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RESEARCH ARTICLE

Isolating Prominent Critical factors in E-commerce Services

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Abstract

E-shops attracts customers to provide E-Commerce, which in fact is a complex process although looks simple. It involves various critical factors such as site design, marketing and delivery etc. In this research work survey was conducted targeting E-customers with the aim to bring up critical factors playing their role in E-Commerce. The aim of this paper is to identify critical factors in E-Commerce so that, the genuine solution to minimize lacunas in them can be obtained using Computational Optimization Techniques (COT).It is being observed that COTis one of the best method as compared to other classical methods to handle such situation.

Introduction

Electronic commerce (E-Commerce) is a subset of global business where negotiations, Recommendations and transactions of services and payment are conducted electronically,rather than physically. E-Commerce is a general term for any type ofbusiness, or commercial transaction that involves the electronic transfer of information.

E-commerce applications automate many daily business activities. Users interact with E-Commerce applications through menu-driven User Interface (UI) components available in e-shop. Although, the tremendous number of functionalities are being provided to users even then users struggle to locate the appropriate UI components to accomplish the tasks required by business processes and to accomplish many more task. In this paper the work is directed towards obtaining , the knowledge embedded in business process definitions[1].

2. E-Commerce:

RESHAPING THE WORLD ECONOMY

The tremendous successes of E-commerce Multi-National Companies (MNC)'slike Amazon, Google, Yahoo, eBay etc., which did not exist in the last decade,clearly indicate the positive approach of people towards E-commerce.Moreover, automated decision making, faster computers, low transaction cost and shrinking distances allow the trading parties involved to be strategic and attempt to "game" the system in their favor. In addition, advances in technology have dramatically reduced the cost of storing, retrieving and distributing information. All this is enough to contribute for reshaping the world economy[2]. The Survey and forcastof E-Marketors Jan 2014 [3] report is quite encouraging. The position of India at 3rdreveals a bright future for E-Commerceand country'seconomical progress .

A quote from Greenwald [4]:

"The interplay of game theory and E-commerce is an exciting domainfor future research. Progress in this area will require a combinationof theoretical analysis, empirical studies, and simulation experiments.Better market designs will do a better job of matching buyerswith sellers, ultimately enhancing the welfare of our society."

The main objective of this paper is to explore the isolated critical determinants from the various identified determinants through a survey of E-commerce potential users. Looking at encouraging scenario of E-Commerce in India at 3rd position. The work was aimed to find critical factors in E-Commerce services which are needed to

brought into focus in order to enhance E-Commerce Potential user base exponentially.An optimization technique such as Robust Optimization, Game Theory and, in particular, Mechanism Design Theory allows one to systematically analyze many of the incentive issues arising in E-Commerce systems.

3.IDENTIFICATION OF CRITICAL FACTORS IN E-COMMERCE OPERATIONS THROUGH LITERATURE SURVEY

A total of 14essentialcritical factorsof E-commerce services were identified through reviewing and critically examining the related literature survey. The critical factors were selected based on theirrelevance and potential contribution to the overall E-commerce experience. The 14 essential critical factors and their definitions are being tabulatedbelow.

Source: Adapted from Surjadjaja et al. (2003) [5]

S.No	Critical factors	Definition
1	Trusted service	Exact delivery of promised services.
2	Responsiveness	Lead time, accuracy, and consistency of response .
3	Site effectiveness and functionality	Effectiveness of web functions such as: help desk, search engine, FAQ (Frequently Asked Questions) section.
4	Fulfillment	Delivery of products/services on time and as Specified.
5	External communication	Building a positive image of a service provider towards the existing and potential customers.
6	Up to date information	Keeping customers updated with latest information on products/services.
7	Navigability	Ease of finding products/services.
8	Availability .	24/7 access to web site and services.
9	Convenience	Elimination of physical restrictions such as place and trading hours.
10	Service recovery	Providing an alternative service to the satisfaction of the customer and/or redressing loss to customers in the event of a failure in the service process.
11	Security	Safety provided by technology against fraud/hackers during online transaction.
12	Price	Competitive pricing of products/services.

13	Interactivity	Web-enabled interaction between customers, between customer and a service provider, and customers' direct interaction with products/services.
14	Customization	Providing facility for customers to modify/adjust the system according to their specific requirements.

Table I : Critical factors in E-commerce operation Identified through literature review

4. RESEARCH METHODOLOGY

A survey was conducted to assess the customers perception and their priorities on these 14 determinants. In order to provide flexibility for completion, the survey was designed into two different kinds of forms: e-mail-attachment, Hand to hand collection. In completing the survey, the respondents were requested to go through the 14 randomly distributed determinants. A brief description of each critical factor as stated in Table was provided in the survey design so that each potential respondent may have a common and unbiased interpretation of the determinants.

Subsequently, respondents were asked to identify three critical factors / determinants that were according to them unavoidable to their E-commerce operations. .

The survey was sent to a balanced proportion of samples in different sectors of E-commerce users in ICT, travel and tourism, wholesalers and retailers. A variety of sectors were chosen in order to present an initial overview of the importance of the determinants in E-commerce operations.

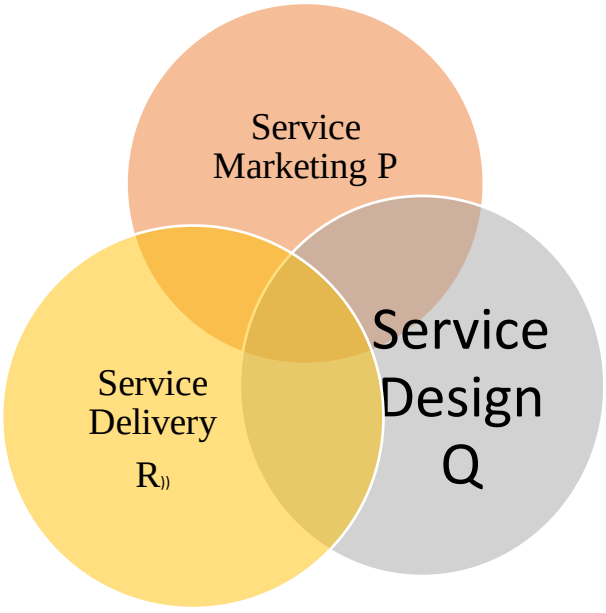
5.ISOLATING PROMINENT CRITICAL FACTORS APPLYING SET THEORY

$(P \cap Q \cap R)$={Availability, Security, Trusted service, Up-to-date information }

In this work the focus wason three main criteria of E-commerce services.

i. E- shop functionality
ii. E-marketing
iii. Product delivery

E- shop design and functionality evolves on the front-end operation, service design focus on the back-end support of service operations. Service design, refers to the design of facilities, servers, equipment, and other resources needed.



5.1Mathematical Modeling Of The Optimization Process(Significance TestFor Determining The Optimum Number Of Determinants)

Significance testwas explored and applied in order toidentify a minimum number of determinants that are critical for E-commerce operations.

The steps involved are as follows:

(1) Constructing the relative frequency distribution table and Assessing the statistical significance of the determinants.

(2) Determine the optimum value of the objective function using computational optimizationtechnique.

S.No.	Critical factors	F*
1	Trusted service	178

2	Responsiveness	145
3	Site effectiveness and functionality	121
4	Fulfillment	112
5	External communication	50
6	Up to date information	25
7	Navigability	30
8	Availability .	30
9	Convenience	25
10	Service recovery	15
11	Security	176
12	Price	40
13	Interactivity.	0
14	Customization	8

TABLE –II Note: F* = frequency

Statistical significance test oncritical factors yields that more determinants will be included if statistical confidence level increases. Arguably, applying 95 per cent confidence level appears to be most appropriate due to the fact that 99.7 per cent confidence level would include too many determinants whereas 68 per cent confidence level would leave out too many determinants.

Given the 95 per cent confidence level .

Hence, any determinant (Xdet) lies in between the limits (2:81 $\leq$Xdet$\leq$ 17:33)
Is considered to be critical with 95 per cent confidence level. Consequently,determinants representing "interactivity", "customization", "price" were removed. In addition, "external communication" was also excluded becauseit has the same frequency as "interactivity", "customization" "Ultimately, a total of four determinants were eliminated and 10 determinants were retained.

Computational Optimization method is proposed as a final alternative for further research, which would allow the identification of an optimum number of specific determinants based on the magnitude of both individual and collective contributions. Thus, prior to applying the "individual relative weight","adjusted individual weight", "overall weight", and "adjusted overall weight" scores
were calculated as follows:

i. Overall relative weight (x) = frequency of each determinant/total frequency.
ii. Cumulative frequency (C_n) = accumulated frequency of successive determinants starting from the first.
iii. Individual relative weight (y)= number of sectors that choose the corresponding determinant/total number of sectors.
iv. Adjusted individual weight (A_{iwt}) = individual relative weight of each determinant/individual relative weight of the determinant having the highest frequency.
v. Overall weight (O_{wt}) = overall relative weight multiplied by individual relativeweight.
vi. Adjusted overall weight (O_n) = overall weight of each determinant/overallweight of the determinant having the highest frequency.

All adjusted values were calculated using indexing method with the determinant havingthe highest frequency i.e. “trusted service” as the reference point.

Mathematical modeling of an optimization process is to find an objective function,which is formed by the summation of “cumulative frequency” andadjusted overall weight curve” in order to identify optimum number of criticaldeterminants. “Cumulative frequency” is a function represented by C_n (x),“adjusted overall weight” as O_n (x,y), and objective function as F_n (x,y); where xrepresents the overall relative weight, y represents the individual relative weight andn = 1 to 14 representing the determinants in sequential order from “Trusted service” to“Interactivity” as shownTABLE II.

Table II. The frequency distribution ofE-commerce determinants

$$F_n(x,y) = C_n(x) + O_n(x+y) \quad (1)$$

$$C_n(x) = \sum_{i=1}^{n} x_i \quad (2)$$

$$O_n(x,y) = (x_n.y_n.100)/x_1.y_1 \quad (3)$$

$$F_n(X,Y) = \sum_{i=1}^{n} x_i + (x_n.y_n.100)/x_1.y_1 \quad (4)$$

In static optimization, the optimum is time invariant and its purpose is to determine thelocation of the extremum and its size once and for all. The abovemathematical function has found the number of determinants to be four and thelocation of the extremum at “Up to date information” and its corresponding optimumvalue is 78.34 per cent. In this case, it is shown from evaluation of equation (4) that Fnhave a minimum value when “n” equals to 4. This result is also conferred by set theory.

B2C Ecommerce Sales Growth Worldwide, by Country, 2012-2017

% change

	2012	2013	2014	2015	2016	2017
China*	93.7%	78.5%	63.8%	43.3%	34.4%	29.4%
Indonesia	85.0%	71.3%	45.1%	37.2%	26.0%	22.0%
India**	35.9%	34.9%	31.5%	30.3%	24.5%	20.0%
Argentina	31.1%	6.3%	24.0%	18.0%	12.0%	10.0%
Mexico	55.8%	41.9%	20.0%	14.5%	10.0%	5.0%
Brazil	21.8%	16.5%	19.1%	8.5%	6.9%	6.0%
Russia	34.4%	19.4%	17.1%	10.8%	6.9%	5.2%
Italy	17.0%	16.8%	15.3%	13.5%	12.0%	10.6%
UK	14.5%	16.3%	14.2%	12.2%	9.2%	8.2%
Canada	15.0%	14.2%	14.0%	13.5%	12.5%	11.5%
Spain	10.0%	10.0%	13.8%	11.9%	10.0%	8.0%
Sweden	18.4%	16.2%	13.3%	10.3%	9.0%	8.4%
US***	14.2%	13.4%	11.8%	11.4%	10.9%	10.4%
Norway	14.9%	12.7%	11.0%	10.8%	8.1%	7.2%
Denmark	14.3%	12.4%	10.6%	8.9%	6.5%	5.9%
France	32.3%	10.3%	10.0%	9.8%	7.6%	7.1%
Netherlands	12.7%	11.4%	9.4%	8.4%	6.3%	5.3%
South Korea	12.7%	9.6%	7.4%	4.8%	4.3%	3.6%
Germany	25.6%	5.7%	7.4%	6.9%	6.5%	6.1%
Japan	12.3%	-10.2%	7.1%	6.7%	5.6%	5.0%
Australia	10.5%	6.0%	5.7%	5.1%	5.0%	4.2%
Finland	4.3%	4.4%	3.7%	3.2%	2.7%	2.5%
Worldwide	**22.3%**	**18.3%**	**20.2%**	**17.7%**	**15.9%**	**14.8%**

*Note: includes products and services ordered and leisure and unmanaged business travel sales booked using the internet via any device, regardless of the method of payment or fulfillment; *includes sales from businesses that occur over C2C platforms; excludes Hong Kong; **digital travel sales represent roughly 70% of B2C ecommerce sales; ***excludes event tickets*
Source: eMarketer, Jan 2014

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6. RESEARCH FINDINGS AND CONCLUSIONS

Mathematical modeling of the optimization process was developed in which an objective functionwas formulated. Based on the objective function, the location of the optimum point wasdetermined which extracted the optimum number of critical determinants.

The prominent criticaldeterminants identified are “Trusted services”, “Security” “Availability”, “Up-to-date information”and together they mayform the foundation of successful E-commerce operations. These determinants encompass three processes of E-commerce operations and they are most likely to have asignificant impact on customer’s perception of service quality.

Moreover, the researchfinding also suggests that Security and trusted serviceare the most influential determinant of E-commerce operations, which strengthens the extensive view of academics andpractitioners on the effect of trust in E-commerce operations

In particular, the determinants isolated here are wellsupported by the findings of Singh (2002). Her findings suggested e-search, e-response,e-transaction and e-payment, e-assurance and trust, and e-help and e-technologies asthe key determinants in e-service operations. "Navigability" and "Up to dateinformation" are part of e-search; similarly, "Fulfilment" falls within e-transaction ande-payment. In addition, "Trusted service" is part and parcel of e-assurance and trustwhereas "Responsiveness" is literally represented as e-response.

It is important to mention that the fact cannot be denied that critical determinantsand the progress of E-Commerce are in closeagreement. In addition usage of computational optimization technique, would provide better insights and understanding for lacuna's in promoting E-commerce operations. However by incorporating both overall and individual weight of thedeterminants, Optimization technique gives a more comprehensive picture of the actualweight of the determinants and offers a sound and reasonable solution on decidingwhat and how many critical determinants to concentrate.

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