Day-5 to Day-6 is used to represent the saturation state of the participants, which means that participants have learned the product usage at their maximum level of learning.

Table 2. Tasks completion time

Participant s / Trials	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Pawan Kumar	78	60	45	40	50	38
Sujeet Ram Vilas	60	50	70	60	30	38
Neha Sharma	80	90	45	55	30	38
Salekh Gupta	70	48	40	33	50	46
Mean value	72	62	50	47	40	40

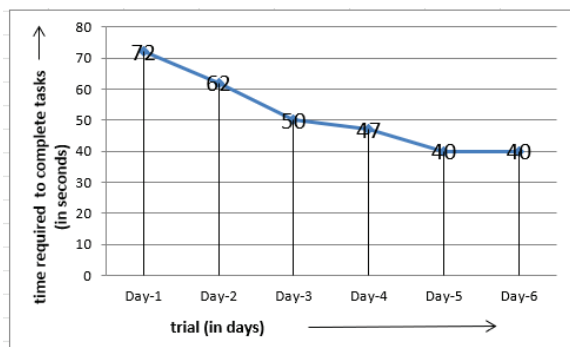


Fig. 3: Learning curve

It is significant to validate the result, as shown in Fig. 3. ANOVA test in<sup>51)</sup> is used for validating whether the learning acquired by participants through trials is real or not, at a certain level of significance ( $\alpha = 0.01$ ). ANOVA is a statistical technique to compare the means of three or more groups to determine whether there are any statistically significant differences among them. The F-statistic is the test statistic used in ANOVA to determine whether the means of the groups are significantly different. It is the ratio of the variance between the groups (MSB) to the variance within the groups (MSE), as shown in Equation (1).

$$F = \frac{\text{Mean Square Between the Group (MSB)}}{\text{Mean Square Error within the Group (MSE)}} \quad (1)$$

MSB is the variance between the group means. MSB is computed as the sum of squares between (SSB) divided by the degrees of freedom ( $k - 1$ ), where  $k$  is the number of groups. SSB is evaluated by subtracting the MSE from the mean square error total (MST). MSB is represented as below Equation (2)

$$MSB = \frac{SSB}{k - 1} \quad (2)$$

where,  $SSB = MST - MSE$

$$= \sum_{i=1}^N (x_i - \bar{x})^2 - \sum_{i=1}^k \sum_{j=1}^{n_i} (x_j - \bar{x}_i)^2$$

MSE is the variance within the groups. It measures the average variability of the data points within each group around their respective group means. MSE is known as the sum of squares within (SSE) divided by the degrees of freedom ( $N - k$ ), where  $N$  is the total number of observations across all groups. MSE is calculated as Equation (3).

$$MSE = \frac{SSE}{N - k} \quad (3)$$

$$\text{where, } SSE = \sum_{i=1}^k \sum_{j=1}^{n_i} (x_j - \bar{x}_i)^2$$

Where  $\bar{x}_i$  is the mean of the  $i^{\text{th}}$  group and  $\bar{x}$  is the overall mean,  $x_j$  is the  $j^{\text{th}}$  sample of the  $i^{\text{th}}$  group and  $n_i$  is the sample size of the  $i^{\text{th}}$  group. In ANOVA, there are three degrees of freedom used: ( $k - 1$ ) for MSB, ( $N - k$ ) for MSE, and ( $N - 1$ ) for the total degrees of freedom. The F-statistic (calculated using equation (1)) compares the variability

between group means (MSB) to the variability within each group (MSE). If the F-statistic is significantly larger than expected by chance, it suggests statistically significant differences between at least two of the group means.

By following the ANOVA test procedure over the Table 2 data, we get Table 3.

Table 3. Analysis-of-variance

Source of variation	Degrees of freedom	Sum of squares	Mean square	F <sub>0.01</sub>
<b>Trials</b>	5	3267.33	653.47	4.12
<b>Error</b>	18	2582.00	158.44	
<b>Total</b>	23	5849.33		

Since the calculated value for F: 4.12 in Table 3 is lesser than the tabulated value for F: 4.25 with 5 and 18 degrees of freedom in <sup>51)</sup>, therefore, the learning acquired by participants through trials is real at the 0.01 level of significance. Further, the system is a fast learnable one as the number of trials to get the saturation state of the participants is very few (4 trials only), as shown in Fig. 3. Moreover, the value of the performance parameter “time required to complete tasks” is large (40 seconds) which is not an acceptable one. Therefore, there is a need to improve the design of the system so that the system can be more efficient.

### 6.1.2 Efficiency Evaluation

The designed product has been modified by improving its design in order to make it more efficient. For efficiency evaluation, we performed the same experiment with the same participants as similar to the learnability evaluation. As a result of the design improvement, participants have shown enhancement in terms of accomplishing their tasks with reduced time (20 seconds) as shown in Table 4. The saturation state of the participants is represented through the portion of the learning curve from Day-4 to Day-5, as shown in Fig. 4.

Table 4. Tasks completion time

Participants / Trials	Day-1	Day-2	Day-3	Day-4	Day-5
<b>Pawan Kumar</b>	24	26	26	20	25
<b>Sujeet Ram Vilas</b>	30	28	33	22	15
<b>Neha Sharma</b>	32	30	23	22	15
<b>Salekh Chandra Gupta</b>	30	24	22	16	25
<b>Mean value =</b>	29	27	26	20	20

By following the ANOVA test procedure in<sup>51)</sup> over the Table 4 data, it has been validated that the improvement achieved in efficiency is real at the 0.01 level of significance as the calculated value for F: 4.09 in Table 5 is smaller than the tabulated value for F: 4.89 with 4 and 15 degrees of freedom in reference <sup>51)</sup>.

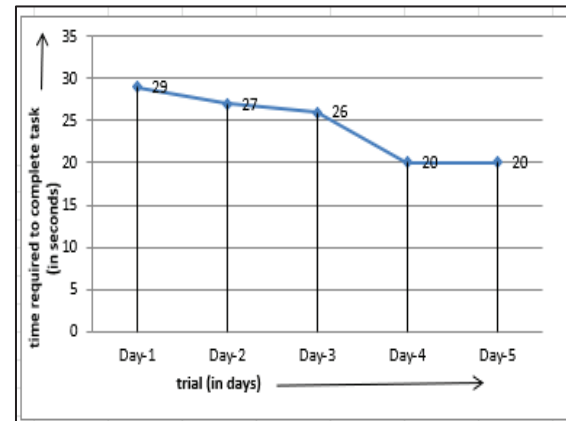


Fig. 4: Learning curve

Table 5. Analysis-of-variance

Source of variation	Degrees of freedom	Sum of squares	Mean square	F <sub>0.01</sub>
<b>Design Improvement</b>	4	276.8	69.2	4.09
<b>Error</b>	15	254	16.93	
<b>Total</b>	19	530.8		

### 6.1.3 Effectiveness Evaluation

The effectiveness of the platform is evaluated by considering the parameters: number of dangling links, and number of errors that occurred during the task's execution. An experiment has been conducted with the same participants in order to collect data related to parameters. It is evident from the information in Table 6, that there is no dangling link and no errors found by any participants while using the platform. Therefore, the platform designed here is effective in performing the tasks for which it has been developed.

Table 6. Effectiveness parameters information

Participants / Parameters	Day-1	Day-2
<b>Pawan Kumar</b>	0	0
<b>Sujeet Ram Vilas</b>	0	0
<b>Neha Sharma</b>	0	0
<b>Salekh Chandra Gupta</b>	0	0

## 6.2 Satisfaction, Usefulness, Attitude, and Memorability Evaluation

These factors have been evaluated using the user investigation strategy. For the evaluation of them, four hypotheses are formulated based on the factors being evaluated. These are as follows:

Hypothesis 3:

$H_{0,3}$ : Users feel happy with the product

$H_{a,3}$ : Users do not feel happy with the product



Hypothesis 4:

$H_{0,4}$ : The product is suitable for the business

$H_{a,4}$ : The product is not suitable for the business

Hypothesis 5:

$H_{0,5}$ : Users do not get frustrated with the product

$H_{a,5}$ : Users get frustrated with the product

Hypothesis 6:

$H_{0,6}$ : Users get the normal pace of product usage even after a long period of not using the product

$H_{a,6}$ : Users do not get the normal pace of product usage even after a long period of not using the product

A questionnaire consisting of 4 questions, as shown in Appendix 2, is prepared in order to test the hypotheses. There is one-to-one mapping between the questions of Appendix 2 and the hypotheses, i.e., Hypothesis 3 corresponds to Question 8, in sequence up to, between Hypothesis 6 and Question 11.

### 6.2.1 Data Collection

A survey is conducted in the same region with the same local vendors, as specified in Section 4, using a questionnaire as shown in Appendix 2. As a result of the survey, their responses are recorded and represented through Table 7, where Q8..., and Q11 in Table 7 corresponds to Question 8..., and Question 11 in appendix 2, respectively. These are analyzed using the sign test for testing of hypotheses. The response to a question is said to be favorable one if a local vendor opted for first option; unfavorable one, if opted for the second option; and a neutral one if opted for the third option.

### 6.2.2 Calculations

The responses for Question 8 related to Hypothesis 3, as shown in Table 7, consist of 11 favorable ones, 6 unfavorable ones and 4 neutral ones out of 21 responses. The 4 neutral ones are rejected. Hence the effective sample size is 17. Favorable ones are replaced with the “+ sign”, and unfavorable ones are replaced with the “- sign”.

The probability of getting less than or equal to 11 “+ signs” is 0.9283 using the binomial distribution function table in<sup>51)</sup> for a sample size 17 and a probability 0.50. Therefore, the probability of getting more than 11 “+ signs” is  $(1-0.9283) = 0.0717$ .

### 6.2.3 Analysis

Since 0.0717 is greater than 0.05, Hypothesis 3 (Null Hypothesis-  $H_{0,3}$ ) is accepted at the 0.05 significance level. Therefore, local vendors are satisfied with the product at the 0.05 level of significance.

Table 7. Vendor's response for usability factors

Owner's name	Q8	Q9	Q10	Q11
Pawan Kumar	1	1	1	1
Pankaj	1	2	2	3
Naman Kanssal	1	1	2	1
Sujeet Ram Vilas	1	2	3	1
Arun Kausik	2	1	1	1
Sujata	2	3	1	2
Arun Sharma	1	1	2	2
Neha Sharma	3	1	2	1
Akash Gaur	1	3	1	2
Dheeraj	1	2	3	1
Krishna	3	1	1	3
Vidhi	2	1	3	1
Salekh Chandra Gupta	1	1	1	1
Anil Kumar	3	2	1	2
Amit Singhal	1	1	2	1
Banti	1	1	1	1
Sumant Kumar	2	2	2	2
Nishu	3	1	1	3
Muskan Sharma	2	3	1	1
Vijay	1	1	3	2
Saurabh	2	3	1	1

Similarly for Question 9, the probability of getting more than 12 “+ signs” is  $(1-0.9755) = 0.0245$  in<sup>51)</sup> for a sample size 17 and probability 0.50. Since 0.0245 is greater than 0.01, therefore Hypothesis 4 (Null Hypothesis-  $H_{0,4}$ ) is accepted at the 0.01 level of significance. Therefore, the product is useful for the business at the 0.01 level of significance. Similarly for Question 10, the probability of getting more than 11 “+ signs” is  $(1-0.9283) = 0.0717$  in<sup>51)</sup> for a sample size 17 and probability 0.50. Since 0.0717 is greater than 0.05, therefore Hypothesis 5 (Null Hypothesis-  $H_{0,5}$ ) is accepted at the 0.05 level of significance. Therefore, the attitude of the local vendors towards the product is satisfactory at the 0.05 level of significance. Similarly for the Question 11, the probability of getting more than 12 “+ signs” is  $(1-0.9519) = 0.0481$  in<sup>51)</sup> for a sample size 18 and probability 0.50. Since 0.0481 is greater than 0.01, therefore Hypothesis 6 (Null Hypothesis-  $H_{0,6}$ ) is accepted at the 0.01 level of significance.

### 6.3 Security Evaluation

The major security issues for the local vendors are related to financial matters and information related to their business. In order to deal with financial matters, the platform relies on third-party security Paytm Gateway whereas business-related information is only accessible to authenticated and authorized users.

## 7. Usage

The platform thus developed, named as MyAwesomeCart (MAC), can be used by the customers to purchase products from their local market, and the local

vendors can sell their products online to their local customers. In order to purchase items, a customer must first register through the home page by clicking on the Sign-Up link, as shown in Fig. 5. Local vendors as well have to register with the platform. They have to provide their information during registration.

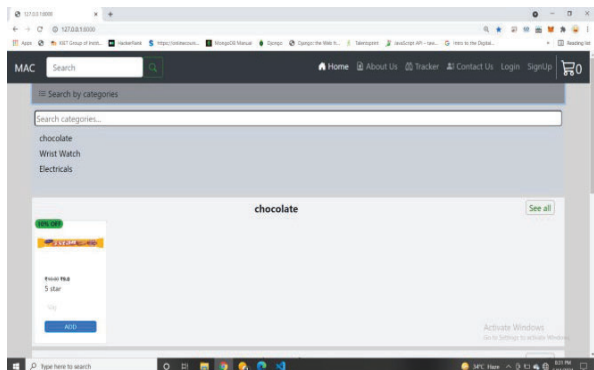


Fig. 5: Home Page

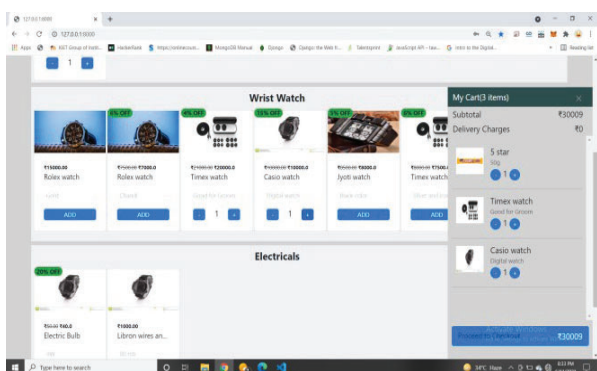


Fig. 6: Cart Details

The items purchased by a customer are shown with Fig. 6 and the amount for the purchased items is transacted through a Paytm Gateway. In order to register, the information related to customer such as username, e-mail, customer name, phone number, address, and password is required as shown with Fig. 7.

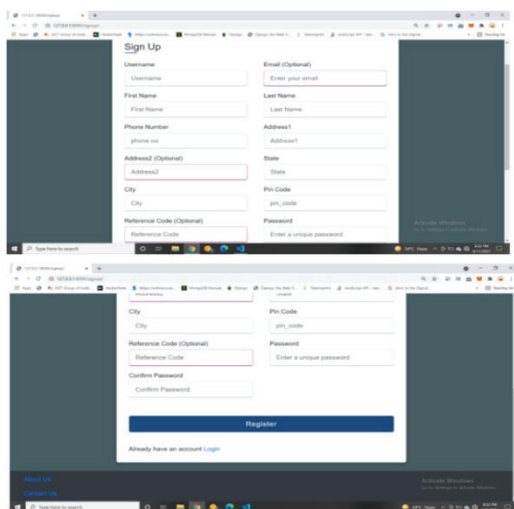


Fig. 7: Sign Up Page

## 8. Result and Discussion

Local vendors were reluctant to run their business online through big players like Amazon, Flipkart, etcetera due to the issues mentioned earlier. Big players restrict the businesses to maintain warehouse for inventory which incurs extra cost. Local vendors find it difficult to bear this expense. They can run their business online through this platform without purchasing a warehouse for storing the inventory, recruiting the man-power for managing the warehouse, acquiring the license, etcetera. Local vendors are not aware of online/electronic business environment knowledge; they all have some hesitation in mind for doing business online. A mentor is provided to help the local vendors with issues related to the online platform, such as how to register themselves, how to create their inventory, how to change prices, how to delete or add a product, and legal agreement between the vendors and the platform provider, how to maintain customer information such as contact details, order details and order status etcetera.

The customers can check their order status by providing order id and phone number. The order status can be: "The order has been placed", "The order has been shipped for delivery", "The order has been delivered". There is no need of registering with the courier service as the area covered is only up-to 5 to 6 kilometers and a delivery person can deliver the order. The big players had the issue of some pin codes being inaccessible, but our platform does not have that difficulty because the delivery person is usually local and familiar with the area.

For a business, payment process is an important factor which should be convenient for customers as well as local vendors. Generally, customers want to pay once order is delivered and verified that what they ordered is received. Local vendors as well have problems with the digital payments. They generally prefer cash mode payment. This problem has been resolved with our platform by offering both the options of payment: online and cash on delivery through Paytm Gateway. If the customer has opted for cash on delivery, the delivery person will deliver the order and collect the cash.

Local vendors may not be aware of cyber security issues. A mentor is provided to help the local vendors who makes aware of the cyber threats to them and guides what to do and what not to do. Moreover, the platform has been designed considering the security mechanisms so that only the authorized and authenticated users can access it. Paytm Gateway takes care of the information related to the customers and the local vendors during the online payment.

For a business to sustain, there is a need to maintain its brand and customer loyalty. This platform provides a way for the local vendors to communicate with their customers for feedback, support etcetera so that customers can be retained. Packaging cost is not an issue for the local vendors. Whatever the packaging they are offering to the customers during offline business, approximately the

same, they need to offer during online business. The reason for this is that the order has to be delivered in a local area (at most 5 to 6 kilometers area) which may not cause damage to the order.

Handling product returns is a typical issue that e-businesses deal with. It should be handled in such a way that there should be no damage to the product being returned. For that, return policies have been notified to customers over the platform which will help avert any loss/damage. Adequate cash supply is important for a business to run. Once the order with cash on delivery option is delivered to and/or verified by the customer, the customer pays the amount to delivery person. The delivery person gives the amount to local vendor on prompt. The problem of biasness related to big players like amazon, Flipkart etcetera towards the vendors is taken care of by providing complete control in the hands of a customer for selecting a vendor for purchasing of items. This will decrease monopoly and increase competition, which will increase the quality of products and services. This platform covers around 5 to 6 kilometers of the market, so there will be less delivery cost, which reduces the cost of products and services.

## 9. Conclusion

The online business platform is developed for local vendors with due consideration for usability. This platform is easy to learn, understandable, and flexible. Recent technological advancements in open-source software offer the opportunity for easy design and implementation.

Local vendors can compete with the large and medium-scale businesses and the customers can get the benefits of doing shopping locally. This is a win-win situation for both the local vendors and the customers. With this platform, customers are getting benefitted of both the online and traditional ways of shopping in the local market. Customers can check products by going there occasionally and can complain verbally about the products being purchased. Customers are encouraged to do online shopping in the local market via social media and invite and earn scheme.

The platform is developed for three types of local vendors dealing with grocery items, cosmetic items, and electrical and electronics items. But it can be extended to others. In future, the platform can be extended as to consider the accessibility (whether disabled people can access or not), and universality (whether users with diverse background can use or not) dimension of usability. We can employ emerging technologies such as AI, IoT<sup>53</sup>, Blockchain<sup>54</sup>, Cloud Computing<sup>55</sup> and 5G<sup>56</sup> with this work to leverage Industry 4.0<sup>57</sup>. AI and IoT also improve network security which enhance the efficiency of the network<sup>54</sup>. AI-based recommendation systems can enhance efficiency and memorize their customers. The system can maintain its customer record in such a way that one can easily identify the needs and frequency of users.

This would help create customer satisfaction. AI will predict the demand and recommendation of a particular item. Blockchain technology can be used to offer a permanent, transparent, shareable, auditable record of products through their supply chain<sup>58</sup>. Supply chain process can also be enhanced by using machine learning<sup>59</sup>.

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**Author Contribution:** The authors investigate the need of online business for local vendors using empirical approach. In order to investigate the need of online business platform, a research model comprising of two hypotheses, one related to psychological factor (hesitation to adopt online business) and the other related to risk factor (business loss) of local vendors, is developed. In order to investigate, a questionnaire consisting of seven questions as shown with appendix 1 has been developed. An online business platform has been developed and assessed considering the usability perspective.

**Data Availability Statement:** Not Applicable

**Research Involving Human and/or Animals:** local vendors have participated during the investigation of the need of the platform and during the assessment of the platform thus developed considering the usability perspective.

**Informed Consent:** Authors have taken care of welfare of humans who participated in the research work carried out here.

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## Appendix 1.

Question 1: What items you sell?

- (1). Grocery Items
- (2). Cosmetic Items
- (3). Electrical and Electronics Items
- (4). None of the Above

Question 2: Do you feel problems with the online shopping?

- (1). Yes
- (2). No
- (3). Don't know

Question 3: What impact is there over the local market due to online shopping?

- (1). Decrease in sell
- (2). Increase in sell
- (3). No impact

Question 4: Do you want an online shopping platform like amazon, flipkart etc. for the local market?

- (1). Yes
- (2). No

Question 5: What do you feel about that there would be some benefit out of this effort?

- (1). Would be
- (2). Would not be
- (3). Don't know

Question 6: Do you agree with the following statement - A mentor is provided you to help in every aspect of online business?



- (1). Yes
- (2). No
- (3). Could not understand

Question 7: Do you agree with that your items would be sold out within the 5 Kilometer range?

- (1). Yes
- (2). No

## **Appendix 2.**

Question 8: Do you feel happy with the product?

- (1). Yes
- (2). No
- (3). Don't know

Question 9: Do you think that the developed product is suitable for your business?

- (1). Yes
- (2). No
- (3). Don't know

Question 10: Do you ever not frustrated with the product?

- (1). Yes
- (2). No
- (3). Don't know

Question 11: Do you easily get the normal pace of product usage even after a long period of not using the product?

- (1). Yes
- (2). No
- (3). Don't know