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Claudia Hiernerth

*Friedrich Schiller Universitat, Jena, claudia.hiernerth@uni-jena.de*

David Meyer

*Wirtschaftsuniversitat Wien, david.meyer@wu-wien.ac.at*

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# A METRICS SYSTEM FOR THE PERFORMANCE MEASUREMENT OF ONLINE DISTRIBUTION CHANNELS OF MULTI-CHANNEL RETAILERS

Hiennerth, Claudia, Friedrich-Schiller-Universität Jena, Carl-Zeiß-Straße 3, 07743 Jena,  
Germany, claudia.hiennerth@uni-jena.de

Meyer, David, Wirtschaftsuniversität Wien, Augasse 2–6, 1090 Wien, Austria,  
david.meyer@wu-wien.ac.at

## Abstract

*The Internet changed from a pure information media to a distribution channel, challenging companies in measuring the performance of their online distribution channels. Multi-channel retailers are particularly concerned since they need to coordinate their efforts with traditional, offline retailing activities. The paper at hand presents a corresponding metrics system derived from literature and a Delphi study, allowing for comparability with offline channels.*

*Keywords: Multi-channel retailing, Metrics system, E-commerce, Performance measurement.*

# 1 INTRODUCTION

The development of the Internet from a pure information media to an increasingly important distribution channel resulted in significant intra-and inter-organizational changes for firms. Intensified by the collapse of the new economy by the turn of the millennium, stakeholders increasingly ask for performance measures tailored for online distribution channels, especially in the context of multi-channel retailers. Companies, however, are confronted with issues such as lack of experience and benchmarks, and missing or insufficient IT support. Challenges specific to multi-channel organizations include cannibalization effects and synergies as well as coordination tasks between online and offline channels (Schäffer & Weber & Freise 2002, Wall 2002, Welling & White 2006, Hienert 2006).

There is already considerable work presenting models for e-commerce success (Hess 2001, Straub & Weber & Steinfield 2002). However, many of them are pure theoretic approaches whose applicability to real situations still needs to be evaluated. A closer look also reveals that some models either lack a precise definition of the research target, or focus on selected success factors such as web shop usability. Further, the supply chain and the corresponding business processes have changed with the increasing importance of online channels, thus limiting previous results valid for traditional organization models (Hansen 1997, Picot 1991, Gosh 1998). Hence, there is still a need for new metrics systems tailored to the requirements of specific business models (Schäffer & Weber 2001, Wall 2002).

Additionally, recent advances in IT multiplied Internet-based business models, fostering the development of new web/e-metrics such as Visits or Page Impressions, making the choice of meaningful, decision-relevant metrics even more difficult (Welling & White 2006). Also, these new metrics create a number of new technical challenges related to data collection and storage. Therefore, the relevance of these measures is still a matter of debate among researchers and practitioners alike (Schwickert & Wendt 2000, Marr & Neely 2001, Link & Schmidt 2001, Bhat & Bevens & Sengupta 2002, Palmer 2002, Nikolaeva 2005).

The paper at hand presents a metrics system specific to the performance measurement of online distribution channels of multi-channel retailers. The model in particular allows for comparability with traditional channels, supporting an integrated controlling system of a company's sales process. The model is based on existing literature on the one hand, and on the results of a Delphi study conducted on the other. The remainder of the paper is structured as follows: In Section 2, we first present design and results of the empirical study. In Section 3, these are combined with theoretical results from literature to a new model, which is then compared to metrics for stationary shops to demonstrate the comparability of both distribution channels. Section 4 concludes.

## 2 EMPIRICAL STUDY

### 2.1 Design of the Delphi study – Selection and number of participants

The two-stage Delphi study presented here was carried out using an e-mail based online questionnaire. First, we contacted 54 experts<sup>1</sup> with a strong background in retailing and e-business, either conducting research or doing business in Austria or Germany. The choice was based on an extensive literature and internet review, as well as on recommendations from the experts themselves (Mullen 2003, Häder 2002). From these, 32 accepted to participate. In the run-up of stage 1, an extensive list with

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<sup>1</sup> We used Beckers (1974, p. 146) definition of expert.

performance metrics derived from the literature was provided to all participants. Five participants quit due to time restrictions, nine other claimed to be unfamiliar with the presented metrics.

In stage 1, the list of experts comprised 18 participants: six web shop managers, three researchers with background in e-commerce / retailing, four members of inter-trade organizations and certification authorities, and five executive consultants. Stage 2 involved 14 experts: four web shop managers, three researchers from the field of e-commerce / retailing, three members of inter-trade organizations and certification authorities, and four executive consultants.

## **2.2 Objectives of each Delphi stage**

The objective of the stage 1 was to evaluate the importance of several metrics deduced from Palloks' Model to measure the success of the online distribution channel. To this end, the experts evaluated 101 metrics within nine categories deduced from IS/e-business literature (especially from the main scholarly journals). Additionally, they were asked to supplement missing metrics and to point out metrics for measuring cannibalization and synergy effects between the web shop and the stationary shops. The first online questionnaire included 26 questions. The first five questions were intended to introduce the topic and to replace a qualitative preliminary study, which is recommended when applying a Delphi study. The remaining questions measured the importance of the listed metrics using a 5-point Likert Scale (1 = very unimportant, 2 = unimportant, 3 = neutral, 4 = important and 5 = very important).

The goal of stage 2 was to rank the most important metrics within the same categories from stage 1, defined as those with an average score of at least 4. All participants received the consolidated results from stage 1, summarized by mean and standard deviations. In total, the experts had to rank 42 metrics (within the different categories). In addition, the experts were asked to evaluate the importance of the metrics for measuring cannibalization and synergy effects between the web shop and the stationary shops, which they completed in the first stage. For this, again a 5-point Likert scale was used. Here again, we selected those with a score above 4, yielding five more metrics that were added to the system. The final model thus comprised 47 metrics in total.

## **2.3 Results**

The 15 most important metrics according to the mean scores to evaluate the success of an online distribution channel for a multi-channel retailer are, in descending order:

1. system availability, 2. number of repeat customer, 3. product availability, 4. delivery time, 5. average server response time, 6. error rate, 7. online sales growth, 8. delivery quality, 9. return, 10. number of first buyers, 11. profit margin per customer, 12. acquisition cost per visitor, 13. acquisition cost per first buyer, 14. service level, and 15. order growth.

Clearly, from the experts' point of view, the most relevant metrics for evaluating the success of the online sales process assess the performance of the information system (e.g., system availability) and goods handling/logistics activities (e.g., delivery time, product availability). This underlines the central importance of information systems in online selling. Also, the choice of metrics such as number of first buyers, number of the repeat buyers, and profit margin per customer shows that "classical" customer metrics from the offline-world are equally valued, particularly regarding the determination of the customer structure, customer retention and customer satisfaction. The same applies—with a grain of salt—to financial metrics such as total acquisition cost, acquisition cost per visitor, online sales, and return on sales.

We now turn to the 15 least important metrics, still according to the mean scores, and listed in ascending order:

42. online sales per daytime, 41. online sales per day of week, 40. online sales per employee, 39. day of week with the highest visit frequency, 38. time of day with highest visit frequency, 37. shop finder rate, 36. cross selling click rate, 35. product impressions, 34. focus, absence time, 33. online sales per payment method, 32. cross selling conversation rate, 31. no referrer, 30. number of clicks, and 29. one-click-rate.

Given the top metrics results, it seems surprising at first that the three most unimportant metrics (online sales per daytime, online sales per weekday, and online sales per employee) are also financial metrics. Obviously, compared to classical controlling figures, a more differentiated view is needed for online channels, taking into account existing structural differences. It is clear, for example, that input factors such as human resources will not have the same importance in online and offline channels.

Another unexpected result is the relatively minor importance attributed to web metrics (e.g., no referrer, focus, product impression, cross selling click rate, and cross selling conversation rate) for the success evaluation of the online distribution channel. Our results do, therefore, not confirm the work from other researchers (e.g., Weischedel et al. 2005) who attach strategic meaning to web metrics. This might, in fact, stem from technical issues such as collection and storage problems, or from a lack of guidance in interpreting these numbers (Novak & Hoffman 1996, Bensberg & Weiß 1999).

### **3 A NEW METRICS SYSTEM**

#### **3.1 Palloks' model as a starting point**

Our model is based on the hierarchical sales controlling system by Palloks (1995), consisting of 24 metrics organized in three main- and several subcategories: structural analysis (sales process, market), profitability analysis (performance of sales activities, efficiency of logistics processes, product profitability), and current state analysis. There are several reasons for choosing this model as a starting point: First, it matches our assumption that online sales activities can completely be represented and analyzed as a distribution channel on its own, a view supported by many authors (e.g., Vishwanath & Mulvin 2001, Chan & Pollard 2003, Hukemann 2004). Second, because of the model's broad scope, it accounts for many influencing factors, opportunities, and risks influencing online sales activities, and thus supports management effectively and comprehensively (Steinfeld & Bouwmann & Adelaar 2002, Anderson & Srinivasan 2003, Wirtz & Schilke & Büttner 2003, Zentes & Schramm-Klein 2006). Third, our goal is to maintain the comparability to traditional sales channels as much as possible. Fourth, it complies with our definition of success as achieving distributional objectives (Zhuang & Lederer 2006, Wade & Nevo 2006).

#### **3.2 Deduction and scope of the new model**

The final model (see Figure 1) was deduced from Palloks' model and the results of the empirical study. The starting model was modified to account for the process differences in online and offline retailing, as well as for the unequal use of input factors (e.g., staff and IT). The subcategory: "Efficiency of Logistics Process" was therefore split into "Handling & Logistics" and "Information System" to better account for IT-related factors, playing an essential role in online retailing. Further, the subcategory "Market" is extended to "Market & Customers", customer-oriented figures being key especially in the start-up stage of online shops. As described above, the metrics were selected according to the Delphi ranking at stage 2, comprising the most important indicators in each category, as well as the five most important metrics for measuring cannibalization and synergy effects.

The final model comprises 47 quantitative and qualitative metrics. It can be employed by small- and medium-sized retailers as well as by web shop managers of larger multi-channel companies to measure the operational performance of their online sales activities. In addition, the model takes into account future developments of the web shop in the "Current State Analysis" category, supporting

strategic decisions for the development of the web shop and the company-wide marketing strategy. The system is generic and needs to be further adapted to the special conditions of a concrete firm implementing the model. It is limited “by definition” to multi-channel retailers, i.e. to companies offering tangible, movable goods in both stationary shops and a web shop.

### 3.3 Comparability with stationary shops

As mentioned above, it is challenging to directly compare online and offline channels by means of performance metrics due to significant differences of processes and input factor use. Such a comparison is, however, of vital importance to multi-channel retailers in order to assess cannibalization effects and synergies, and to optimize their overall marketing strategy (von Oelsitz 2006). In the following, we compare our metrics system to the integrated controlling model of Becker & Schütte (2004) for stationary retailers and discuss comparability issues.

We categorized the metrics into three groups according to the degree of comparability between online and offline channels, based on a comparison of their formulas and the required data sources. Table 1 lists metrics from both models that are identical or can directly be compared. Table 2 comprises performance measures that have similar semantics. Table 3 shows metrics without stationary counterpart. Note that in practice, the actual measurement of some metrics can be difficult due to technical or organizational issues. Also, most of the metrics listed are not uniquely defined, possibly causing biased values if different formulas are used for compared values.

As can be seen from the tables, most metrics (e.g., return, complaint rate) in fact allow direct comparison. Some others, more technical ones (e.g., system availability, down time) can be compared by analogy with corresponding metrics calculated for the ERP/POS-system used in the stationary shop. Only a few metrics (e.g., most frequent search term) have no matching counterpart in the stationary world. This supports the claim that, even though e-commerce has transformed the value chains, business principles have not changed after all (Hansen & Neumann 2005).

The comparison, however, raises another important issue regarding the implementation of the system: even though most metrics are identical conceptually, the required raw data in both channels often stem from different systems and data sources (e.g., log files versus database of ERP system). Differences in data quality and actuality might therefore cause additional variance in comparisons. It is therefore recommended to avoid redundant, external controlling systems, and to favour an integrated systems approach instead.

| <b>Metric web shop</b>                         | <b>Metric stationary shops</b>                          |
|--|---|
|  | Return on sales   |
|  | reactivation rate                                       |
|  | market share  |
|  | inventory turnover ratio                                |
|  | product availability                                    |
|  | service level   |
|  | delivery quality  |
|  | liability failure rate                                  |
|  | margin per product                                      |
|  | complaint rate  |
|  | margin per customer                                     |
|  | market share growth                                     |
| online sales growth                            | stationary shops sales growth                           |
|  | acquisition cost  |
| fulfilment costs in percentage of online sales | fulfilment cost in percentage of stationary shops sales |
| personnel cost in percentage of online sales   | personnel cost in percentage of stationary sales        |
| marketing costs in percentage of online sales  | marketing cost in percentage of stationary shops sales  |

|  |   |
|--|---|
| delivery time (to the customer)                                | delivery time (to the stationary shops)             |
| number of unique visitors (of the web shop)                    | number of unique visitors (of the stationary shops) |
| number of first buyers   |   |
| average order value per first buyer                            | average purchase value per first buyer              |
| average visit frequency  |   |
| purchase / order frequency                                     |   |
| order number development / growth                              | purchase number development / growth                |
| acquisition costs per web shop visitor                         | acquisition costs per stationary shop visitor       |
| acquisition cost per first buyer                               |   |
| repeat customer conversion rate                                |   |
| acquisition cost per repeat buyer                              |   |
| average orders per repeat buyer                                | average purchases per repeat buyer                  |
| average order value per repeat customer                        | average purchase value per repeat customer          |
| return rate  |   |
| basket to buy rate   |   |
| customer overlap between the web shop and the stationary shops |   |
| turnover allocation between the web shop and stationary shops  |   |
| web shop to stationary sales ratio                             |   |
| brand awareness  |   |

Table 1. Metrics with direct comparability to stationary shops.

| Metric web shop       | Metric stationary shops              |
|-----------------------|--------------------------------------|
| system availability   | system availability ERP/POS system   |
| average response time | average response time ERP/POS system |
| error rate            | error rate ERP/POS system            |
| breakdown rate        | breakdown rate ERP/POS system        |
| breakdown intensity   | breakdown intensity ERP/POS system   |

Table 2. Metrics with analog comparability to stationary shops.

| Metric web shop                             | Metric stationary shop |
|---|------------------------|
| most frequently used search word externally | -                      |
| development duration per product web page   | -                      |
| average download time                       | -                      |

Table 3. Metrics without comparability to stationary shops.

The following example should illustrate the notion of the comparability of both distribution channels and the meaning of this comparison for the management. Let us assume an average purchase value per repeat buyer of 45 Euros in the web shop and of 30 Euros in the stationary shops. This could indicate that web shop buyers are different (e.g., income, gender, ...) to the stationary shop visitors. Further, in this situation, the management should have a closer look at the market share growth. If, e.g., the web shop grows by 6 percent and stationary shops grow by 2 percent, the management should foster the online channel and accordingly allocate more resources to it. Moreover, it should investigate the consumers' motivations for choosing the online distribution channel and adapt the corporate strategy accordingly. In any case, the different metrics employed should be monitored over time to capture important structural changes.

## 4 CONCLUSION

This paper presents a new metrics system suitable to measure the performance of online retailing systems. The metrics are based on literature and the results of a Delphi study. The system

comprehends 47 quantitative as well as qualitative metrics. Despite the structural differences of online and offline retailing regarding the work flows and priorities of input factors, the system allows comparisons between web shops and stationary shops. Comparative analyses over time should reveal cannibalization and synergy effects, effectively supporting the management of both online and offline distribution channels in a coordinated way.

The presented metrics system is limited to multi-channel retailers offering movable goods to their customers. Also, the validity of the results is limited by the relatively small number of participants of the Delphi study. There is, however, no clear recommendation in the scientific literature on the minimum number of participants in Delphi studies. Also, the small number of participants (and especially their drop-off from stage 1 to stage 2) might indicate some lack of awareness among practitioners regarding the existing metrics, and the need for researchers to investigate and publish case studies where metrics are employed in practice.

Eventually, the efforts of investigating metrics systems for online and offline channels should result in the development of a comprehensive multi-channel controlling system. To this end, further investigation of existing interaction effects between the different channels is needed, especially with regard to the customers' switching behaviour and the optimal allocation of marketing resources.

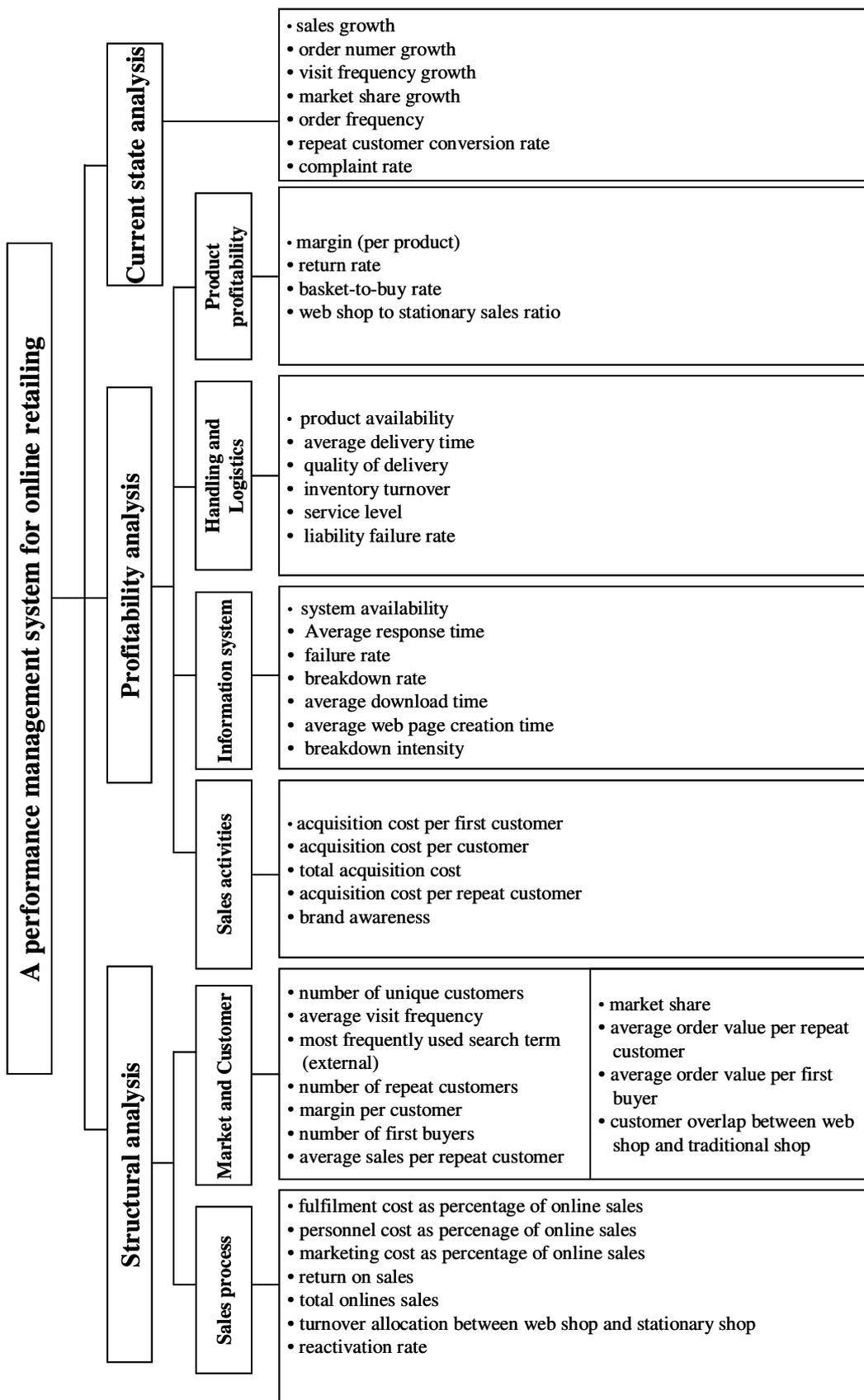


Figure 1. Metrics system for measuring the performance of online retailers.

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