

An Approach to Satisfy Managerial Awareness of Strategic Events in the Field of M-Commerce

Completed Research Paper

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Abstract

Continued success in business relies on the capability to notice changes in the market before others and to access expert experience and knowledge that has been built over many years. Today the increased usage of mobile commerce (M-commerce) in business produces opportunities to access these changes and information anywhere, anytime, and any place. The opportunities that arise from M-Commerce not only support increased engagement through multiple channels, but enable the development of a thriving market sector which is shifting how businesses make strategic decisions. The present study introduces a new approach to create managerial awareness of strategic events in the field of mobile commerce. Specifically, a new method including a tool is presented and validated using expert interviews.

Introduction

Strategic decisions are made using given information that is processed and converted into knowledge. In order to make successful strategic decisions, business leaders must have access to information (Jennex 2013). Knowledge is information combined with experience, context, interpretation, and reflection (Davenport, De Long and Beers 1998). It is this combination that becomes increasingly crucial for corporate competitiveness and is relevant for long-lasting decisions; thus supporting the fact that knowledge has strategic importance (Pfeifer, Freudenberg and Hanel 2000). Hence, we believe that knowledge management can be used as a key component of our strategic decision practices.

Knowledge management, in the classical sense, aims at the creation of competencies at the organizational and individual level and considers knowledge as a shared and further developed resource (Jennex and Olfman 2004; Jennex and Olfman 2005). One means of gaining knowledge for improved corporate decision making initiatives is the awareness and interception of event-driven information. Influences such as political, legal or business strategic initiatives of competitors form a diffuse structured mesh of events. The challenge to intercept accurate, required, decision-relevant information and to create managerial awareness by generating the crucial knowledge for strategic decisions falls within a special scope of knowledge management, which has been until now largely ignored (Sultanow and Sonnenborn 2013). The approach as presented here applies knowledge management at the strategic level, and provides managers in a globalized environment an immediate access to decision-relevant knowledge events. This concept uses the information, decision-relevant events, knowledge flows and persons in relation to time and place in a substantive context.

Mobile commerce technologies are used in our approach to capture information as raw material, which are combined and analyzed in order to generate the desired managerial awareness. The events must relate to time and location and to specifically required business contexts, in order to be a suitable basis for decisions that managers meet on a strategic level. The managers are therefore system users that specify the target contexts and awareness objects. This paper describes a method to create managerial awareness

using mobile commerce technologies. This method is regarded as an artifact construction as it is often used in design science approaches (Hevner, March, Park and Ram 2004; March and Smith 1995). Strictly speaking, it is a situation-specific artifact, comprising a prototype that provides a technical infrastructure and visual software application and will be evaluated against the real world. The prototype-based validation is based on the Benefit-Expectation Model (Schubert and Williams 2009; Schubert and Williams 2013). The result of this validation is a set of empirically acquired beneficial elements, which relate to real-world scenarios in the M-commerce arena, such as the recognition of information leaks, consumer behavioral changes, trade information or unknown market moves.

The balance of the paper proceeds as follows: The next section develops the theoretical concepts used in the study. We then discuss the methodology and the construction of the prototype used as our research model. Next we share our method validation and results. Finally, we conclude with limitations and implications.

Background

In this section, we will discuss three existing areas of research we have integrated to develop our prototype. Specifically, we discuss mobile commerce, managerial awareness of strategic events, and the knowledge modeling and description language (KMDL).

Figure 1 illustrates schematically the substantive background of the present work. M-Commerce technologies are capable to capture market situation descriptive data and information. These include market and behavioral changes, influences and knowledge events.

Knowledge events are events in the business environment, which decision-makers on strategic corporate level seek to perceive in a timely manner, in order to enable them to react on these events promptly and effectively. In the context of this research, those events are called “strategic events”. Strategic actions are guided by one’s own awareness, knowledge on the influences on what is happening in the business environment as well as on the background and intentions of other activities, which in total form complex decision situations (Greve 2002; Habermas 1982).

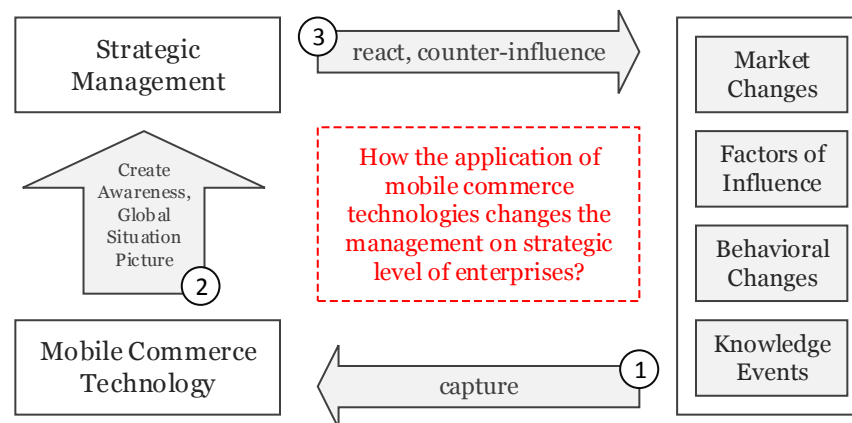


Figure 1. Background, Definition and Delimitation of the Research Question

Mobile Commerce

M-commerce has continued and is predicted to grow at an explosive rate (Chong 2013). The term mobile commerce “*refers to any transaction with monetary value that is conducted via a mobile network. It will allow users to purchase products over the Internet without the use of a PC* (Clarke 2008).” M-commerce, or the business activities conducted via wireless telecommunication networks, offers instantaneity, ubiquity, localization, personalization and identification (Zhang, Zhu and Liu 2012). That is to say, users do not need to use a personal computer system to conduct electronic commerce (e-commerce), such as online banking or shopping, since they can simply use a mobile device to perform various e-commerce activities (Ngai and Gunasekaran 2007). The enormous range potential has led to mobile devices increasingly moved in the interest of advertising and market research industry (Holland and Koch 2014).

The data and information retrieved from mobile devices is a substantial analytical basis for generating knowledge into managerial awareness.

We can capture and generate decision-relevant knowledge from the data and information retrieved from mobile devices, such as:

- all data, which are obtained by the mobile e-commerce trade and provide information about time and location-based sales, buying trends, abnormal decreases, etc. which can be logged at each online transaction – even if it has been performed by a mobile device or not
- trade-related organizational structures and changes, (e.g., the organizational changes of key persons) which may be extracted from social network activities
- all possible data related to trade policy-related events; these are government reports on foreign trade law, censorship guidelines (which often occur in Asia) or changing regulations that affect the working conditions in production and logistics

The focus of our work is the M-commerce technology, which enables us to capture decentralized data that form the basis for generating the desired managerial awareness.

Managerial Awareness

Awareness is defined as a state of being informed, in conjunction with an understanding of activities, states and relationships of each individual within a given group as a whole (Dourish and Bellotti 1992). It is a key computer supported cooperative work (CSCW) research component that has been used mainly for creating transparency of what people do within a small, collocated, local team. Yet, the primary focus of recent awareness research has been solely on local collaboration within and between organizations. Thus, existing awareness concepts only generate a picture of local situations as the basis for the coordination of their activities for a local team. In an effort to address this literature gap and to further explore M-commerce, we explore the literature on globally distributed collaboration.

Globally distributed collaboration is influenced by several factors (Sultanow et al. 2013). One set of factors are technical. For instance, the financial industry is concerned with economic relevance such as market size, growth and competition as well as the economy's specific technical infrastructure, including logistics communication networks and information systems. Another set of factors, which influence global teamwork, are related to legal and governmental considerations (e.g., intellectual property rights, taxes, subsidies and administrative practices). These circumstances are often directly related to current political conditions such as the role and influence of economic actors as well as the relationship between the individual and the state. Yet another set of factors generate influence on how internationally linked partnerships are social structures, which can determine class distinctions and different social institutions. Cultural factors range from predominate languages and religions to issues such as common etiquette, customs and leadership techniques. Geographical factors that affect global collaboration must consider differences in time zones, climates, topographies and resources. Lastly, demographical factors, such as urbanization, migration, education attainment and skills may also be examined. The above factors, among many others, are subjects important to understanding how global collaboration can optimally perform and provide an in-depth understanding of groups beyond local ties. The *Real World Awareness (RWA)* concept refers to global management and eliminates space and time boundaries that exist in local collaboration (Sultanow, Cox, Brockmann and Gronau 2015). Based on this concept, we offer a novel approach for managers to create transparency as well as enhancing their control capacity in collaborative processes.

Knowledge Modeling and Description Language

A comprehensive comparison of methods for transparency creation has shown that many existing methods are capable of capturing, analyzing and visualizing events at the operational level (Sultanow, Zhou, Gronau and Cox 2012). These methods meet the requirements of operational management. Unfortunately in strategic management, there is hardly a technical, time-location-based, methodological transparency creation in the global environment. The only method is Knowledge Modeling and Description Language (KMDL) that objectifies knowledge, formalizes knowledge flows and applies knowledge management concepts on action line of global strategists (Brockmann 2015; Gronau 2012; Gronau, Müller and Korf 2005).

One of KMDL's main features is the detection of knowledge processing activities – called conversions (Nonaka and Takeuchi 1995). KMDL enables RWA by its temporal and spatial referencing – a feature which does not exist in current awareness and knowledge management approaches. For this purpose, KMDL features time-location vectors, which observe people and information objects (artifacts that contain knowledge). An in-depth discussion of this vector concept can be found in (Sultanow et al. 2015).

The time-location vector concept allows running queries to determine appropriate conversions for time and location information such as the duration, spatial reach or temporal-spatial development. Listeners monitor a plurality of time-location vectors. For each conversion, for example, the condition may be formulated so that at least one of the persons participating in the conversion is located in China. The vector concept performs time and location related analyses on knowledge flows, persons, information objects and processes. IP addresses are utilized to derive locations. A time-location vector can describe the temporal and spatial course of observed perception objects, for example the distribution of products. This definition is the basis for the design of specific RWA-algorithms and is the foundation for formulating and evaluating complex conditions relating to the time and place of people, knowledge, information objects and conversions as well as their temporal and spatial course. The following examples illustrate the vector-based analytical capabilities.

Example 1: “Information object / person is located in a specific place”

If influential wholesale agents with an e-/m-commerce background and huge budget appear at certain manufacturer locations, then this may have an unprecedented negative effect for smaller distributors. Such mega-deals stamp out even local distributors who have a close contractual and cooperative connection to the manufacturer. The empirical study shows that even the manufacturer has not expected this course of events and accidental loss of the price control.

Example 2: “Distance between two information objects (products), persons or between object and person exceeds/falls below a certain value”

In some cases, distributors offer the same product for specific industries at another price, whereby the product label may differ and a certificate is provided that confirms a more accurate quality assurance. In such cases, the parallel use of the same (but differently stated) products may be undesirable from the perspective of manufacturers and distributors.

Example 3: “Which people have acquired knowledge on a specific product?”

To answer this question, we have provided an example that presents an application area for the entrance of potentially competing products in online shops, after their conformity has been assessed. A firm in California, which specializes in electronic conformity, takes the responsibility as a service provider for pretesting and documentation, maintenance, process management and communicating with registration offices (Figure 2). This service provider appoints an admission manager who takes over the registration process for a particular country. The admission manager obtains the information for a new product in communication with the product manager (Product Manager from manufacturers), then he illuminates the product information into several technical documents (by using his quality and compliance knowledge). Administrative bodies will then verify these documents and subsequently gain the product information as a result.

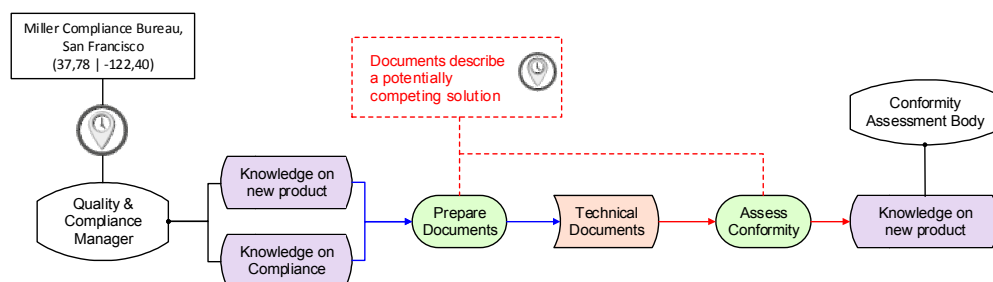


Figure 2. Knowledge event model for an e-commerce perception domain of the competitive pressure in the target market

The goal of creating the technical documents by accredited testing bureaus becomes important because these documents gather all the research and development results of the new product together and must be examined in terms of registration procedures by those registration offices. Competition thickens as more products are introduced and registered in specific application areas. The RWA principle makes it possible to comprehend the notification of the new document submissions.

The first person who learns about the new product is the compliance manager, the. The compliance manager, acting as a listener and one who manages the conditions, reviews for the information object that contains attributes indicating a potentially competing product. This condition can be verified formally by full text search in the document or by checking keywords. Information objects originate from different Internet sources such as industry information services, news portals from any government or other online news agencies.

Automated messages from different online services are also displayed in the event view. For example, they include the status of category-specific product offers in online shops, and the rising or falling sales of products per category. Such data can be collected by WebCrawler and mobile devices. Automated collected data via m-commerce technologies provide substantial information on increasing and declining interest for products.

Methodology

The managerial benefits of mobile business process modeling in e-commerce environments were derived using the expectation-benefit model by Schubert & Williams (Schubert et al. 2009; Schubert et al. 2013). For each benefit, measurable criteria are determined, such as the availability of information at the level of management.

For testing, the benefits were obtained by interviewing executives of three multinational corporations (MNCs). First, we conducted semi-structured interviews with the executives about decisions or the execution of tasks. Second, the KMDL was identified as suitable to monitor knowledge intensive business processes that are distributed globally. Third, informational requirements from the executives were implemented using KMDL. Requirements towards transparency of the managers are defined by conditions, which result in alerts once specific values are reached (e.g., minimums or maximums, price developments of competitors or product groups, changes in purchase behavior). Figure 3 shows the procedure of our empirical research.

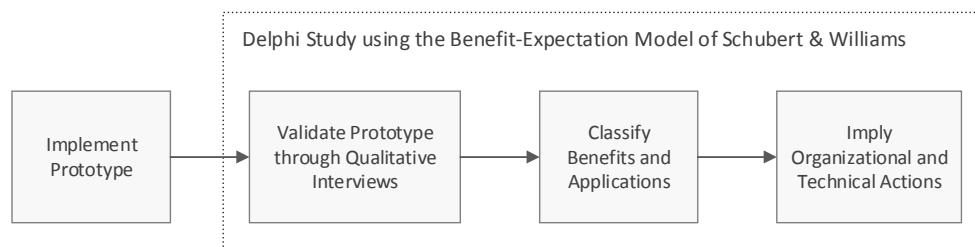


Figure 3. Methodical Approach

CONSTRUCTING THE PROTOTYPE

In order to test and evaluate the concept, a prototype was developed. Technological, infrastructural factors have a significant impact on the success of an e-/m-commerce solution (Jennex, Amoroso and Adelakun 2004). For this reason, the architecture of the prototype plays a major role. The prototype's architecture consists of five main components: a Mobile Client, a Model/Configuration Client, a Model Server, an Event Server and a RWA Client (Figure 4).

The Mobile Client captures behavior, collects data and generates events including time and location. The tags, based by the client, determine which data is relevant or not. These tags (e.g. "Market", "Huawei", "Smartphone", "Tablet", "China", "Brazil", and "Europe") are configured through the Model Client and stored in the Model Server. For instance, if someone buys a Huawei smartphone in Europe, an event will be generated and transmitted to the event server. Other examples include when smartphone prices drop or a new distributor offers Huawei Tablets. These examples of events indicate increasing competition, loss

of price control or other events creating managerial awareness. The Model Server describes the management's position of interest (e.g., market information, knowledge flows, influences, etc.). The creation and configuration of this model can be achieved by using the Model Client. The Model Client is a web browser-based client, which has been programmed/developed using the technologies HTML5, JavaScript, CSS3 and mxGraph. The Event Server enriches the model by time-location vectors, tags, and external data from social networks where a *Living Model* or *Living Real World Model* emerges. A KMDL listener resides in the Event Server and captures data from the continuously evolving M-commerce events and transmits it to the RWA Client. Similarly to the Model Client, the RWA Client is a browser-based client developed using HTML5, mxGraph and in addition uses WebGL. The prototype's GUI shows on a world map the events for managers and allows them to perform searches and analyses.

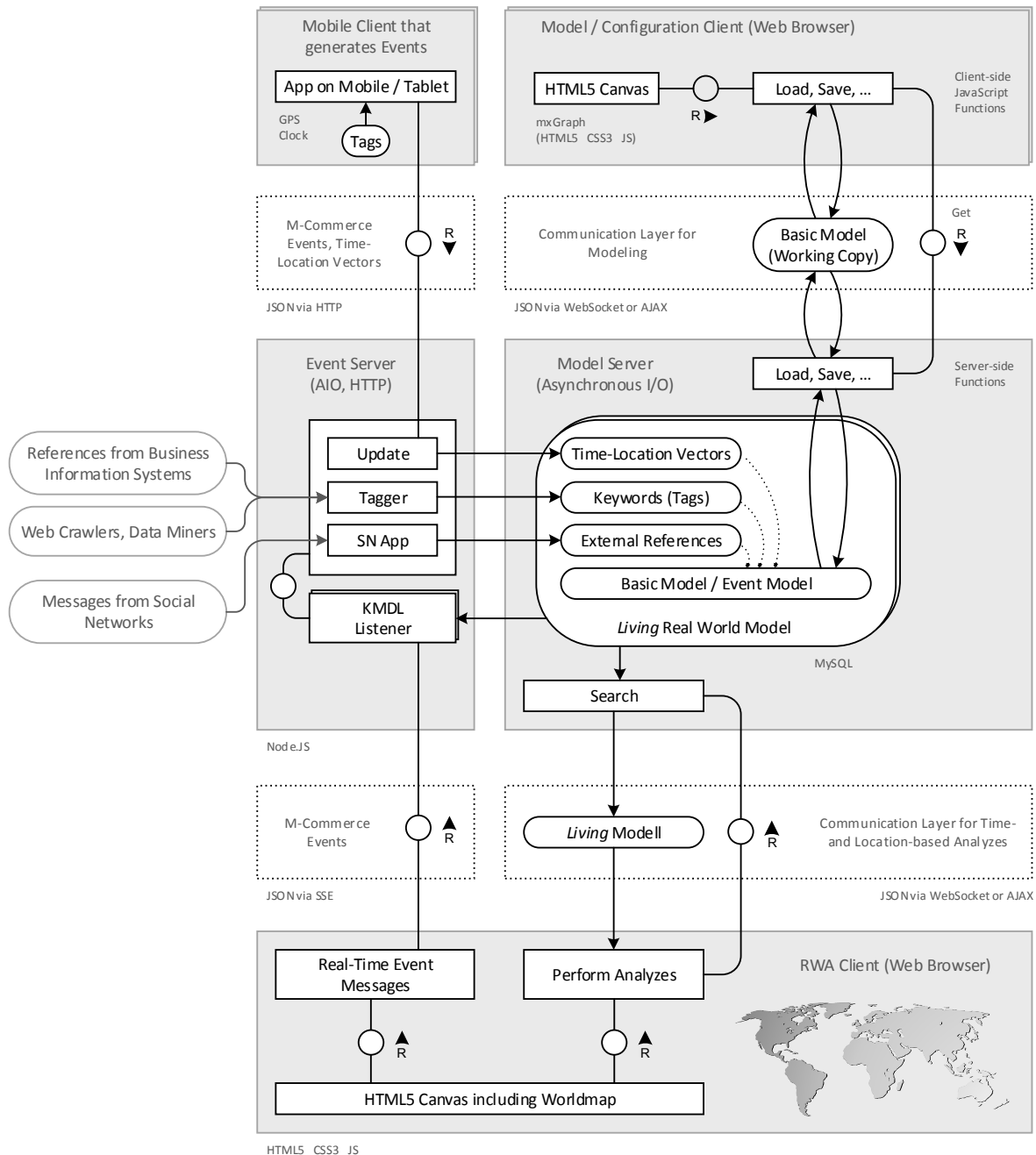


Figure 4. Prototype Architecture

Figure 5 demonstrates the prototype (RWA Client) using collected sample data. The data was collected via web crawling, although could have been captured from mobile clients. Also, event sources can be configured from statistical offices by defining, for example, governmental feeds or services. For this demonstration, we examine all relevant events on the world map and investigate the awareness goals below:

- The market role and influence of Brazil's leading provider Netshoes
- The environmental change affecting e-commerce Business in Saudi Arabia
- The M-commerce market development in Mexico
- The formation and the prevailing position of M-commerce market players in China

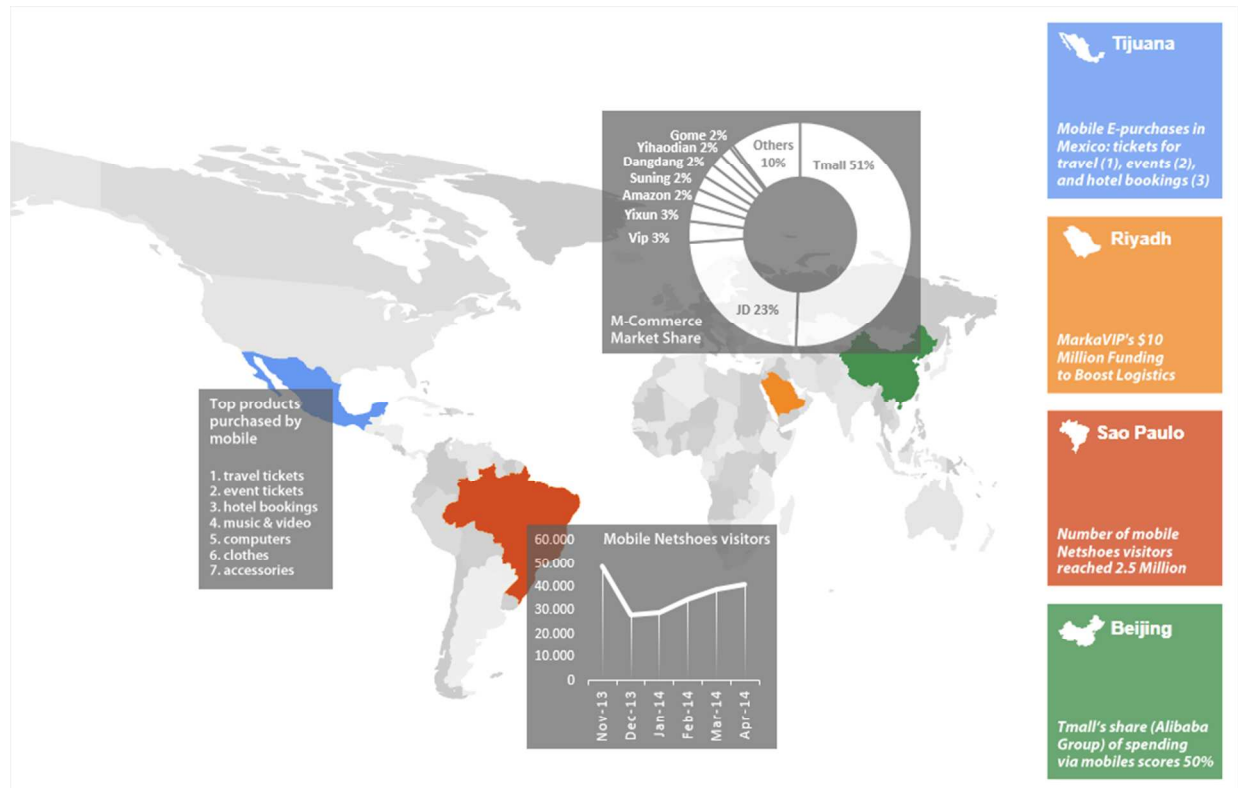


Figure 5. Prototype's World View with real-time reports of those incidents that are relevant to managerial transparency goals

Method Validation and Discussion

Within the scientific literature, there are various sources proposing models for the identification and classification of an information system's benefits (Gable, Sedera and Chan 2003; Gable, Sedera and Chan 2008; Schubert et al. 2009; Schubert et al. 2013; Shang and Seddon 2004; Shang and Seddon 2000; Shang and Seddon 2002). Similar to the model of Shang and Seddon (Shang et al. 2004; Shang et al. 2000; Shang et al. 2002), Schubert and Williams (Schubert et al. 2009; Schubert et al. 2013) divided the benefits into five main categories and their elements. For each benefit element, measurable criteria are determined, such as the availability of information, transparency and awareness.

Selection of participants, description of the statistical sample

We interviewed several managers, mainly CEOs, of international businesses. Specifically, we interviewed decision-makers with sales and personnel responsibility. The companies are from the organization and partner network of the authors. This makes sense, since the pharmaceutical sector is characterized precisely by the focal lack of transparency, hidden influences and diffuse structures to be uncovered. An

interview took about 1 hour. To validate our model, we apply the transparency method and use the awareness tool. Table 1 gives an overview of the participating companies.

Company/Area of operation	Reference to E-Commerce	Person
Search Engine Optimization & Marketing (SEO/SEM), Germany	Projects include E-commerce portals and Online-Shops with mobile applications.	Managing Director
Pharma Wholesale specialized in Oncology, Germany	Webpages contain Information about Company and its Services. Webpages are Search Engine Optimized using E-Commerce Technologies	CEO
Institute for market and product strategies, Germany	Consulting projects include E-Commerce and marketing projects that use mobile channels	CEO
Solution Provider for IT-Healthcare Products, Brazil	Products and Services are being commercialized via Online-Shops, SEM activities	CEO
Distributor of Medical Devices and IT-Healthcare Solutions, Hong Kong	Products and Services are being commercialized via Online-Shops, SEM activities	Product Manager
Consultant and Service Provider for User Centric Software Design and Development, Germany	Projects include Design and Development of E-Commerce and Mobile Solutions	CEO
Web-Platform and Mobile Solution Developer and Operator of a Community Platform, Germany	CEO worked for many years at one of Germany's E-Commerce portal operator	CEO
Medical Device Provider, Germany	Medical Devices are being distributed also through Online-Shops	CEO
IT-Healthcare Solution Provider and Software developer, Germany	IT-Services and Products are being distributed also through Online-Shops	CEO
Biotec Consulting and Regulatory Affairs, Germany	Provision of Services are advertised through E-Commerce Channels	CEO
Healthcare-IT Products and Services, Germany	Products are provided through an Online-Shop	CIO

Table 1. Companies, in which Interviews have been conducted.

Implementation and results of empirical survey

During the individual interviews, the RWA application and its underlying idea was introduced to create the substantive basis for a discussion of the benefits. In this way, all benefits could be identified on the level of management of the companies surveyed. Semi-structured interviews with experts are very well suited for exploratory studies and therefore also for the benefit of validation of the developed transparency method. The interview guide ensures that the content of the discussions remain focused on the theoretical concepts that were identified beforehand. The interviews were conducted in a flexible manner and divided into two main points:

- Brief introduction to the idea, method, and the RWA tool
- Transparency creation and benefits for managers in the interviewed company

The data included audio recordings, which were transcribed and analyzed for relevance according to the qualitative code structure based on the levels introduced by Schubert and Williams (2009, 20013). The statements made in the interviews can be classified using qualitative content analysis. According to Mayring a structured, qualitative content analysis is suitable for exploratory approaches such as this study (Mayring 1985, 2010). Table 2 shows the results of the analysis.

All businesses interviewed obtained significant benefits from informal knowledge flows and information collected from informal networks expanding one's informal network to include access from external networks brings significant competitive advantages. Information obtained from these networks allows one to have the distinct knowledge advantage over competitors, especially those depending solely on conventional sources. However, the benefits are not limited exclusively to upper management. At the department level, the knowledge transfer and the use of contacts from informal networks increase the probability of project success.

During an evaluation run of the prototype, all interviewed managers advocated very strongly for aggregated decision-relevant information in their network. According to the managers, this feature was considered very helpful because the explosive events were shown in relation to time and location. The interviewer also asked whether the server infrastructure or the distributed system could be used in a closed, private, corporate area, which is not accessible from outside or by any person – even if it is involved in the generation of any of these events. Again, the managers responded positively. Every manager agreed that it was important that the captured information and knowledge was available exclusively to him/her and/or to his/her organization. Another question given by the interviewer addressed whether the collected data can be transferred via an interface into their enterprise system in order to combine these with internal data for analyses or Business Intelligence (BI) purposes. Several managers agreed that the transference of data had immense purposes. Based on these responses, we recognize that M-Commerce is able to make a conceptual contribution to the integration of knowledge management and business intelligence.

Interview Statement	Paraphrase	Beneficial Element
<p>"... Of course I want to be the first, who receives information about changes in the market."</p> <p>„If during a project, for example, in e-commerce or sales a dispute arise, then the management will taking notice.“</p> <p>„We need recognize political and legal changes in the market as early as possible - this is a crucial time advantage over competitors.“</p>	Management want to see (external) changes in its environment and internal debates in a timely manner	Capture internal and external changes quickly
<p>„There's always a lot of information in the company - both formal and informal, to keep track here is very hard.“</p> <p>„There are standard sources, which deliver in different rhythm (daily, weekly, ...) information from the outside via a press service to me.“</p> <p>„In addition, we have internal wikis that are held by the Press Office up to date.“</p>	Information must be presorted/filtered by third parties	Automate the selection and filtering of information
<p>„By publicly available news I get a rough overview of what is happening in public.“</p> <p>„The formal information acquisition only provides the foundation or the base information.“</p> <p>„If the method collects relevant messages from the Internet to me, filtered and displayed on the world map, then I have all the information comfortably at a glance.“</p> <p>„With information from formal sources, we have no room for delay and misinterpretation, because they can be retrieved by everyone and are the basis for our actions.“</p>	<p>Formalized and structured information retrieval forms the basis</p> <p>Filtering and visualization using local sourcing increases cognitive access to information</p> <p>Information from formal sources are of advantage for the actor, which is the first who receives and uses it</p>	<p>Improve visual representation of formal information</p> <p>Communicate information from formal sources in real time</p>
<p>„Generally speaking, informal networks are very important for effective and efficient project work.“</p> <p>„In our research before starting the project, we draw heavily on informal contacts back.“</p> <p>„When companies come to us with their own projects, they are primarily aimed at the use of informal channels, so as</p>	<p>Informal (expert) networks enable knowledge advantage and competitive advantage</p> <p>They are sources for decision-relevant information and knowledge</p>	Increase effectiveness and efficiency of knowledge-intensive project tasks

Interview Statement	Paraphrase	Beneficial Element
<i>to gain competitive advantage. Basically, they have recognized the importance and the enormous benefits of informal networks and now want to use this..“</i> <i>„We use both tips as well as informal networks to gain access to information and knowledge advantages.“</i> <i>„Informal information obtained make the differentiation. It then goes about making special decisions and to just know more than other actors.“</i>	Informal networks are the most critical basis for relationship-based business	Generate competitive advantages

Table 2. Results of the Empirical Analysis.

The need for real-time transparency for decision makers, market participants and managers is a fundamental fact that applies to various industries. A special feature of M-commerce is that by means of mobile technology, many data can also be recorded automatically, which form a basis in terms of transparency. But we have also shown that the informal networks are not replaceable by any automatically recorded data. The decision relevant information and knowledge that originate from a personal contact together with the automatically collected and filtered data are displayed in real time on a world map. This is an ultimate feature of the method that managers would use to gain competitive advantage by being the first to be aware of market impacts and by being able to react first on these influences. Such influences can be massive price drops in online shops or new competitive products that are sold through e-commerce channels.

As with any study there are limitations. In particular, there are two major limitations captured - technical and organizational. A technical limitation occurs with the quality of the data collected. It is dependent on the event sources and the manner in which it was captured. The availability of public information is simultaneous to all economic actors. This information is most beneficial to those who gain awareness of its first and are able to act on it. Hence, data obtained in more informal networks have greater significance than publicly obtained information due to the differences in time when actors are aware of the information and when they utilize the information.

The organizational limitation is concerned with data security and privacy. Mobile users permit organizations to collect data by installing apps and other collection tools. Organizations must be transparent with respect to how the data will be collected and used. They must also be diligent regarding the information security and privacy tools with which they protect this sensitive data from being accessed by unauthorized parties.

Conclusion and Future Research

The method presented already reflects the current wave of the future and adds a great deal of advantage to practical implications. Soon, more and more events, time and location of persons and objects and links between them will be detected and recorded. Strategists might be able to anticipate developments or irregularities in the market before others because this knowledge will be directly available to managers. Therefore, the extension and maintenance of informal networks and retrieval of decision-relevant information and knowledge in real time by managers allows strategists to anticipate developments or irregularities in the market ahead of the competition. The RWA method assures that knowledge is progressively viewed as the companies' capital and the competitive edge will increasingly be down to those who have the most knowledge. For this reason, organizations consider their abilities of predictive analysis and their ability to influence their knowledge as a growing priority.

RWA in the context of knowledge management overcomes the fact that knowledge is bound to persons extending the theoretical implications. Managers are able to view a world map, which displays incidents that are relevant to their genuine interests because the knowledge and information within the content of these events come from individual persons who belong to the informal network and not from a general RSS-feed - which might only contain a miscellaneous amount of information that could possibly be of interest. Subsequently, managers are notified of events that are relevant to their decision-making tasks and thus, gain access to knowledge that is epistemologically progressive. In this paper, we focused on the

utilization of automated captured data through M-commerce technologies for managerial awareness creation. A complementary option of creating this awareness is to exchange data through an informal network of influencing key people or exclusive knowledge carriers as given by the KMDL-example. Future research may focus on this option by answering several questions: how would the users interact to share information; how agile is the application of this logic; and, what motivates people in the informal networks to share (and register) in real time.

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