Selection of Paramaters of Ecommerce Websites Using AHP

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Abstract

With the fast development of the E-commerce, it becomes critical to set up an E-commerce evaluation criteria system for online shopping. Analytic Hierarchy Process is a one of the multi-criteria evaluation method normally used. This paper aimed to find out the key factors that affect the E-commerce business. It gives an evaluation method for E-commerce in order to help researches and managers to determine the opportunities of better selection of e-commerce website based on parameters for future. Outlook, Operations and Services are the three broader categories desired by business professionals at the time of selection of best e-commerce website among all the available alternatives. The evaluation of parameters is done by using AHP and the ranking of parameters may help the business professionals to make best decision regarding design and operations of e-commerce websites.

Keywords: E-commerce Website, Parameters, Evaluation, AHP.

Introduction

'E-commerce', a well-known term, used for buying and selling of goods and services over the Internet. Ecommerce can be considered as an important component of e-business. The importance of e-commerce for consumers is freedom of choice, save time and effort. Ecommerce gives flexibility to its consumers by offering benefits of procurement and retailing of products and services at any time and any place, communicating and collaborating with other organizations and gathering information from real-time databases for future analysis. Some of the successful e-businesses providing products and services are e-ticketing for airlines and railways, banking services, computer hardware, software, electronic gadgets, books, clothing, flowers and gifts etc. that can be purchased online. Ecommerce has capability to reduce costs and potential to generate high revenue for businesses. Moreover, ecommerce also provides a platform to the small and medium enterprises to collaborate with bigger firms for the benefit of cost reduction and to serve huge customer database by taking advantage of value chain integration.

Ecommerce website is an interactive way to fulfill all requirements of individuals for all online purchases. E-commerce sites launch forums for its users where they can express and share their opinions and experience about a particular product or service. Business-to-Consumer (B2C) and Business-to-Business (B2B) are the two main sections of the activities of E-commerce.

In recent years, ecommerce can be considered as the fastest growing sector in India. The main drivers behind this success are contribution from all geographical regions including towns and cities, advancement in technology adoption, rising convergence of online and investors focusing more on increasing their market share rather than profits.

The selection of appropriate ecommerce website depends on various parameters including past experience and learnings with the portal. The outlook or appearance of the website, overall operations starting from order processing till dispatching of order and entire performance of ecommerce companies makes impact on final selection for repeated purchases of consumer. The e-commerce sites need to evaluate their services for their survival and growth and will help in better future prospects by retaining customers for long term.

Although e-commerce websites are growing at very high pace but still many barriers hinders its path to success. Supply chain management and poor infrastructure are huge obstacles which creates difficulties for key players of e-commerce. Further, as in online shopping, customer database seems to be increasing from time to time but customer loyalty is still a matter of concern. People usually prefer COD (Cash on Delivery) option for their online buying but this may create a difficulty of managing post payments to the owner of goods. Many governments polices like inter-state taxation rules, compliance frameworks and regulations creates lot of hurdles for them.

In this paper, Section-1 gives introduction about e-commerce. In section -2, literature review related to e-commerce and various parameters on which different websites will be evaluated and compared are discussed. Section -3 highlights the research methodology used for the paper. In section-4, ranking of parameters considered at the time of selection of best e-commerce website are done by using Analytical Hierarchy Process (AHP). In secton-5, results are discussed and conclusion of the study has been made.

Review of Literature

Zwass(1998) defined E-commerce as "the sharing of business information, maintaining business relationships, and the conducting business transactions by means of telecommunications networks". In India, ecommerce showed remarkable growth in past years and encouraged the trend of online shopping from traditional one (Sharma and Mittal, 2009). Although, many researchers also highlighted the risk involved in online shopping from internet. Past shopping experience, perceived risk level and future purchase intentions are the key drivers responsible to retain customers (Samadi and Ali, 2010).

Kim et al. (2003) identified six categories of e-commerce website evaluation through vast literature review. The identified categories are business function, corporation credibility, content's reliability, Web site attractiveness, systematic structure and navigation. Au Yeung and Law (2004) focused on usability and functionality in their study on applied the modified heuristic evaluation technique to compute Usability Hazards Indices of hotel Web sites in Hong Kong. Their study found that due to the strong support and wide operation scale, chain hotels received overall Usability Hazards Indices, which were significantly lowered than independent hotels. The three broader categories in perspective of customer for any e-commerce website is Outlook, Operations and Service. Outlook is a visual appearance based on the expectation for the future. It includes Appearance, Ease of Use, Content Quality, Navigation and Personalization.

Operations are business operations, which take cares of harvesting of value from assets owned by a business. In the e-commerce website the value derived from a physical asset is not considered. But it is more focused on intangible asset, like an idea, royalty etc. Pricing, shipping, Order Processing, Packaging and Security/Privacy are some of the parameters are used for the evaluation of operations in e-commerce industry.

Service is an action of helping or doing work for someone. A type of economic activity that is intangible, is not stored and does not result in ownership. A service is consumed at the point of sale. Services are one of the two key components of economics, the other being goods. Service includes Product Tracking, Product Assurance, Return Policy, Timely Delivery and feedback Policy. The details are discussed in the table 1.

Table 1 – Review of Parameters for E-Commerce Websites

Ategory	Features	References
Outlook		
	Appearance	(Park and Gretzel ,2007)
	Ease of Use	(Park and Gretzel ,2007) (Hausman and Siekpe, 2008)
	Content Quality	(De Wulf et al. ,2006) (Chae et al.,2002)
	Navigation	(Flavian et al. ,2009) (Zhang et al. ,2000)
	Personalisation	(Park and Gretzel ,2007) (Tsai et al., 2010)
Operations		
	Pricing	(Liang and Lai ,2002)
	Shipping	(Song and Zahedi ,2005)
	Order Processing	(Kim et al. ,2002)
	Packaging	(Huizingh and Hoekstra, 2003)
	Security/Privacy	(Korgaonkar and Wolin ,1999)
Service		
	Product Tracking	(Liang and Lai,2002)
	Product Assurance	(Gefen , 2002)
	Return Policy	(Liang and Lai(2002) (Hausman and Siekpe ,2008)
	Timely Delivery	(Reix, 2003)
	Feedback	(Agarwal and Venkatesh (2002)

Research Methodology

Satty (1980) developed a multi-criteria decision making method, known as Analytical Hierarchical Process (AHP). A well-defined and structured process which helps in dealing with both quantitative and qualitative techniques. AHP is widely applicable in almost all sectors like healthcare, education, government, supply chain and e-commerce etc. AHP evaluates on set of criteria and then make the final decision of selecting best alternative among all the alternatives taken for study.

In AHP, pair wise comparison matrices are created. The AHP generates final weights corresponding to each evaluation criterion on the basis of the decision maker's input. Next, for a fixed criterion, the AHP assigns a score to each option according to the decision maker's pair wise comparisons of the options based on that criterion. The higher the score, the better the performance of the option with respect to the considered criterion. Finally, the AHP combines the criteria weights and the options scores, thus determining a

global score for each option, and a consequent ranking. The global score for a given option is a weighted sum of the scores it obtained with respect to all the criteria.

It also provides a methodology to calibrate the numeric scale for the measurement of quantitative as well as qualitative performances. The scale ranges from 1/9 for least valued than, to 1 for equal and to 9 for absolutely more important than covering the entire spectrum of the comparison 9 as shown in table 2. Some key and basic steps involved in this methodology are (Saaty, 1980):

1. State the problem.

2. Broaden the objectives of the problem or consider all actors, objectives and its outcome.

3. Identify the criteria that influence the behavior.

4. Structure the problem in a hierarchy of different levels constituting goal, criteria, sub-criteria and alternatives.

Table 2: Scale for Quantitative Comparison of Parameters

Option	Numerical value(s)
Equal	1
Marginally strong	3
Strong	5
Very strong	7
Extremely strong	9
Intermediate values to reflect fuzzy inputs	2, 4, 6, 8
Reflecting dominance of second alternative compared with the first	Reciprocals

5. Compare each element in the corresponding level and calibrate them on the numerical scale. This requires n(n -1)/2 comparisons, where n is the number of elements with the considerations that diagonal elements are equal or '1' and the other elements will simply be the reciprocals of the earlier comparisons. 6. Perform calculations to find the maximum Eigen value, consistency index CI, consistency ratio CR, and normalized values for each criteria/alternative.

$$CI = (\lambda_{max} - n)/(n - 1)$$

where λmax is the maximum eigenvalue of the judgement matrix. This CI can be compared with that of a random matrix, RI. The ratio derived, CI/RI, is termed the consistency ratio, CR. Saaty suggests the value of CR should be less than 0.1.

RI values	n	2	3	4	5	6	7	8	9	10
	RI	0.00	0.58	0.90	1.12	0.12	1.32	1.41	1.45	1.51

7. If the maximum Eigen value, CI, and CR are satisfactory then decision is taken based on the normalized values; else the procedure is repeated till these values lie in a desired range.

Proposed Framework

A user when access any e-commerce websites then three major categories are main reasons responsible for his/her selection of website. From literature review, outlook, operations and service are considered to be three broader categories for selection. Further,

from past scholarly articles, it has been observed that Appearance, Ease of Use, Content Quality, Navigation and Personalisation are responsible to evaluate outlook or appearance of any website. Operations is said to be one deciding factor for attracting and retaining customers for long term. After discussing with experts and from literature, it is found that Pricing, Shipping, Order processing, packaging, security/privacy are the important features under operation. Service is something which worked as order winner rather than order qualifier. Organizations usually give utmost preference to serve customers with best quality. Product Tracking, Product Assurance, Return Policy, Timely Delivery, Feedback are the main parameters which should include under service as justified from past studies also.
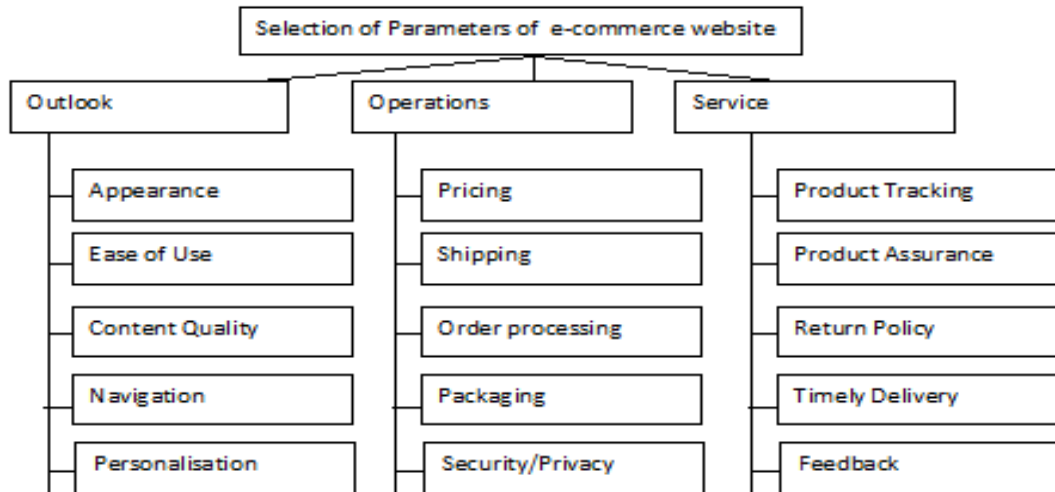

Figure 2. Proposed Framework for Selection of Parameters of e-Commerce Website

Findings and Results

In this analysis, the identified parameter from literature under Operations, Outlook and Service category are prioritized by using AHP methodology as discussed in section 3. The data for the study is collected through expert users. The findings of the evaluation by using AHP are shown in this section. In Table 3 the pair wise comparison matrix of three major categories required for selection of best ecommerce website is shown.

Table 3: Evaluation of Weights for Three Main Categories

	Operations	Outlook	Service	Average	Sum	Weighted Sum
Operations	0.65	0.62	0.66	0.64	1.94	3.007
Outlook	0.13	0.12	0.11	0.12	0.36	3.001
Service	0.21	0.25	0.22	0.22	0.69	3.002
					Lambda =	3.003

CR is 0.003, which is acceptable. According to our findings by using AHP, Operations (3.007) is most important category for selection of e-commerce website. Operations are followed by service (3.002) and then outlook (3.001). The results are in lined with past studies. It can be easily validated from past studies and also looking at shopping trends, users give first preference to ease of operations then to service and give last preference to outlook of website.

Table 4: Evaluation of Weights for Parameters Under Operations

	Pricing	Shipping	Order Processing	Packaging	Security / Privacy	Avg	Sum	Weighted Sum
Pricing	0.38	0.20	0.51	0.33	0.41	0.37	2.08	5.64
Shipping	0.13	0.07	0.02	0.05	0.05	0.06	0.32	5.06
Order Processing	0.05	0.20	0.07	0.14	0.08	0.11	0.58	5.21
Packaging	0.05	0.07	0.02	0.05	0.05	0.05	0.25	5.13
Security/ Privacy	0.38	0.47	0.37	0.43	0.41	0.41	2.20	5.35
							Lambda =	5.27

CR is 0.062 , which is acceptable According to our findings by using AHP, Pricing(5.64) is most important parameter for selection of e-commerce website under operations category. As shown in table-4, Security/Privacy, Order Processing, Packaging and Shipping having weights 5.35,5.21,5.13 and 5.06 respectively.

Table 5: Evaluation of Weights for Parameters under Outlook

	Pricing	Shipping	Order Processing	Packaging	Security / Privacy	Avg	Sum	Weighted Sum
Pricing	0.38	0.20	0.51	0.33	0.41	0.37	2.08	5.64
Shipping	0.13	0.07	0.02	0.05	0.05	0.06	0.32	5.06
Order Processing	0.05	0.20	0.07	0.14	0.08	0.11	0.58	5.21
Packaging	0.05	0.07	0.02	0.05	0.05	0.05	0.25	5.13
Security/ Privacy	0.38	0.47	0.37	0.43	0.41	0.41	2.20	5.35
							Lambda =	5.27

CR is 0.040, which is acceptable According to our findings by using AHP, Content Quality (5.37) is most important parameter for selection of e-commerce website under outlook category. As shown in table -5, Personalization, Navigation, Ease of Use and appearance having weights 5.28, 5.12, 5.09 and 5.04 respectively.

Table 6: Evaluation of Parameters under Service

Service	Product Tracking	Product Assurance	Return Policy	Timely Delivery	Feedback	Average	Sum	Weighted Sum
Product Tracking	0.12	0.17	0.05	0.10	0.14	0.12	0.61	5.22
Product Assurance	0.36	0.52	0.74	0.48	0.24	0.47	2.90	6.20
Return Policy	0.36	0.10	0.15	0.29	0.43	0.27	1.45	5.44
Timely Delivery	0.12	0.10	0.05	0.10	0.14	0.10	0.54	5.32
Feedback	0.04	0.10	0.02	0.03	0.05	0.05	0.24	5.09
							Lambda =	5.45

CR is 0.096, which is acceptable, according to our findings by using AHP, Product assurance (6.20) is most important parameter for selection of e-commerce website under service category. As shown in table -6Return policy, timely delivery, product tracking and feedback having weights 5.44, 5.32, 5.22 and 5.09 respectively.

Table 7: Local and Global Weights with Ranking of all Parameters

Parameters	Local Weights	Weightage	Global Weights	Rank
Appearance	5.0381439	3.00131796	15.12107171	15
Shipping	5.0577471	3.00714508	15.20937918	14
Ease of Use	5.0850085	3.00131796	15.26172734	13
Feedback	5.0866312	3.00262697	15.27325588	12
Navigation	5.1183678	3.00131796	15.36184906	11
Packaging	5.1302027	3.00714508	15.42726388	10
Order Processing	5.2064682	3.00714508	15.65660533	9
Product Tracking	5.2215661	3.00262697	15.67841521	8
Personalization	5.2790369	3.00131796	15.84406822	7
Timely Delivery	5.316283	3.00262697	15.96281473	6
security/Privacy	5.3490028	3.00714508	16.08522749	5
Content Quality	5.3701159	3.00131796	16.11742539	4
Return Policy	5.4404711	3.00262697	16.33570514	3
Pricing	5.6391173	3.00714508	16.95764395	2
Product Assurance	6.2004457	3.00262697	18.61762547	1

In table 7, the local and global weights of all parameters under all the categories are shown in decreasing order of their weights. From the analysis, it is find that product assurance is the most important parameters which users consider while selecting e-commerce website for shopping. Pricing is second important component considered.

Return, policy, content quality, security and privacy are next important parameters prioritized by business professionals at the time of selection.

The ranking of all the 15 parameters are evaluated and shown in table 7.

Conclusion

AHP is a more convenient approach suitable for this study. The parameters responsible for selection of e-commerce websites are identified through vast literature review. Based on experts' discussions, 15 parameters are finalized under three categories. Operations, Outlook and service are the three broader categories which make impact on final decision of selection of e-commerce website. The pairwise comparison matrices for all categories and parameters are generated on the basis of expert opinion. Then, by using AHP, the local and global weights for all parameters are calculated. Based on the results, Operations is found to be most important category among all. Product assurance is found to be most important parameter considered while selecting e-commerce website. Pricing is second important criteria desired by users. Then users also give importance to return policy and content quality as well. The study is very useful for decision makers to plan and design their websites as per the ranking shown in results. This study can be extended by considering more categories and parameters.

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