

An Integrated Approach for Measuring the Relative Importance of E-Marketing Tools for Online Businesses

K. M. Sam^{*1}, C. R. Chatwin²

^{*1}Department of Accounting and Information Management, University of Macau, Macau, China

²School of Engineering and Informatics, University of Sussex, Brighton, United Kingdom

^{*1}tonysam@umac.mo; ²c.r.chatwin@sussex.ac.uk

Abstract- An effective e-marketing strategy is an important ingredient for the success of any kind of business. E-marketing's uniqueness is created using a series of specific and relational functions that are combined with the 4P's to form the e-marketing mix elements, each of which contains associated e-marketing mix tools that are provided on business web sites to facilitate sales transactions. This research analyses the importance of each e-marketing tool related to its support of its e-marketing mix element by using an integrated approach which takes account of: i) the relevance of each e-marketing tool to its supporting e-marketing mix element and ii) comparisons of e-marketing tools within their e-marketing mix element. The results indicate the e-marketing tools which should be frequently addressed are very important for online stores developing their e-marketing strategy. This research concludes with a discussion of the accuracy and relative importance of the e-marketing tool weights.

Keywords- *E-marketing Mix Element; E-marketing Mix Model; E-marketing Tools; Factor Analysis; Analytical Hierarchy Process; Integrated Relative Weight*

I. INTRODUCTION

During the past 20 years, the popularity of the Internet has been growing exponentially [1]. As a result of the increased utility and bandwidth of Internet communications, the use of web browsers has increased dramatically over the past ten years. Thousands of businesses have exploited this great opportunity to create their own web sites that allow customers to purchase products directly from their browsers. Most commercial companies believe that they can generate a large amount of profit from the web. The collapse of dot-com boom caused many online businesses to terminate operations from April 2000 to December 2001. However, those e-retailers that developed and introduced new Internet-based marketing techniques (e-marketing), which were integrated into their current marketing strategy, managed to increase their business activities. Marketing operations should now be focusing on developing new paradigms for electronic commerce on the Web, rather than use the existing primitive 4Ps structure [2]. Many new models have been developed to replace the 4P model in the digital marketplace including the 4C model [3], 4S model [4] and 4Ps + P²C²S³ model [5]. This study investigates consumers' perceptions about the e-marketing mix provided by online business stores in order to facilitate sales transactions. The adopted e-marketing mix model should be based on the consumers' viewpoint.

The web-marketing mix 4S model [4] is based on the organization's viewpoint in addition to the consumers' viewpoint. This requires the identification of strategic objectives, classification of the potential competitors and customers of the site, assessment of the degree of readiness of the company for e-commerce, or recognition of the co-operation with other Internet partners outside the organization. This expensive investment is not required for the system reported herein.

For the 4Cs model [3], it is a customer-oriented marketing mix model which is quite relevant to this research. However, one of the 4Cs, satisfying consumer's costs, does not only concern price, which may be one of the most important factors in a consumers' purchasing decision. For the other Cs, they mainly focus on developing relationships with consumers.

A. E-Marketing Mix – 4Ps+P²C²S³ Model

Van Waterschoot and Van den Bulte [6] pointed out that the components of “communication” address “barriers to wanting”, whereas the sales promotion function addresses “barriers to acting”. They observed that “triggers to customer action” seem necessary in certain situations to induce the exchange. Hence, they termed sales promotion a “situational” function. On the basis of these distinctions, the marketing mix can be reclassified into the “basic mix” and the “situational mix”. In addition, since the sales promotion mix can apply across the full spectrum of the basic mix (the rest of the traditional marketing mix), it is considered by Van Waterschoot and Van den Bulte to be overlapping. The concepts developed by Van Waterschoot and Van den Bulte (1992) can be summarized in the form of the following axioms:

Axiom 1: Marketing functions are the appropriate properties for the classification of marketing tools.

Axiom 2: Some functions are essential and others are situational in nature.

Axiom 3: Some functions have a moderating effect across other marketing functions and are called overlapping functions.

Axiom 4: Functions are accomplished by marketing tools.

Axiom 5: A tool can serve one or several functions.

Based on the above axioms, Kalyanam & McIntyre [5] created a new E-marketing mix $4Ps + P^2C^2S^3$ model as illustrated in Fig. 1. The model consists of i) more components than 4Ps model in order to reflect the e-commerce environment and ii) e-marketing tools, which can influence consumer retention on the Internet [7] and play an important role in the formation of an effective e-marketing strategy [5][8], mapped into each component.

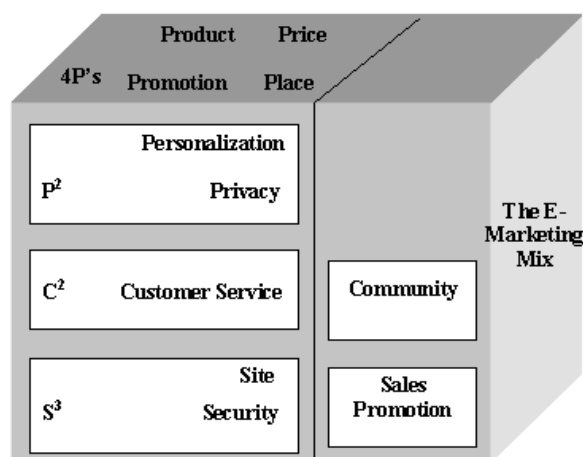


Fig. 1 E-marketing mix model: $4Ps + P^2C^2S^3$ [5]

In the $4Ps + P^2C^2S^3$ model, there are some customer-oriented e-marketing tools such as i) product configuration engine, ii) product image viewing tools, iii) online product discussions among consumers and iv) security techniques. For i), Maru Winnacker, the CEO of Project OONA, strongly believes that mass customization offers huge potential in the online market and it can bring customers and online retailers closer together [9]. For ii), according to Linda [10], many product items cannot be fully described with words and other tools such as: enlarged images with different colors, zooming and back views can better describe the product items. For iii), Nielsen [11] stated that the average social networking visitor is now spending almost 6 hours in April 2010, versus 3 hours, 31 minutes in 2009, an increase of almost 60% in one year. According to a recent survey more than half of all marketers are currently engaging in some form of social media activity with about 60% of them planning on increasing their spending in the near future [12]. After friends and family, the number one driver for brand trust is online reviews and feedback from social networking [13]. As a direct result, advertisers are moving from a more traditional broadcasting based marketing relationship with online consumers to a more interactive based marketing relationship, where consumers directly engage with marketing messages and pass them along to their friends via social networking sites [14]. As a result, the social networking sites can greatly affect online consumers' buying decision. This concern has been addressed in the $4Ps + P^2C^2S^3$ model. For iv), despite the high number of online shoppers, 150 million [15], it seems that only a small percentage-12%- of the European Internet users are truly confident when buying online [16] due to the security and privacy concerns. Based on the above observations, the $4Ps + P^2C^2S^3$ model is the most suitable choice for this research.

According to Sam and Chatwin [17], there is a strong correlation between e-marketing mix of online businesses and Internet consumers' decision making styles. If online business can measure their e-marketing mix elements accurately, it can certainly increase sales revenues. Regarding the $4Ps + P^2C^2S^3$ model, there has not yet been any significant research on the analysis of the importance of e-marketing tools relative to their associated e-marketing mix elements. The purpose herein is to evaluate how successful a business web site implements its e-marketing mix in a B2C environment.

II. METHODOLOGY

There are two e-marketing tools (Forward Auctions and Reverse Auctions) omitted from our research as they are not relevant in a B2C environment. In order to analyze the importance levels of e-marketing tools supporting the corresponding e-marketing mix elements, a marketing survey was conducted and the e-marketing tools were converted to the survey items shown in Table I. The target of this study was online consumers in Macau and the questionnaire was distributed to different industries in Macau via mail drop-off and email approaches. On this basis, a sample of 263 usable responses was gathered from diverse respondents with different demographic characteristics. Descriptive statistics related to the sample are presented in Table II.

TABLE I TWENTY-EIGHT ITEMS ABOUT E-MARKETING TOOLS

1. Different categories of product items available
2. Tool that can allow me to configure preferred product components
3. Tool that can allow me to view a product image closely from different angles
4. Online advertisement
5. Newsletter e-mail sent to me
6. The business web site contains messages or video clips about some products that are so attractive that I will inform others about that.
7. Suggestions regarding complementary items for my interested item
8. The link to the business web site can be accessed from some web sites
9. The product items of the business web site can be available through the shopping page of search engines such as Yahoo
10. The price of product items in the business web site can be changed in response to changing supply and demand conditions
11. I can enter my target price of my preferred product so that the business web site can list out suitable items
12. When I return to the business web site, it can show all those items that I visited before.
13. When I log into the business web site, it will send notice to me about new items based on my interest.
14. Based on my interested items, there are some suggested items already purchased by those customers who have the same interest.
15. Messages about privacy such as "we will not sell your personal data..."
16. Frequently asked questions / Help page
17. Quick response from e-mail enquiry
18. Chat rooms between customers and supporting staff
19. Order status tracking
20. Sales return policy
21. Online product discussions among customers
22. User rating and review at the product web page
23. Registry and wish list
24. The homepage of the business web site defines its features and the product categories clearly.
25. The contents of the business web site should be well organized and the background format is matched with the text style and color.
26. Tool that can allow me to search product items easily in the business web site.
27. Security techniques such as data encryption and secure socket layer (SSL)
28. Electronic coupon

TABLE II DEMOGRAPHICS OF THE RESPONDENTS

Demographics	Number	Percent
Gender		
Female	139	52.8
Male	124	47.2
Age		
< 29	119	45.2
30 – 39	92	35.0
40 – 49	42	16.0
> 50	10	3.8
Job positions		
Top and middle managers	37	14.1
Line managers	71	27.0
Frontline staff	117	44.5
Others	38	14.4
Industries		
Manufacturing	25	9.5
Marketing and service	76	28.9
Information technology	45	17.1
Government agencies	69	26.2
Others	48	18.3

A. Loading-Based Weights of E-marketing Tools

Each item was measured on a scale from one to five, starting from “strongly agree” to “strongly disagree”. The strong correlation between e-marketing mix of online businesses and Internet consumers’ decision making styles [17] indicates that the target respondents of the survey are online consumers.

For the data analysis process, confirmatory factor analysis was adopted to i) determine if the number of factors conforms to the 4Ps + P²C²S³ model and ii) evaluate the importance levels of e-marketing tools supporting the corresponding e-marketing mix elements. Furthermore, the varimax rotation method is employed to facilitate the interpretation of factors.

The results of factor analysis shown in Table III, which categorizes the 28 items into 11 factors (e-marketing mix elements) and shows the factor loading of each item (over 0.4), conform to the 4Ps + P²C²S³ model. Table IV presents Cronbach alpha reliabilities for the e-marketing tools within each e-marketing mix element. Cronbach Alpha values were computed to assess the reliability of the data collected. According to Leedy and Ormrod [18], a Cronbach Alpha value greater than 0.6 is regarded as satisfactory for reliability assessment. The overall Cronbach Alpha value was 0.8, which was higher than the acceptable value of 0.6 according to George and Mallery [19].

TABLE III THE LOADING OF EACH E-MARKETING TOOL CORRESPONDING TO ITS E-MARKETING MIX ELEMENT

Factor and corresponding items (e-marketing tools):	Loadings
Factor 1 – Product	
Different categories of product items available	0.773
Tool that can allow me to configure preferred product components	0.810
Tool that can allow me to view a product image closely from different angles	0.423
Factor 2 – Promotion	
Online advertisement	0.748
Newsletter e-mail sent to me	0.761
The business web site contains messages or video clips about some products that are so attractive that I will inform others about them.	0.578
Suggestions regarding complementary items for my interested item	0.500
Factor 3 – Place	
The link to the business web site can be accessed from some web sites	0.719
The product items of the business web site can be available through the shopping page of search engines such as Yahoo	0.472
Factor 4 – Price	
The price of product items in the business web site can be changed in response to changing supply and demand conditions	0.642
I can enter any target price of the preferred product so that the business web site can list out suitable items	0.603
Factor 5 – Personalization	
When I return to the business web site, it can show all those items that I visited before.	0.400
When I log into the business web site, it will send notice to me about new items based on my interest.	0.819
Based on my interested items, there are some suggested items already purchased by those customers who have the same interest.	0.685
Factor 6 – Privacy	
Messages about privacy such as “we will not sell your personal data...”	0.600
Factor 7 – Customer Service	
Frequently asked questions / Help page	0.556
Quick response from e-mail enquiry	0.753
Chat rooms between customers and supporting staff	0.410
Order status tracking	0.721
Sales return policy	0.500
Factor 8 – Community	
Online product discussions among customers	0.896
User rating and review at the product web page	0.539
Registry and wish list	0.343
Factor 9 – Site	
The homepage of the business web site defines its features and the product categories clearly.	0.740
The contents of the business web site should be well organized so that the background format is matched with the text style and color.	0.763
Tool that can allow me to search product items easily in the business web site.	0.752
Factor 10 – Security	
Security techniques such as data encryption and secure socket layer (SSL)	0.791
Factor 11 – Sales Promotion	
Electronic coupon	0.620

TABLE IV RELIABILITY COEFFICIENTS FOR E-MARKETING MIX ELEMENTS

E-Marketing Mix Elements	Cronbach Alpha Reliabilities
Product	0.69
Promotion	0.91
Place	0.85
Price	0.67
Personalization	0.87
Privacy	0.94
Customer Service	0.82
Community	0.84
Site	0.90
Security	---
Sales Promotion	---

Since the factor loadings shown in Table III represent the correlation coefficients between the items and the factors, the loading of an item refers to the weight of the item used to contribute to the corresponding factor.

The relative weight of each item (e-marketing tool) is computed according to the ratio of each item's factor loading to the sum of the absolute factor loadings of all items relative to their associated factors, respectively [20]. The formula is summarized as follows:

$$RW_i = \frac{Loading_i}{\sum_{j=1}^n Loading_j} \quad (1)$$

where, RW_i is the loading-based weight of the i^{th} e-marketing tool with respect to a particular e-marketing mix element and $Loading_i$ is the loading of the i^{th} e-marketing tool with respect to a particular e-marketing mix element.

Based on Table III and Equation (1), the loading-based weight of each item is shown in Table V.

TABLE V LOADING-BASED WEIGHTS OF E-MARKETING TOOLS

Factor and corresponding items (e-marketing tools):	Loading-Based Weight
Factor 1 – Product	
Different categories of product items available	0.385
Tool that can allow me to configure preferred product components	0.404
Tool that can allow me to view a product image closely from different angles	0.211
Factor 2 – Promotion	
Online advertisement	0.289
Newsletter e-mail sent to me	0.294
The business web site contains messages or video clips about some products that are so attractive that I will inform others about them.	0.223
Suggestions regarding complementary items for my interested item	0.194
Factor 3 – Place	
The link to the business web site can be accessed from some web sites	0.604
The product items of the business web site can be available through the shopping page of search engines such as Yahoo	0.396
Factor 4 – Price	
The price of product items in the business web site can be changed in response to changing supply and demand conditions	0.516
I can enter any target price of the preferred product so that the business web site can list out suitable items	0.484
Factor 5 – Personalization	
When I return to the business web site, it can show all those items that I visited before.	0.21
When I log into the business web site, it will send notice to me about new items based on my interest.	0.43
Based on my interested items, there are some suggested items already purchased by those customers who have the same interest.	0.36
Factor 6 – Privacy	
Messages about privacy such as “we will not sell your personal data...”	1.0
Factor 7 – Customer Service	
Frequently asked questions / Help page	0.189
Quick response from e-mail enquiry	0.256
Chat rooms between customers and supporting staff	0.139
Order status tracking	0.245
Sales return policy	0.171
Factor 8 – Community	
Online product discussions among customers	0.504
User rating and review at the product web page	0.303
Wish list	0.193
Factor 9 – Site	

The homepage of the business web site defines its features and the product categories clearly.	0.328
The contents of the business web site should be well organized and the background format is matched with the text style and color.	0.338
Tool that can allow me to search product items easily in the business web site.	0.334
Factor 10 – Security	
Security techniques such as data encryption and secure socket layer (SSL)	1.0
Factor 11 – Sales Promotion	
Electronic coupon	1.0

B. AHP-Based Weights of E-marketing Tools

The Analytic Hierarchy Process (AHP) has been proposed in recent literature as an emerging solution approach to large, dynamic, and complex real world multi-criteria decision-making problems [21, 22]. It is mainly used to derive ratio scales from pair-wise comparisons and is the most popular method of determining the relative weights of items. It has been used in a wide variety of business-oriented complex decision making problems, such as the strategic planning of organizational resources [23], the evaluation of strategic alternatives [24] and a firm's overall performance [25].

Under each e-marketing mix element, a pair-wise comparison is performed between two associated items (e-marketing tools) which are measured on a scale from 1 to 9 (1 means equally important and 9 means extremely important). The number of pair-wise comparisons depends on the number of items in a specific e-marketing mix element. Suppose n is the number of items, the number of pair-wise comparisons is $n(n-1)/2$. Fig. 2 shows the relative scale measuring how important the e-marketing tool on the left (item 1) is when compared to the e-marketing tool on the right (item 2). A judgment value on the left means item 1 is more important than item 2; while a judgment value on the right means item 2 is more important than item 1.

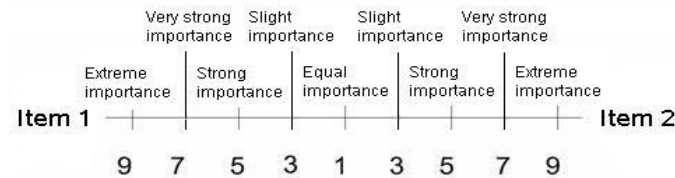


Fig. 2 Relative scale of measuring importance levels between Item 1 and Item 2

Assume an e-marketing mix element $e_x \in E$ and N_{e_x} is the number of e-marketing tools of e-marketing mix element e_x , a reciprocal N_{e_x} by N_{e_x} matrix M_{e_x} is created and it is filled up by using Equation (2):

$$f(x, y) = \begin{cases} V_{xy}, & V_{xy} \text{ lies on the left side of 1} \\ \frac{1}{V_{xy}}, & V_{xy} \text{ lies on the right side of 1} \end{cases} \quad (2)$$

where V_{xy} is the judgment value when comparing item x and y .

Suppose $I_{e_{xy}}$ is the item y of e-marketing mix element e_x and N_{e_x} is 3. The 3 by 3 reciprocal matrix of e_x is shown below:

$$M_{e_x} = \begin{matrix} & \begin{matrix} I_{e_{x1}} & I_{e_{x2}} & I_{e_{x3}} \end{matrix} \\ \begin{matrix} I_{e_{x1}} \\ I_{e_{x2}} \\ I_{e_{x3}} \end{matrix} & \begin{bmatrix} 1 & f(I_{e_{x1}}, I_{e_{x2}}) & f(I_{e_{x1}}, I_{e_{x3}}) \\ \frac{1}{f(I_{e_{x1}}, I_{e_{x2}})} & 1 & f(I_{e_{x2}}, I_{e_{x3}}) \\ \frac{1}{f(I_{e_{x1}}, I_{e_{x3}})} & \frac{1}{f(I_{e_{x2}}, I_{e_{x3}})} & 1 \end{bmatrix} \end{matrix} \quad (3)$$

Each column of the reciprocal matrix is summed as S_i where i indicates the column number and each element of the matrix is divided by S_i . Then, the normalized relative weight can be obtained and S_i of each column is 1. The normalized principal Eigen vector can be obtained by averaging across the rows as below:

$$W_{e_x} = \frac{1}{N_{e_x}} \begin{bmatrix} \frac{1}{S_1} + \frac{f(I_{e_{x1}}, I_{e_{x2}})}{S_1} + \frac{f(I_{e_{x1}}, I_{e_{x3}})}{S_1} \\ \frac{1}{S_2 * f(I_{e_{x1}}, I_{e_{x2}})} + \frac{1}{S_2} + \frac{f(I_{e_{x2}}, I_{e_{x3}})}{S_2} \\ \frac{1}{S_3 * f(I_{e_{x1}}, I_{e_{x3}})} + \frac{1}{S_3 * f(I_{e_{x2}}, I_{e_{x3}})} + \frac{1}{S_3} \end{bmatrix} \quad (4)$$

The normalized principal Eigen vector is also called the priority vector. Since it is normalized, the sum of all elements in the priority vector is 1. The priority vector W_{e_x} shows AHP-based weights among the e-marketing tools of the e-marketing mix element e_x .

Data analysis and matrix evaluation are conducted using software optimized for matrix computation, called GAUSSIAN. It evaluates the eigenvalues of a matrix. The software package of the AHP - Expert Choice is recommended for larger real world problems [26]. The results of AHP-Based weights along with the consistency ratios of corresponding e-marketing mix elements are presented in Table VI. Since all factors have consistency ratios of less than 0.1 (10%), the online consumers' judgment values about the importance of e-marketing tools are consistent.

TABLE VI AHP-BASED WEIGHTS OF E-MARKETING TOOLS

Factor and corresponding items (e-marketing tools):	Consistency Ratio	AHP-Based Weight
Factor 1 – Product	0.063	
Different categories of product items available		0.362
Tool that can allow me to configure preferred product components		0.469
Tool that can allow me to view a product image closely from different angles		0.169
Factor 2 – Promotion	0.057	
Online advertisement		0.227
Newsletter e-mail sent to me		0.343
The business web site contains messages or video clips about some products that are so attractive that I will inform others about them.		0.205
Suggestions regarding complementary items for my interested item		0.225
Factor 3 – Place	0.082	
The link to the business web site can be accessed from some web sites		0.638
The product items of the business web site can be available through the shopping page of search engines such as Yahoo		0.362
Factor 4 – Price	0.059	
The price of product items in the business web site can be changed in response to changing supply and demand conditions		0.582
I can enter any target price of the preferred product so that the business web site can list out suitable items		0.418
Factor 5 – Personalization	0.046	
When I return to the business web site, it can show all those items that I visited before.		0.127
When I log into the business web site, it will send notice to me about new items based on my interest.		0.392
Based on my interested items, there are some suggested items already purchased by those customers who have the same interest.		0.481
Factor 6 – Privacy	---	
Messages about privacy such as “we will not sell your personal data...”		1.0
Factor 7 – Customer Service	0.069	
Frequently asked questions / Help page		0.153
Quick response from e-mail enquiry		0.262
Chat rooms between customers and supporting staff		0.121
Order status tracking		0.288
Sales return policy		0.176
Factor 8 – Community	0.041	
Online product discussions among customers		0.442
User rating and review at the product web page		0.429
Wish list		0.129
Factor 9 – Site	0.077	
The homepage of the business web site defines its features and the product categories clearly.		0.326

The contents of the business web site should be well organized and the background format is matched with the text style and color.		0.332
Tool that can allow me to search product items easily in the business web site.		0.342
Factor 10 – Security	---	
Security techniques such as data encryption and secure socket layer (SSL)		1.0
Factor 11 – Sales Promotion	---	
Electronic coupon		1.0

C. Integrated Relative Weights of E-marketing Tools

The factor loading of each e-marketing tool can only indicate the degree of relevance between an e-marketing tool and its associated e-marketing mix element. The comparisons among e-marketing tools within a specific e-marketing mix element should also be taken into account when measuring their relative weights. As a result, integrated relative weight, which will take item factor loadings and item comparisons into account, can be evaluated by using Equation (5). Table VII shows the results evaluated for the integrated relative weights of the e-marketing tools.

$$RW_i = \frac{W_{L_i} + W_{AHP_i}}{2} \quad (5)$$

where W_{L_i} is the loading-based weight of item i and W_{AHP_i} is the AHP-based weight of item i .

TABLE VII INTEGRATED RELATIVE WEIGHTS OF E-MARKETING TOOLS

Factor and corresponding items (e-marketing tools):	Integrated Relative Weight
Factor 1 – Product	
Different categories of product items available	0.3735
Tool that can allow me to configure preferred product components	0.4365
Tool that can allow me to view a product image closely from different angles	0.190
Factor 2 – Promotion	
Online advertisement	0.258
Newsletter e-mail sent to me	0.3185
The business web site contains messages or video clips about some products that are so attractive that I will inform others about them.	0.214
Suggestions regarding complementary items for my interested item	0.2095
Factor 3 – Place	
The link to the business web site can be accessed from some web sites	0.621
The product items of the business web site can be available through the shopping page of search engines such as Yahoo	0.379
Factor 4 – Price	
The price of product items in the business web site can be changed in response to changing supply and demand conditions	0.549
I can enter any target price of the preferred product so that the business web site can list out suitable items	0.451
Factor 5 – Personalization	
When I return to the business web site, it can show all those items that I visited before.	0.1685
When I log into the business web site, it will send notice to me about new items based on my interest.	0.411
Based on my interested items, there are some suggested items already purchased by those customers who have the same interest.	0.4205
Factor 6 – Privacy	
Messages about privacy such as “we will not sell your personal data...”	1.0
Factor 7 – Customer Service	
Frequently asked questions / Help page	0.171
Quick response from e-mail enquiry	0.259
Chat rooms between customers and supporting staff	0.13
Order status tracking	0.2665
Sales return policy	0.1735
Factor 8 – Community	
Online product discussions among customers	0.473
User rating and review at the product web page	0.366
Wish list	0.161
Factor 9 – Site	
The homepage of the business web site defines its features and the product categories clearly.	0.327
The contents of the business web site should be well organized and the background format is matched with the text style and color.	0.335
Tool that can allow me to search product items easily in the business web site.	0.338
Factor 10 – Security	
Security techniques such as data encryption and secure socket layer (SSL)	1.0
Factor 11 – Sales Promotion	
Electronic coupon	1.0

D. Discussion of the Integrated Relative Weights of E-marketing Tools

Based on Table VII, the product configuration tool has the highest relative weight (0.4365); thus making it the most important e-marketing tool in the product element, hence, offering different product categories is more important than product viewing tools. For the promotion element, newsletter email (0.3185) is relatively more important than online promotional video clips (0.214) and suggestions regarding complimentary items (0.2095). For the price element, dynamic pricing in business web sites is slightly more important than allowing customers to enter a target price. With regard to personalization, the notices of suggested items (0.4205) and new items (0.411) related to consumers' are much more important than the notice of recently browsed items. For the customer service element, order status tracking and the quick response from email enquiry are the two of the most important e-marketing tools while the chat room between customers and supporting staff is the least important one. For community element, online product discussion among customers is slightly more important than customer reviews while wish list (0.161) is not important. For the site element, user-friendly product searching tools, clear web site features and product categories available at the homepage as well as organized web site contents are equally important.

E. Measuring the E-marketing Mix Element

The relative weights of e-marketing tools play a very important role in measuring their corresponding e-marketing mix element. Suppose there are n e-marketing tools inside an e-marketing mix element e . The formula for measuring the score of the e-marketing mix element is shown below:

$$W_e = \sum_{j=1}^n \begin{cases} RW_j \cdot X_j, & X_j = 1 \\ 0, & X_j = 0 \end{cases} \quad (6)$$

where W_e is the score of an e-marketing mix element e and RW_j is the relative weight of the j^{th} e-marketing tool with respect to a particular e-marketing mix element e . X_j is the Boolean value indicating whether the j^{th} e-marketing tool is supported. If $X_j = 1$, it means the j^{th} e-marketing tool is supported. If $X_j = 0$, it means the j^{th} e-marketing tool is not supported.

III. CONCLUSION

There are two popular methods of evaluating the relative weights of factor items: factor loading and AHP. However, the factor loading method can only be used to measure the relevance of each item to its associated factor; while the AHP method can only be used to compare between the items. By combining these two methods to evaluate the integrated relative weight of each e-marketing tool with respect to its e-marketing mix element, the importance level of each e-marketing tool corresponding to its e-marketing mix element can be ranked accurately. For the product element, the most important e-marketing tool is the configuration tool; while the newsletter emails are very important for the promotion element. Since the purpose of this research is to allow online businesses to develop more effective e-marketing strategies based on the analysis of their e-marketing tools, this guideline is very important for online businesses, as the managers can effectively allocate resources to different e-marketing tools when they are developing e-marketing strategies. Furthermore, the score of each e-marketing mix element plays a very important role when evaluating the overall performance of the e-marketing mix based on the supporting e-marketing tools. One of the future enhancements of this research is to develop an e-marketing mix analyzer tool based on this proposed integrated approach to analyze the e-marketing tools supported for online businesses.

ACKNOWLEDGMENT

This research has been conducted with the support from the graduate assistants at the University of Macau, who contributed their valuable time to distribute the survey questionnaires to the consumers. In addition, the Information and Communication Technology Office provided the software support so that the data could be analyzed by using suitable software.

REFERENCES

- [1] J. W. Hou and R. Cesar, "Internet Marketing: An Overview," University of Mississippi, School of Business Administration, United States, Technical Report, 2002.
- [2] D. L. Hoffman and T.P. Novak, "A New Marketing Paradigm for Electronic Commerce," *The Information Society, Special issue for electronic Commerce*, vol. 13, iss. 1, pp. 43-54, 1997.
- [3] B. Lauterborn, "New Marketing Litany: Four P's Passe: C-Words Take Over," *Advertising Age*, vol. 61, iss. 41, pp. 26, 1990.
- [4] Constantinides, "The 4S Web-Marketing Mix Model," *Electronic Commerce Research and Applications*, vol. 1, iss. 1, pp. 57-76, 2002.
- [5] K. Kalyanam, and S. McIntyre, "The Marketing Mix: A Contribution of the E-Tailing Wars," *Journal of the Academy of Marketing Science*, vol. 30, iss. 4, pp. 483-495, 2002.
- [6] W. Van Waterschoot, and C. Van den Bulte, "The 4P Classification of the Marketing Mix Revisited," *Journal of Marketing*, vol. 56, iss. 4, pp. 83-93, 1992.
- [7] Noor Raihan Ab Hamid and Ali Khatibi, "How Effective are Firms' E-Marketing Tools?" in *Proc. the 5th WSEAS International Conference on E-ACTIVITIES*, pp.183-188, Venice, Italy, 2006.
- [8] S. Krishnamurthy, "Introducing E-MARKPLAN: A Practical Methodology to Plan E-Marketing Activities," *Business Horizons*, vol. 49, iss. 1, pp. 51-60, 2006.

- [9] Mass Customization & Open Innovation News (2012). Interview with German handbag customizer Project OONA. Retrieved 12 December, 2012, from <http://mass-customization.de/2012/12/market-watch-project-oonaa-womans-paradise-part-ii.html>
- [10] B. Linda, "How Top Retailers Show Product Images" Retrieved 30 June, 2008, from <http://www.getelastic.com/how-top-retailers-show-product-images/>
- [11] W. Nielson, "Social Networks/Blogs Now Account for One in Every Four and a Half Minutes Online" Retrieved June 15, 2010, from <http://blog.nielson.com/nielsenwire/global/social-media-accounts-for-22-percent-of-time-online/>
- [12] G. Ramsey (2010). 10 Best Practices for Success with Social Media. New York, NY: eMarketer.
- [13] W. Nielson, "Friending The Social Consumer" Retrieved June 16, 2010, from http://blog.nielson.com/nielsenwire/online_mobile/friending-the-social-consumer/
- [14] J. Gibbs and S. Bruich (2010). Advertising Effectiveness: Understanding the Value of a Social Media Impression. New York, NY: The Nielsen Company.
- [15] A. Teodorescu, "CE propune noi reguli pentru a proteja consumatorii care facumparaturi online" *Wall-Street*, Retrieved December, 2009, from <http://www.wall-street.ro/articol/IT-C-Tehnologie/50223/CE-propune-noi-reguli-pentru-aproteja-consumatorii-care-fac-cumparaturi-online.html>
- [16] European Commission. (2009). *EYouGuide*. Retrieved December 2009, from http://ec.europa.eu/information_society/eyouguide/index_en.htm
- [17] K. M. Sam and C. R. Chatwin, "The Mapping Between Business E-Marketing Mix And Internet Consumers' Decision-Making Styles In E-Commerce," in *Proc. the Fifth International Conference on Electronic Business*, pp. 411-418, Hong Kong, 2005.
- [18] P. D. Leedy and J. E. Ormrod (2003). Practical research: planning and design. (8th ed). New Jersey, NJ: Prentice-Hall.
- [19] D. George and P. Mallery (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed). Boston: Allyn & Bacon.
- [20] M. G. Kang, G. M. Lee and I. H. Ko, "Evaluating Watershed Management within a River Basin Context Using an Integrated Indicator System," *Journal of Water Resources Planning and Management*, vol. 136, iss. 2, pp. 258-267, 2010.
- [21] M. M. Albayrakoglu, "Justification of New Manufacturing Technology: A Strategic Approach Using the Analytical Hierarchy Process," *Production and Inventory Management Journal*, vol. 1, pp. 71-76, 1996.
- [22] C. Carlsson and P. Walden, "AHP in Political Group Decisions: A Study in the Art of Possibilities," *Interfaces*, vol. 25, iss. 4, pp. 14-29, 1995.
- [23] T. L. Saaty, "How to Make a Decision: The Analytic Decision Process," *European Journal of Operations Research*, vol. 48, pp. 9-26, 1990.
- [24] J. Yang and H. Lee, "An AHP Decision Model for Facility Location Selection," *Facilities*, vol. 15, iss. 9/10, pp. 241-254, 1997.
- [25] J. Q. Yang and P. Shi, "Applying Analytic Hierarchy Process in Firm's Overall Performance Evaluation: A Case Study in China," *International Journal of Business*, vol. 7, iss. 1, pp. 29-46, 2002.
- [26] Expert Choice (1992). Expert Choice, Version 11.0. Expert Choice, Inc., Pittsburgh, PA.