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Preface

Philip Machanick, Overall Chair: SAICSIT'99

Running SAICSIT'99, the annual research conference of the South African Institute for Computer Scientists and Information Technologists, has been quite an experience.

SAICSIT represents Computer Science and Information Systems academics and professionals, mainly those with an interest in research. When I took over as SAICSIT president at the end of 1998, the conference had not previously been run as an international event. I decided that South African academics had enough international contacts to put together an international programme committee, and a South African conference would be of interest to the rest of the world.

I felt that we could make this transition at relatively low cost, given that we could advertise via mailing lists, and encourage electronic submission of papers (to reduce costs of redistributing papers for review).

The first prediction turned out to be correct, and we were able to put together a strong programme committee.

As a result, we had an unprecedented flood of papers: 100 submitted from 21 countries. As papers started to come in, it became apparent that we needed more reviewers. It was then that the value of the combination of old-fashioned networking (people who know people) and new-fashioned networking (the Internet) became apparent. While the Internet made it possible to convert SAICSIT into an international event at relatively low cost, the unexpected number of papers made it essential to find many additional reviewers on short notice. Without the speed of e-mail to track people down and to distribute papers for review, the review process would have taken weeks longer, and it would have been much more difficult to track down as many new reviewers in so little time.

Even so, the number of referees who were willing to help on short notice was a pleasant surprise.

The accepted papers cover an interesting range of subjects, from management-interest Information Systems, to theoretical Computer Science, with subjects including database, Java, temporal logic and implications of e-commerce for tax.

In addition, we were very fortunate in being able invite the president of the ACM, Barbara Simons as a keynote speaker. Consequently, the programme for SAICSIT'99 should be very interesting to a wide range of participants.

We were only able to find place in the proceedings for 36 papers out of the 100 submitted, of which only 24 are full research papers. While this number of papers is in line with our expectation of how many papers would be accepted in each category, we did not have a hard cut-off on the number of papers, but accepted all papers which were good enough, based on the reviews. Final selection was made by myself as Programme Chair, and Derrick Kourie, as editor of the South African Computer Journal. Additional papers are published via the conference web site.

We believe that we have put together a quality programme, and hope you will agree.

Acknowledgments

I would like to thank the South African Computer Journal production team, Andries Engelbrecht and Herna Viktor, respectively from the Department of Computer Science and Informatics, University of Pretoria, for their work on producing the proceedings.

The reviewers listed overleaf did an excellent job: many wrote very detailed reports, sometimes after being called in on very short notice. Inevitably, there were some glitches resulting from the unexpected workload, but the buck stops with the programme chair: I promise to do better next time.

I would also like to thank my own department for putting up with the extra work and expense that running a conference entails. I tried not to burden them with too much extra work, but our secretaries, Zalm Gowar and Leanne Reddy, inevitably had to take on some extra work. John Ostrowick provided valuable assistance with design of our web pages and call for papers poster. Carol Kernick, who handles our finances and membership records, did a fine job of keeping up with the demands of the conference.

Finally, I would like to thank our sponsors, whose contribution made this conference been possible:

- PricewaterhouseCoopers – sponsored generous prizes and the conference banquet
- National Research Foundation (NRF) – provided financial support
- University of the Witwatersrand – provided financial support
- Programme for Highly Dependable Systems, University of the Witwatersrand – provided financial support
- Standard Bank – provided financial support
Editorial

- Apple Computer - provided equipment for the conference
- Qualica - provided technical support including helping with the conference web site

Web Site

For more information about SAICSIT, including a pointer to the conference site, see <http://www.saicsit.org.za>.

Referees

- Department of Computer Science, University of Pretoria
  - Derrick Kourie
  - Bruce Watson
  - Vali Lalioti
  - Andries Engelbrecht
  - Ivan Mphahlele
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  - Gernot Goebbels
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  - Peter Warren
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  - Kurt April
- CSIR
  - James Jardine
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  - Shaun Bangay
  - Peter Clayton
  - John Ebden
  - Richard Foss
  - George Wells
  - Peter Wentworth
- Information Technology Division, Rhodes University
  - Caro Watkins
- Department of Information Systems, Rhodes University
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  - Dave Sewry
- Department of Informatics, University of Pretoria
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  - Herna Viktor
  - Niek du Plooy
  - Elsie van Rooyen
  - Machdel Matthee
  - Alan Abrahams
  - Jackie Phahlamohlaka
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  - Dwight Makaroff
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  - Peter Shackleton
  - Tas Adam
  - Alastair Wallace
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  - Jerzy Lepa
  - Geoff Sandy
  - Rod Turner
  - Alastair Wallace
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• Department of Computer Science, Universidade do Vale do Rio dos Sinos - UNISINOS Rio Grande do Sul
  - Marcelo Walter

• School of Information Technology & Mathematical Sciences, University of Ballarat
  - Binh Pham
What are Web Sites used for - Cost Saving, Revenue Generating or Value Creating?

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Abstract

For responding to the previous debate about whether Web sites can be more properly used as a cost saving or revenue generating devices. The author interprets Phelan’s internet selling matrix in a particular way to provide an insight about what industries can use web sites as a selling device and What industries can use web sites for cost saving purposes. Then the author empirically test the typology of internet selling matrix and also explores other usage (customer-relation development) of Web sites in different industry.

Keywords: Electronic Commerce, Strategic Analysis, Business Model, Functional Analysis, Web-site Study

Computing Review Categories: D.2.0, H.3.5

1 Introduction

The recent development of Electronic Commerce is revolutionizing the way of doing business. However, our knowledge about the use of Web site as a competitive advantage is controversial. Those different views of previous researchers can be conveniently and tentatively classified into two categories: cost and transaction (or Revenue generating) approaches. The cost approach proposes that the evaluation of Web site performance should be based on cost-saving measurement (PERTERSON et al. 1997) (BLOCH, 1996). On the other hand, the transaction approach propose that the ultimate measure is the revenue generating capabilities of Web sites (KOTIA 1998) (DUTTA, KWAN et al. 1998) (LIU 1997). To understand this issue is important that many firms started investing without first having a sound business strategy (BLOCH, 1996). As the costs of running an on-line presence increase, companies would have left the Web, as they can’t find enough business justification to maintain their presence. A key strategy have to be shaped before investment and the objective of this paper is to understand how web sites are used differently in different industries-i.e. for cost saving, revenue generating or other uses?

1.1 Proposed solution: A particular interpretation of Phelan’s Internet Selling Matrix

For clarifying to such a question, the author adopts Phelan’s Internet Selling Matrix (illustrated in Figure 1) which provides a two axis (perceived risk and channel costs) contingency. According to the author’s interpretation of this matrix, for Web sites in industries like car and real estate, which fall into the category of higher channel costs and higher perceived risk, a cost-saving evaluation is more appropriate since products in these industries are less likely to be bought on line. On the contrary, for Web sites in industries like travel and software industries, which fall into the category of lower channel costs and lower perceived risk, a transaction approach evaluation would be more appropriate.

1.2 Analysis and comments on Phelan’s Internet Selling Matrix

Considering the scarcity of rigorous academic research in the nascent stage of the Web site study, the author proposes that Phelan’s Internet Selling Matrix provides an initial and important insight into what market conditions might mediate the way Web sites are leveraged in different industries. However, Phelan’s Internet Selling Matrix is not without its limitations. One primary assumption in such typology is its cost-based approach that assumes only cost elements (risk cost, channel cost) to determine the use (or, in our terms, ‘functions’) of Web sites. Such an assumption will be doubtful if the author sees the Web site as a resource and examine it from a Resources Based View, which propose that firms employ internal resources for “creating positives” rather than for cost saving reasons (CONNER 1991). This is why the author adds the value-creating dimension (Relationship development) in the distribution channel functions list because the author believes Web site resources should be considered not only as a cost saving but also value creating devices for firms. By “value”, the author means not only short term “revenue” generating, but also long term “relationship building” with customers. To empirically test such a Web-usage proposition, the author develops a list of distribution- channel functions (abbreviated as “channel functions” in this paper) to test the hypotheses derived from the Internet Selling Matrix. In following paragraphs, the author first describes the channel
functions and then the hypotheses.

2 Terms and Definitions

There are two terms in this paper about channel functions with which the author would like to familiarize our readers. These are Classical channel functions and Customer relationship functions. For mapping the activities of Web sites, the author summarizes fifty functions (as illustrated in Table 1) from previous literature in distribution channel research and electronic commerce research. In this research context, these fifty functions are classified into following two categories: The Classical Distribution Channel functions and Customer Relation Development functions. For the convenience of identifying related functions, each time the author mentions a function it is followed by a sequential number. For example, the first function in our function list is the "recruiting resellers" function and, in this paper, it will be followed by "(#1)" to specify its number on our function list.

2.1 Classical Channel Functions

Classical channel functions are those tasks found in the traditional approach of industrial product distribution systems. These functions can be conveniently classified into five channel types (KOTLER 1997): Communication, Transaction, Distribution, Service and Risk. On the other hand, due to the fact that the interaction features of the Web site make itself also a powerful tool in developing customer relationships, the author adds another category of functions- "Customer relationship development", into our analysis.

2.2 Customer Relation Functions

Briefly speaking, Customer Relation Functions are those functions which can promote the three levels (i.e., economic, social and structural) of relationship. For example, virtual interaction with sales men (#33) and forum (#34) functions enable consumers to interact with others and develop 'social relationships', whilst secured, anonymous interaction (#35) facilitates the relation-building process. Prepurchase experience (#36) and Hedonic value (#37) functions provide the consumer with 'economic-based benefits' by aiding consumers to avoid unnecessary purchase and by giving out free gifts or games in the online shopping process.

One reminding point in adopting the channel function view is that although conceptually distinct, in the context of consumer marketing these channel functions frequently overlap (PERTERSON et al. 1997) p334. So, beside those functions listed under "Relationship Development" category, some channel functions also have the relationship development functionality, which will be detailed in the interpretation section.
<table>
<thead>
<tr>
<th>6 Channel Types</th>
<th>Items of Functions: 42</th>
<th>Number of Functions #: 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>1. Recruiting resellers</td>
<td></td>
</tr>
<tr>
<td>(1-6)</td>
<td>2. Training Reseller sale forces</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Providing information to customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. (a) products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. (b) company</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. (c) co-production</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Persuasion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. (a) Price discount of standard product (also #9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. (b) expert’s opinion (on product, on site)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Market research</td>
<td></td>
</tr>
<tr>
<td>RBV</td>
<td>6. Sharing knowledge of local market conditions</td>
<td></td>
</tr>
<tr>
<td>Transaction</td>
<td>7. New account solicitation</td>
<td></td>
</tr>
<tr>
<td>(7-15)</td>
<td>8. Solicitation of current accounts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Promotion to final customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. (a) Maintaining virtual retail showrooms (image or catalogue, which is different from 3a) which is only textual information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. (b) a real showrooms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Negotiation prices and terms of sale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12. Order processing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13. Billing customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14. Handling collections</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15. Avoiding salesmen hassles</td>
<td></td>
</tr>
<tr>
<td>Distribution (16-21)</td>
<td>16. Accumulating (variety source to single source)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17. Sorting out (from heterogeneous to homogeneous)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18. (a) Assorting (variety source to single source) finished good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18. (b) Allocation (from big Q to q) finished good</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19. Inventory storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20. Product transportation:</td>
<td></td>
</tr>
<tr>
<td>Service :</td>
<td>21. Providing technical service and advice (counter knowledge variance) (salesman like service) on the process and products*</td>
<td></td>
</tr>
<tr>
<td>(22-26)</td>
<td>22. Customizing product or process **</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. (a) Customized Purchased product</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. (b) Customized Purchasing process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. (c) Customized Purchasing sites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>23. Product maintenance and repair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>24. Handling returned products (customer complaints)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25. Handling product recalls</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26. Inventory financing</td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>27. Conducting credit checks</td>
<td></td>
</tr>
<tr>
<td>(27-32)</td>
<td>28. Providing credit to final customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>29. Ownership of inventories (this is a problem of %)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30. Warehouse investment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31. Product liability (risk protection for suppliers)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32. Privacy risk protection for customers</td>
<td></td>
</tr>
<tr>
<td>Relation development:</td>
<td>33. virtual (Physical) interaction with sales man</td>
<td></td>
</tr>
<tr>
<td>Entertaining, Social Value Creating Dimension and Experience</td>
<td>34. Forum: (interaction with other customers)</td>
<td></td>
</tr>
<tr>
<td>#22(33-43)</td>
<td>35. Secured, anonymous interaction?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36. Prepurchase experience (can be degree difference)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37. Hedonic value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>38. Find alliance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>39. In different languages (targeting different markets?)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40. Broad scope of MERCHANDISE CHOICE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. Complementary information and goods (complementary to product the author bought)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. (a) Complementary information and service free</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. (b) Complementary information and service sale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>42. Creating new business</td>
<td></td>
</tr>
</tbody>
</table>

* also see the service components table 5-5 p215 (BERMAN 1996)

** "Customization function" is a service also a customer relationship function see p208 (BERMAN 1996)

Table 1: Channel functions
3 Hypothesis

To test the validity of Phelan's (cost approach) Internet selling matrix, the author develops the following two testable hypotheses:

Since the travel industry is located in the lower channel cost and moderate high perceived risk cell (3b) of the Internet Selling Matrix, the author would expect to see more functions carried out by the majority of Web sites (i.e., the industry-wide functions) in the travel industry than in the other two industries (Hypothesis 1). The same principle is applicable to the hypothesis of comparing the book and the automobile industry (Hypothesis 2). Thus the author has the following two hypotheses (as illustrated in Figure 2):

3.1 Hypothesis 1

The number of functions of Web sites in the travel industry shall be greater than that of the book industry and the automobile industry.

3.2 Hypothesis 2

The number of functions of Web sites in the book industry shall be greater than that of Web sites in the automobile industry.

4 Methodology

This section describes how the author collected data, codified functions and conducted statistical treatment of data for testing our hypotheses.

4.1 Data Collection

Data collection includes the selection of industry and Web sites. The author selected the travel industry to represent firms in category 1 of the Internet Selling matrix, the book industry for category 2 and the automobile industry for category 3. The selection of these three industries allows us to contrast the different (high, moderate, low) contingencies in the two dimensions of channel costs and perceived risk. For example, concerning channel cost, buying a Car occur high channel costs; book, moderate; travel, low. Concerning perceived risk, buying a Car on-line is high perceived risk; travel, moderate high risk; book, moderate low risk.

For selecting Web sites within each industry, the author first examine the press-reported Web sites in these industries. The press-reported sites are chosen for two reasons. First, in terms of publicity exposure, they are more or less the same. Secondly, the best-reported sites are more comparable in terms of technical design quality due to the frequent patronage of Web users. However, for avoiding bias, the second source of selecting "normal" sites is to type in the key words "travel agent" "car sale" and "book store" in an internet research engine (in this case, "Yahoo") and the author randomly chose some sites for observation. Totally, there are 60 sites analyzed which include 36 car sites, 11 travel sites, 11 book sites.

4.2 The codification of Web site functions

Sites are analyzed according to the grill of 50 channel functions. Since the channel functions list is a generic typology, to apply them to a specific industry the author needs to first establish the operational meaning of these functions in a specific industry. This is done by consulting the field experts. For example, the author asks a travel agent who has worked in travel agency for 4 years to check our (generic) function list and specify the operational meaning (or practice) of these functions in the travel industry. The second step is to operationalize the above industry-specific functions into the Web site functions. This is done by analyzing practices of best-reported sites (in terms of Web page visits) and noting the specific Web practice corresponding to channel functions. Finally, the author prints out Web pages, "mark" and "count" the number and types of channel functions according to the established code rules. The treatment time of a site is generally around 2-3 hours.

4.3 Statistical treatment

To identify the representative industry-specific functions, the author adopts the Functional Spin-off theory (Mallen 1973) in the distribution channel literature (Frazier 1990). Functional spin off theory predicts that if marketing intermediaries (i.e. Web sites in this context) characterize an industry, their nature will be determined by the mix of functions and sub-functions spun off. For example, if the ownership function is a prevalent spin-off function, then the merchant will be a prevalent type of marketing intermediary in the industry (Mallen 1973) p24. For finding the representative functions of Web sites in an industry, the author introduce following two terms. First, an industry-wide function is a function which has been adopted by more than half of the sites in the same indus-
try, it represents one of the typical functions of Web sites in that industry. Also according to the Functional Spin-off theory, the industry-wide function of Web site is theoretically the function most efficiently carried out by Web sites in that industry. Secondly, to further compare different industries, the author also identifies the Empirically-Unique-industry-wide function so that if, in our study, an industry-wide function appears only in one industry and not in others then it is termed an Empirically-unique-industry-wide function. The significance is to identify the industry specific functions. Collectively, these industry-wide functions and Empirically-Unique-industry-wide functions can provide us different profiles of Web sites in different industries.

5 Results

The summarized results are listed in Tables 2 and 3. The empirical evidence supports hypothesis 1 that Web sites in the travel industry have more functions (30) than the book industry (20) and the automobile industry (25). However, the empirical evidence does not support hypothesis 2 and the automobile industry actually has more industry-wide Web functions (25) than the book industry (20), rather than less as predicted by the Internet Selling Matrix of Phelan.

To further investigate the rationale for such a discrepancy as the automobile industry having more functions than Phelan's matrix hypothesized, the author further examined what are the extra functions carried out in the automobile industry, i.e. the empirically-unique-industry-wide functions of the automobile industry. Consequently, the automobile industry has the largest number of the empirically-unique-industry-wide functions (total number: 6) (as illustrated in Table 4) while the book industry has only one and the travel industry has three. Among these six unique industry-wide functions of the automobile industry, most functions (4 out of 6) are "relation development" functions. And if compared only with the book industry (since, theoretically, the number of sites in the automobile industry should be less than the book industry), sites in the automobile industry feature the other 7 extra functions like (#3, 6, 7, 8, 22a, 33 and 40) as illustrated in Table 4) that give it in total 13 more functions than the book industry (see Table 4).

6 Interpretation

The author’s interpretation of this discrepancy concerning the numbers of industry wide functions in Web sites between the automobile and the book industry (Table 4) is described in the following paragraphs (or as depicted in Figure 3):

6.1 Heterogeneous Leverage of Homogenous Resource (Web sites) in the three industries

1. The fact that the automobile industry has the greatest number of unique functions (6) seems to suggest that the automobile industry can exploit the Web site resources in a particular way.

2. Point 1) is further strengthened by the observation that the majority (5 out of six) of the unique industry functions are related to relationship development functions (Providing credit to customers (#28), Forum (#34), Hedonic Value (#37), Complementary information sale (#41a) and Creating new business (#42). These functions are related to customer relationship development since they either provide economical and social benefits (i.e., functions #28, 34, 37, 41a) or are the consequence of good customer relationship (i.e., function #42) as discussed previously. These extra "relationship development functions" seem to suggest that the automobile industry firms use the Web site to obtain customer relationship (a value creating) which is different from the revenue generating purpose of other two industries.

3. The other complementary point based on the difference between the automobile and the book industry is that, in addition to the 6 unique industry wide functions of the automobile industry, what distinguishes between Web sites of the automobile industry and those of the book industry are the following 7 functions: co-production (#3), sharing knowledge of local market conditions (#6), New account solicitation (#7), Solicitation of current account (#8), allocation (#18), customized product (#22a), virtually interaction with sales men (#33), broad scope of Merchandise choice (#40). Except the broad scope of Merchandise choice (#40) and allocation (#18) functions, these functions also enable firms to obtain more customer information, develop relationship and take the advantage of exist-
6.2 Proposed integration of Value Dimension into Internet Selling Matrix

Secondly, while Phelan’s analysis work includes the two dimension of products: namely, channel cost (inspection and transportation costs) and perceived risk, the finding of this paper suggests that the third dimension (i.e., value of product) to be further integrated into future analysis (as shown in Figure 4). What is interesting is the tension between the original risk element and our proposed value element. Normally, for on-line sales, the higher value of products are linked to higher perceived risk and should reduce the number of functions a Web site can perform (which in turn seems to imply Web sites have less value to the-higher-value- product industry than to that of the-lower-value- product as suggested by one article of The Economist (KOTHA 1998) see also Figure 5). But here, the empirical evidence apparently indicates that the automobile industry exploits Web sites to get more valuable intangible resources- customer relationship and customer information. In this sense, Web sites can actually be recognized as a more valuable resource in the automobile industry than in other industries where Web sites are used only as a revenue-generating device.

7 Conclusion

Overall, the author draws the following points as our conclusions (as illustrated in Figure 3):

1. In this research, Phelan’s Internet Selling Matrix has been partially validated (i.e., the travel industry has the largest number of Industry-wide functions) and partially rejected (i.e., the book industry does not have

<table>
<thead>
<tr>
<th>6 Channel Types</th>
<th>Travel (11 sites)</th>
<th>Book (11 sites)</th>
<th>Automobile industry (36 sites)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication (1-6)</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Transaction (7-15)</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Distribution (16-21)</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Service *(22-25)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Risk Assumption (26-32)</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Relation development: (33-42)</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 2: Results (by function categories) of Comparison Among 3 Industries

So while Phelan’s work presents a first step in understanding the advantage of Web sites as an information channel (rather than only advertising or sale channel), the finding of this paper adds one more brick by suggesting that the Web sites in the automobile industry are found to be used also as “relationship development” channel (as illustrated in Figure 3).

[Figure 4: Suggestion of Future Modification]

[Figure 5: A proposed value of Web site in different industries by “The Economist”]
<table>
<thead>
<tr>
<th>Channel Types</th>
<th>Functional Tasks</th>
<th>Travel</th>
<th>Book</th>
<th>Car industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>1. Recruiting resellers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1-6)</td>
<td>2. Training reseller sales forces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Providing information to customers</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>4. Persuasion</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>5. Marketing research (channel wide functions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Sharing knowledge of local market conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transaction</td>
<td>7. New account solicitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7-15)</td>
<td>8. Solicitation of current accounts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Promotion to final customers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. (a) Maintaining virtual retail showrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. (b) Real showrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11. Negotiation prices and terms of sale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12. Order processing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13. Billing customers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14. Handling collections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15. Avoiding salesmen hassles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>16. Accumulating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(16-21)</td>
<td>17. Sorting out</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>18. (a) Assorting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18. (b) Allocation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>19. Inventory storage</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>20. Product transportation</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Service</td>
<td>21. Providing technical service and advice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(22-26)</td>
<td>22. Customizing product or process</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>22. (a) Customized Purchased product</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. (b) Customized Purchasing process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22. (c) Customized Purchasing sites</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23. Product maintenance and repair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24. Handling returned products</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>25. Handling product recalls</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>26. Inventory financing</td>
<td></td>
<td></td>
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<tr>
<td>Risk</td>
<td>27. Conducting credit checks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(27-32)</td>
<td>28. Providing credit to final customers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29. Ownership of inventories</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>30. Warehouse investment</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>31. Product liability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relation</td>
<td>32. Privacy risk protection for customers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>development</td>
<td>33. Virtual (Physical) interaction with salesman</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertaining, Social Value Creating</td>
<td>34. Forum: (interaction with other customers)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#22(33-43)</td>
<td>35. Secured, anonymous interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36. Prepurchase experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37. Hedonic value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>38. Find alliance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>39. In different languages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40. Broad scope of MERCHANDISE CHOICE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. Complementary information and goods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. (a) Complementary information and service free</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>41. (b) Complementary information and service sale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42. Creating new business</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: Unique industry-wide functions (criteria % > 0.5). If more than half of sites in one industry carry a certain function, then that function is marked by a "1".

Table 3: Results (by functions) of Comparison Among 3 Industries
more industry-wide functions, as hypothesized, than the automobile industry).

2. Based on the fact that the majority (5 out of 6) of Unique-Industry-Wide functions in their Web sites of the automobile industry and the majority (6 out of 7) of difference of Web site functions between the book and automobile industries are related to relationship development functions, the author proposes that the automobile industry does use Web site as a strategic resource, which focus on acquiring the intangible resources (customer information, customer relationship) than purely traditional thinking of "cost saving" or "transaction".

3. Though not formally hypothesized and tested, the proposition that the value of product would increase number of industry wide Web functions raised in the previous section indicates the potential for future research.

7.1 The Managerial Implications

Based on the highly interesting feedback in response to our findings from managers in several leading companies, The author proposes that our results shall be interested to managers at least in channel design (or dis/reintermediation) and competitive issues as described in the following paragraph.

1. The function analysis developed here can be a useful guide for managers in rethinking their distribution channel design. These 50 functions can serve as an initial cookbook guide (or receipe) to be further developed, or tailored for fitting specific industry conditions and aide managers to think about the disintermediation (i.e., what functions they can put in the Web site) and reintermediation (i.e., what functions be carried out by traditional intermediaries like car dealers) issues.

2. The list of Industry-wide functions can also be a strategic necessity guide for managers in thinking about competitive issues. For example, theoretically these functions represent ones which can be the most efficiently carried out by Web sites in different industries. For Web-based firms competing on a "cost strategy", these industry-wide functions represent the basic functions they can or must adopt into their sites to be as efficient as their competitors. On the other hand, for Web-based firms adopting a "value strategy", they probably need to focus on either doing better in some of these functions or doing other functions (to differentiate from these industry-wide functions) to be competitive.

7.2 Limits

The main limit of such an approach lies on the lack of a rating scale. In analyzing Web sites, the author uses only "function counting" (i.e., what functions a Web site carries) but no rating scale (i.e., How well a Web site carries a function ). Because, the author considers that, if the author did rating, the rating scale might be biased due to the fact that the rating scale is subject to subjective evaluation and that previous research indicates that there is actually a gap between different (i.e., customer and Webmaster) groups in such an evaluation p162 (LIU 1997). Without the rating scale, the author are limited in further linking up to the consequential performance prediction. For example, even though site A would have more functions than site B, site A might actually perform better than site B by focusing on fewer but key functions. The author are also limited in answering the disintermediation issue that a function being able to carried out by Web site does not necessarily lead to the disintermediation effect. Traditional intermediaries might also carry out the same functions in a complementary way.

7.3 Future Research

Finally, the author proposes future research in following directions:

Table 4: Books and Automobile industry comparison

<table>
<thead>
<tr>
<th>Channel type</th>
<th>Functional Tasks #</th>
<th>Books and car comparison</th>
<th>Relationship development functions and Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. (c) co production (for by others)</td>
<td>0</td>
<td>1</td>
<td>Social benefits</td>
</tr>
<tr>
<td>6. Sharing knowledge of local market conditions</td>
<td>0</td>
<td>1</td>
<td>Results of Customer R.</td>
</tr>
<tr>
<td>Transaction</td>
<td>7. New account solicitation (#47)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>(7-15)</td>
<td>8. Solicitation of current accounts (#47)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>18. (b) Allocation of finished good</td>
<td>0</td>
<td>1</td>
<td>Not Customer R. function</td>
</tr>
<tr>
<td>22. (a) customized purchased product</td>
<td>0</td>
<td>1</td>
<td>Financial and/or social R.</td>
</tr>
<tr>
<td>Relation development</td>
<td>28. Providing credit to final customers</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Entertaining, Social</td>
<td>33. Virtual (physical) interaction with salesman</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>(27-32)</td>
<td>34. Forum: (interaction with other customers)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>37. Hedonic value</td>
<td>0</td>
<td>1</td>
<td>Financial and/or social R.</td>
</tr>
<tr>
<td>40. Broad scope of MERCHANDISE CHOICE</td>
<td>0</td>
<td>1</td>
<td>Not Customer R. function</td>
</tr>
<tr>
<td>41. (a) Complementary information and service free</td>
<td>0</td>
<td>1</td>
<td>Financial benefits</td>
</tr>
<tr>
<td>42. Creating new business</td>
<td>0</td>
<td>1</td>
<td>Results of Customer R.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abreviation R denotes Relation
Legend: Unique-Industry-Wide Functions indicated in italic

Research Article
1. While our initial step tests only 3 industries, further validation of Phelan's Internet Selling Matrix by testing industries in all 6 categories would bring us more insights.

2. The hypothesis developed here (The value of products has positive relationship with number of relationship development functions on Web sites) should be further tested.

3. Once the "product value-number of customer relation functions" hypothesis is tested, the author can further integrate the "value dimension" with the other two dimensions (perceived risk, inspection costs). Specifically, the author should elaborate the tension between commodity's value and perceived risk with the number of functions carried out by Web sites in different categories of Phelan's matrix. Our initial hypothesis is that while the value of commodity will have positive relationship with firms' reliance on using Web as relationship development media, higher perceived risk would reduce transaction related functions, but also increase risk protection functions.

References


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  - the author’s affiliation and address
  - an abstract of less than 200 words
  - an appropriate keyword list
  - a list of relevant Computing Review Categories
  - Tables and figures should be numbered and titled.
- References should be listed at the end of the text in alphabetic order of the (first) author’s surname, and should be cited in the text according to the Harvard method.

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