Business Systems Research

A Systems View Across Technology & Economics
Impressum

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## Business Systems Research

**A Systems View across Technology & Economics**

### Information Systems Research Articles

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational Capabilities Required for Enabling Employee Mobility through Bring-Your-Own-Device Concept</td>
<td>B-Abbe Toperesu, Jean-Paul Van Belle</td>
<td>17</td>
</tr>
<tr>
<td>Corporate Social Responsibility Reporting - a Stakeholder’s Perspective Approach</td>
<td>Thorsten Litfin, Gunther Meeh-Bunse, Katja Luer, Özlem Teckert</td>
<td>30</td>
</tr>
<tr>
<td>Mining for Social Media: Usage Patterns of Small Businesses</td>
<td>Shilpa Balan, Jahnabi Rege</td>
<td>43</td>
</tr>
<tr>
<td>Data Mining Usage in Corporate Information Security: Intrusion Detection Applications</td>
<td>Masoud Al Quhtani</td>
<td>51</td>
</tr>
<tr>
<td>Social Business Process Management: Croatian IT Company Case Study</td>
<td>Katja Vesna Bosilj Vukšić, Dalia Suša Vugec, Anita Lovrić</td>
<td>60</td>
</tr>
</tbody>
</table>

### Economic and Business Systems Research Articles

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Multi-Country Trade and Tourism with Endogenous Capital and Knowledge</td>
<td>Wei-Bin Zhang</td>
<td>71</td>
</tr>
<tr>
<td>How to Choose Your Next Top Salesperson: Multiple-Criteria Approach</td>
<td>Violeta Cvetkoska, Filip Iliev</td>
<td>92</td>
</tr>
<tr>
<td>Knowledge-cum-values Management belongs to the Way out from Global Crisis</td>
<td>Zdenka Ženko, Matjaž Mulej, Vojko Potočan</td>
<td>113</td>
</tr>
</tbody>
</table>

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Abstract

Background: Business Process Modelling (BPM) is one of the most important phases of information system design. Business Process (BP) meta-models allow capturing informational and behavioural aspects of business processes. Unfortunately, standard BP meta-modelling approaches focus just on process description, providing different BP models. It is not possible to compare and identify related daily practices in order to improve BP models. This lack of information implies that further research in BP meta-models is needed to reflect the evolution/change in BP. Considering this limitation, this paper introduces a new BP meta-model designed by Business Process and Practice Alignment Meta-model (BPPAMeta-model). Our intention is to present a meta-model that addresses features related to the alignment between daily work practices and BP descriptions.

Objectives: This paper intends to present a meta-model which is going to integrate daily work information into coherent and sound process definitions.

Methods/Approach: The methodology employed in the research follows a design-science approach.

Results: The results of the case study are related to the application of the proposed meta-model to align the specification of a BP model with work practices models.

Conclusions: This meta-model can be used within the BPPAM methodology to specify or improve business processes models based on work practice descriptions.

Keywords: business process, daily practices, business process modelling, meta-model

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Introduction

Business process modelling (BPM) specializes on describing how activities interact and relate with each other, and how activities interact with other business concepts such as goals and resources, where resources may be material and informational entities, as well as human or automated actors. BPM considers organizations as entities mainly driven by processes and process-related concepts such as activities,
tasks, resources, decisions and workflows as the main perspective of an organization (Hollingworth, 2004). However, process execution is affected by many factors not included in process models. Indeed, the enacted organization is composed by a complex and adaptive web of human and automated actors acting and interacting with each other. Interactions among actors are both supported and constrained by information systems and tools, shared vocabularies and meanings, interaction patterns and rules. Moreover, business process execution is in constant evolution and current BPM languages are not able to cope with such evolution (Castela et al., 2012).

BPM languages do address properly high-level process descriptions, because at that level, processes are generally fairly stable. Lower-level descriptions though are more difficult because they exhibit greater variability. In general, organizations are not able of fully-describing their process models due to lack of detailed information, and the tacit and decentralized nature of the knowledge required (Verner, 2004). The problem of process variability and resulting unpredictability is addressed by (Mutschler et al., 2008; Reichert et al., 2008). Research on agile BPM (Bider et al., 2016) aims at managing the evolving nature of processes by using principles and practices from the software engineering community. Yet, there is still little guidance regarding the problem of (1) tacit knowledge and (2) means for keeping an up-to-date alignment between business process models and actual execution.

From our point of view, actual execution is better captured by work practices rather than procedures or business process specifications. The term work practice comes from socio-technical approaches to system analysis and design, organizational anthropology, and management studies (Sierhuis et al., 2000). Work practices not only capture action and interaction patterns with high levels of detail. The patterns reflect behaviours of specific individuals and groups over time, rather than generic and static behaviours expected from job roles. Furthermore, work practice reflect the particular circumstances or conditions in which given behaviours are exhibited, the usage of machines, tools, information sources and other artefacts. Consequently, modelling work practice provides a deeper understanding of the human and automated activities that compose business processes, and is better suited to capture changes that trigger business process transformations in time.

Considering the aspects described previously, the authors proposed a Business Process and Practice Alignment Methodology (BPPAM) (Zacarias et al., 2014) for business process improvement, which set out principles and strategies for improving quality of business processes, based on actual work practices. This methodology provides guidance about how knowledge about organizational practices is gathered to improve business processes improvement. A key driver of BPPAM, concerning business process improvement is the ability to facilitate the alignment of business processes improvement activities and daily work practices. In this regard, this paper focuses on a meta-model to integrate daily work information into coherent and sound process definitions.

The remainder of this paper is organized as follows: section 2 presents a brief analysis about business process meta-models and work practice modelling. Section 3 describes the methodology applied in this research work. In section 4 we present the proposed Business Process and Practice Meta-model (BPPAMeta-model). Section 5 reports preliminary results of exploring the usage of BPPAMeta-model. Finally, section 6 concludes and discusses future trends.
Literature Review

The literature review is organized in three parts including the basic overview on business process meta-models, work practices modelling and limitations related with these approaches.

Business Process Meta-Models

This section describes several business process meta-models, a subject of several standardization efforts. These meta-models are a basis to the BPPAM methodology, briefly described in the introduction. These approaches comprise a set of concepts to capture several aspects of business processes. In particular, the business process meta-model allows capturing functional, informational and behavioural aspects of business processes. The following present an outline of three meta-models with the strengths and weakness of each approach to justify the creation of our meta-model proposal, we do not represent each meta-model in full detail.

Figure 1
BPMN Meta-metamodell

![BPMN Meta-metamodell](image)

Source: Adapted from OMG (2013)

The Business Process Model and Notation (BPMN) Meta-model (OMG, 2013) was defined by the Object Management Group as a de facto standard that holds all definitions common to process oriented models. The BPMN is structured in several layers, the most important is the Core layer that contains 3 sub-packages: Foundation, a package with fundamental constructors for modelling; Service, a
package that includes constructors for services and interfaces modelling; Common, a package with the classes that are common to the layers of Process, Choreography and Collaboration. Since our focus is business process meta-modelling approaches, we only describe the Process meta-model and ignore the others because they are out of scope of this study.

Figure 2
Quality-Oriented Business Process Meta-model

Source: Adapted from Heidari et al. (2011)

The meta-classes of the Process Meta-model are depicted in Figure 1; the illustration shows the term Collaboration used to model interactions between processes. A Process contains several FlowNodes (Activity, Event, Gateway) connected by SequenceFlows. A SequenceFlow shows the order in which activities are performed in a process, and relates activities, gateways and events to each other. A Process has several resources that will perform or will be responsible for that Process which are designed by ResourceRole.
The Quality-Oriented Business Process Meta-Model (QOBPM) (Heidari et al., 2011) besides providing a unified view of all business process constructs and related quality dimensions also serves as a basis for business process quality evaluation. The main contribution of this approach was the assignment of quality information meta-classes to the corresponding business process constructs, which are grey-coloured in Figure 2. The different types of elements of a business process are: Activity, Event, Gateway and Connectors. This meta-model has been designed integrating the concepts existing in seven different business process modelling techniques (BPMN, IFED0, IFED3, RAD, UML-AS, SADT and EPC).

**Figure 3**
Transactional Meta-model Business Process (Business Process Package)

The Transactional Meta-model for Business Process (TMBP) (Thom et al., 2005) is composed of five packages: Business Process, Organizational, Resource, Routing and Catalogue. The Organizational package differentiates between functional and organizational roles (Figure 3). The Resource package identifies different types of
resources. The Routing package determines the order of tasks execution. The Catalogue package allows the selection of the best design pattern from a catalogue of business (sub-) process patterns to model certain business process. The Business Process package describes a business process which can involve several business transactions that can be decomposed into tasks. The relationship between the package meta-classes and the actor, resource, organizational unit, skill and routing meta-classes of the other packages are also included in the diagram.

Work Practice Modelling
In order to better comprehend what the concept of work practices entails, we must distinguish between procedures and practices. Procedures are specifications that define how tasks should be accomplished, and who is responsible for each task (Degani et al., 1997). Work practices reflect how people enact procedures. Since different individuals and groups have different skills, habits, preferences, values and personalities, the degree to which they follow procedures is highly variable and thus deviate from procedures in varying measures. Fine-grained process descriptions, activity, and task models represent standard operating procedures, they are not able of representing actual work practices. Modeling work practices offers a means of uncovering problems not detected in process or tasks models. Some research efforts in work practice modelling include a context model and representation language developed by Pomerol and Brézillon (2011). A premise of this work is that the main distinction between operational procedures and practices is the context where these practices apply. Their model of context relates the notion of context and knowledge. At each moment, context is what surrounds a given focus of attention (e.g. a particular step of a task at hand). Proceduralized context is in fact part of contextual knowledge; however, it is put together and reorganized in order to solve a problem. The authors model context using acyclic graphs with two basic components; actions and contextual elements.

Sierhuis and Clancey (1997) developed a language called BRAHMS (Business Redesign Agent-based Holistic Modelling System). BRHAMS is part of a modelling environment based on agents and activities, where people are the center of the model instead of activities because their premise is that knowledge cannot be disembodied from them. BRAHMS capture what agents do throughout the day, not just the activities they perform. The language is focused on capturing knowledge and learning in human activities. It combines the perspective of business processes with a cognitive perspective to make social processes visible by capturing the knowledge that each agent has of other agents allowing a proper work distribution, seeking support from others and prioritizing jobs. Thus, Brahms not only models standard task flows but also how work get done, emphasizing practices, and individual productivity statistics. In this sense, BRAHMS enriches work-related concepts (activities and work frames i.e. rules that model situations that trigger actions), other concepts such as detectables (facts of the world, probability of occurrence during a particular action). Detectables may represent conditions that cause interruptions to workframes or ending them.

Zacarias et al. (2010) propose a model based on contexts and agents to capture and model work practice by representing agent behavior from three different perspectives, action, deliberation and learning/change. The action layer captures recurrent behavior using concepts such as actions, resources (information items, tools and human). These concepts are combined to represent action and interaction patterns. The model acknowledges the contextual nature of these
patterns by associating them a particular context. The deliberation layer captures the rules used to activate or deactivate action or interaction contexts. The main concepts of this layer are context activation rules, interpersonal rules, to-do lists, events and commitments. In other words, this layer captures scheduling rules and multi-tasking behavior. Thereafter, the deliberation layer enables to see the practices used by people in managing themselves. The change/learn layer captures rules that constrain possible changes to the concepts in action and deliberation layers.

Limitations in process and practice modelling
Although, there is no current standard core business process meta-model, all the three meta-models presented use more or less the same concepts and don’t support work practice modelling. As final conclusion, BPMN also integrates orchestration and choreography. The QOBPM considers all possible constructs of a business process but enriched with quality information to effectively assess the quality of business processes. Finally, the TMBP links organizational structure aspects with business (sub) process and makes it feasible the reuse of business (sub)process patterns to create business (sub)process.

Regarding current work practice modelling approaches, they are mostly informal. Hence, no formal meta-model has been proposed, as is the case for several business processes modelling approaches. Since current business process meta-model lack constructs for work practice modelling, no means are provided to address the alignment between business process and work practices.

Methodology
In 2004, [Hevner et al., 2004] proposes an approach to Information Systems research that combines behavioral and design science research. In this approach, the environment surrounds goals define business goals and business needs identified by members of the organization. Based on given business needs, behavioral science research develops and justifies theories explaining business phenomena. Within Information Systems research, such phenomena involve human actors, organizations and supporting technologies. Design-science builds and evaluates artifacts to satisfy business needs previously agreed upon. Whereas behavioral research aims at finding a given truth, the goal of design science research is utility of artifacts. An artifact maybe useful due to a still unknown truth. Incorporating a given truth into an artifact design requires developing theories, which are later assessed through evaluation and justification activities and lead to further refinements of the theory.

The methodology employed in the present research follows the design-science approach of Hevner and colleagues. As aforementioned, design science encompasses two complementary activities; building artifacts to meet specific business needs or solving a given problem, and evaluating the utility of the artifacts regarding the satisfaction of the respective needs or the problems intended to be solved. The artifacts built by design science include constructs, models, methods and instantiations. Constructs allow defining the language to build models, and define problems and solutions. Models provide means of exploring the effects of designs on the real world. Methods define ways of solving specific problems. Finally, instantiations show implementations of artefacts in working systems.

This paper describes an artefact, a meta-model to facilitate the alignment between business processes and work practices that was built as part of our research. The objective of the remaining research process is to evaluate the utility of
meta-model in real business environments, regarding the particular needs identified within such environments.

**BPPAMeta-model**

Business Process and Practice Alignment Methodology (BPPAM) intends to establish disciplined business process practices based on daily actions. To support this approach, it is important to define and describe business processes and daily practices.

**Figure 4**

Business Process and Practice Alignment Meta-model

Business process modelling aims to describe the actually performed business process, the models are used as the basis for understanding and analysing processes, improving existing processes, as a baseline for process changes or for disseminating process knowledge. Nevertheless, existing meta-modelling approaches don’t cover aspects related to daily actions and also do not solve the gap regarding how to use elements from daily practices to create business process elements. In order to provide support for these aspects, an extra layer is included in our meta-model. This extension also intends to describe the relation between business processes and daily practices. Figure 4 illustrates BPPAM meta-model that has three layers: **service layer, structure layer** and **action layer**. Each layer is focused on a specific set of concerns and encompasses several elements that describe the concerns of the layer. Considering the complexity of the action layer, the representation of its elements is showed in a separated figure (Figure 5).
The service layer offers business products and business service to external customers, which involves some business collaborations. The basic elements are:

- **Business Service** – unit of functionality that supports a business that hides internal activities.
- **Business Product** - goods that are sold to other businesses, and used to produce other goods.
- **Business Value** – satisfying the needs and expectations of the customer.
- **Business Collaboration** – joint effort of multiple work groups to accomplish a business service.
- **Business Interface** – point of access where a set of activities is made available to customers.

*Figure 5*
Action Layer of the BPPAMeta-model

Source: Author’s illustration

The structure layer of the BPPAM meta-model represents the elements (meta-classes) that are relevant for modelling the functional aspect (activity, process), informational aspect (product and product kind), behavioural aspects and organizational aspects (role and actor). These basic elements are:

- **Behaviour** – best practices that guide an organization.
- **Business Process** - is a behaviour element based on a set of ordered activities. It is intended to produce products or business services.
- **Business Areas** – an organizational unit corresponding to a defined business segment or area of responsibility.
- **Business Activity** – unit of work that consumes and produces products.
o **Product** - item that is produced or consumed during business activities. One or more roles develop a product in the performance of one or more activities.

o **Product Kind** - represents several types of products. Work products can be classified in several types, which identify the kind of input or/and output expected in an activity.

o **Contract** - formal or informal specification of agreement that specifies the rights and obligations associated with a business product.

o **Business Role** – responsibility for performing specific activities in order to produce, either directly or indirectly, versions of one or more products.

o **Actor** – organizational entity that performs one or more business roles.

Enriching business process meta-model with work practice information results in the action layer. In order to build a work practice Meta-model (WPM); there is a need for identifying the corresponding work practices constructs before the alignment with business process constructors. Figure 5 proposes an extension to the meta-model concerning work practice expressed in terms of entities and the relationships among them. The proposal conveys the following ideas:

- The entities individual, dyad and group that can be regarded both as actor or resources (of other actors).
- As actors, they perform several actions that use different kinds of resources (including other individuals, dyads or groups).
- **Actions** are not strictly classified into tasks, projects, etc. Rather, action streams are grouped in personal contexts.
- A single **individual** handles several personal contexts. At any given moment, individuals use personal scheduling rules to choose the context to work in. Likewise, two individuals (dyad) and groups activate **inter-personal and group contexts** using shared scheduling rules.
- An inter-personal context relates two personal contexts of two different individuals. Hence, the same two individuals (a unique dyad) may share several inter-personal contexts.
- Personal and inter-personal contexts may be related to one or several tasks/projects. Conversely, tasks/projects may be associated with several contexts.
- **Actions** create, update or delete resource-related items. These items may be related to one or more formal resources. Conversely, several items may compose a formal resource. The association of items with formal resources is user-defined.
- **Communicative** and **non-communicative actions** must be distinguished. The relationship of communicative actions with the obligations (to-dos) and commitments created, updated or cancelled by them, need to be provided.
- The notion of a person’s state is included. This state is described in terms of the set of actions to-do and shared commitments. Knowing the person’s state allows defining scheduling rules based on current commitments and actions to-do.
- Currently, the identification of an individual current context is based on the actions performed and resources used. This identification can be greatly enhanced if personal, inter-personal and group-level scheduling rules taking into account the individual state were known.
The action layer of our meta-model describes a set of constructors to represent the relevant issues of organizational daily work practices. By instantiating the entities of the meta-model we are able to identify and map work practice constructors to business process constructors. This facilitates analysis and decision-making using views of different actors (individual, dyad and group in the action layer) to describe the actual business process of an organization (structure layer). The alignment between aspects of the action layers and its related business process aspects (Figure 6) is motivated by two considerations. First, daily actions change over time, and second, that change can be problematic since increases the gap with actual business process descriptions. This continued alignment is crucial for the capacity to manage change.

At the action layer, context is regarded as a group of related actions (personal action and interaction). At this level, personal action context reflects the personal view that the individual has of a given interaction context. The interaction context captures typical interactions between any two individuals. Whereas any two individuals share a single inter-personal relationship, they may share several inter-personal contexts. The inter-personal context represents interaction rules shared by two individuals, which governs the interactions patterns among them. The relationship of these patterns with business activities in the structure layer needs to be established through the identification and analysis of such contexts.

At the action layer, each interaction type is related to a specific set of resources types that enable, but also constrain, agent interactions. This relationship is essential to identify and associate products that consumed and produced by business activities in the structure layer. Each agent involved in the execution of specific actions must present a set of abilities and obligations. This means that is possible to infer specific roles (structure layer) of a business process based on agent abilities.

The dependencies of the constructors along these two layers (action layer and structure layer) form the structural backbone of the meta-model (BPPAMeta-model).

Contexts are formed by conversations (sequence of actions and interactions) among people around topics that may be related to one or several activities. The
nature and structure of the conversation is determined by the activities involved and the role each person plays in them. Since people may interleave different topics of different activities within a conversation, it is not straightforward to associate a given context to a particular activity.

Results and Discussion
The meta-modeled proposed was applied in a case study. This section summarizes results obtained regarding the alignment of business process specifications with work practices. In this case contexts were analyzed to identify recurrent interaction patterns. Such analysis allowed identifying how different groups executed business activities and in what measure they deviated from pre-defined process specifications. Some interaction context features are illustrated in the following example, which is taken from a real organizational setting of a post-graduate educational institution. Consider the following sequence of actions:

- Prof. Smith requests Alice the payment of a course he has lectured
- Alice checks Prof. Smith’s payment requirements (course grades and report) and notices it lacks the course report
- Alice requests Prof. Smith to send the course grades and corresponding report
- Alice informs Prof. Smith that payment can only be made after receiving the required documentation
- Prof. Smith informs Alice that due to personal reasons, he can only send the documentation on date D
- Prof. Smith requests an exception asking for the payment to be made prior to date D
- Alice analyzes Prof. Smith’s request
- Alice asks her boss whether to accept Prof. Smith’s request
- Alice’s boss answers that she should accept Prof. Smith’s request because he has a very good record and consequently, deserves the exception requested
- Alice accepts Prof. Smith’s request
- Alice orders Luisa the corresponding payment
- Alice informs Prof. Smith that payment is ordered

The previous sequence of actions created a context depicted in Figure 7. Such context is identified as ‘Prof. Smith’s payment situation’ context. This context has three participants (agents): Alice, Prof. Smith and Alice’s boss. The context reflects an agent network and its boundaries are defined first, by the three participating agents: Alice, Prof. Smith and Alice’s boss. The topic ‘Prof. Smith’s payment situation’ is the second criteria that help defining this context. The third and final criteria, is a set of action types (request, analyze, inform, acknowledge, order, check, accept), and resources (telephone, mail, payment, requirements, knowledge about prof. Smith). The former and latter criteria can be used to uncover action and interaction patterns. Thereafter, identifying contexts means clustering actions within action repositories sharing a set of common features.

Contextual patterns
Action repositories describe not only action types and its participants, they include descriptions of the information items, tools, materials or knowledge used or produced by each action. All this information allows finding detailed and personalized action and interaction patterns. Once found, action and interaction patterns can then be analyzed in order to identify to which business activity (and its encompassing business process) they belong to. It also allows identifying the role
played by each agent in such activity. Patterns are also linked with formally defined resources already associated to given business activities or processes.

Figure 7
‘Prof. Smith’s payment situation’ context

![Diagram](image)

Source: Author’s illustration

This bottom-up approach of linking work practices to business processes allows assessing deviations. Depending on their outcome, such deviations can be regarded as anomalies or innovations. After collecting work practice diagrams, the team discussed them and selected the ones they considered as best practices. Those best practices were then used to assess an existing business process. Figure 8 depicts a business process model that emerged from this discussion. In this case, the resulting business process reflects the course payment practice depicted in Figure 8 as it was considered a good practice by all teams. The previous conversation creates a context that is related to the Pay Course business activity (Figure 8). This context has two agents that play payer (Alice) and payee business roles (prof. Smith). Some of these actions will appear in the formal description of the activity Pay Course (request payment) but some will not (informing that the report will be sent a later date). Some resources are formal activity products (course grades and reports), and some will not due to their transient and informal nature (information that the report will be sent a later date and reason for the delay).
Conclusion

The different meta-models presented in related work focus different perspectives concerning with business process. The review of these meta-models allowed identifying the advantages and limits of each approach, each one concentrated on different aspects. The BPMN Meta-model belongs to the most well-known approaches that is used to create orchestrations of business processes internal to a specific organization and allows the definition of choreographies by interconnecting different processes. The QOBPM approach provides an integration of quality information to the corresponding business process constructs because without this quality data it is not possible to assess a business process. The TMBP approach contributes with support between organizational structure aspects and specific business process constructors as well as a catalogue of patterns based on different business process types. This study showed that although exists several business process meta-models, little effort has been devoted to the development of meta-models supporting the alignment between daily actions and business process descriptions as they are really executed in organizations.

In this paper, the BPPPAMeta-model has been presented with its extension to integrate work practice information. The structure layer of the BPPPAMeta-model allows designing functional, informational and behavioural aspects of business processes. The action layer extends the meta-model with work practice concepts that allow designing several aspects of daily actions. Moreover, structure and action layers had been aligned to perform the definitions of process elements based on work practice aspects. Besides, this meta-model can be used by the methodology BPPAM to specify or improve business processes models based on work practice descriptions.
References
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Organisational Capabilities Required for Enabling Employee Mobility through Bring-Your-Own-Device Concept

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Abstract

Background: Mobile device adoption is on the rise and people are increasingly using mobile devices as a part of their lives. Studies have shown that people can use mobile devices to perform their work duties from anywhere. Organisations are now exploring ways of enabling and supporting mobility for employees’ mobile devices, including BYOD (Bring-Your-Own-Device) policies. Objective: The objective of this study is to identify the main capabilities required for enterprise mobility. Methods/Approach: This qualitative research study presents empirical results based on interviews with selected senior IS managers of large organizations. Results: The main findings of this study suggest that information security and mobile device management are among the main capabilities required for enterprise mobility. Conclusions: Enterprise mobility is an emerging field which has received very little research attention. More research in the field will help organisations make informed decisions on how to increase productivity, sales and efficiency while achieving employee satisfaction through enterprise mobility.

Keywords: mobility, productivity, use case, security, BYOD, Bring-Your-Own-Device, connectivity
JEL classification: O33
Paper type: Research article

Introduction
The advances in mobile technologies have enabled exciting new possibilities for individuals and organisations. The considerable developments in mobile hardware, software and networks contribute greatly to mobile collaboration and communication. Mobile hardware available on the market includes tablet...
computers and smartphones, while advanced applications have been developed for these devices based on the iOS and Android platform. Advanced mobile networks such as 3G and LTE allow seamless connection of these devices with fast data transfer rates enabling advanced communication software such as Skype video calling to work seamlessly. These developments in mobile technologies have made mobile devices sophisticated and powerful to the extent that their performance nearly equals that of desktop computers (Ghosh et al., 2013).

As a consequence, the traditional workplace is changing as individuals now perform their work duties using mobile devices at home, from remote sites or while on the go. Mobile technologies enable workers to work and collaborate while on the move (Kietzmann et al., 2013). However, enterprise mobility has not received much research to date (Sørensen, 2014).

The purpose of this research study is to come up with an empirically validated list of ‘must-have’ capabilities for enterprise mobility. Qualitative data was collected and analysed and final conclusions drawn from it.

This study seeks to contribute new insights on enterprise mobility to both theory and practice. Organisations seeking to optimise enterprise mobility can use the research findings as a reference. Researchers may find the proposed model of factors, capabilities and impacts useful for research into enterprise mobility and related fields.

The paper first presents a literature review outlining the benefits, issues and impacts of enterprise mobility; and introduces the theoretical framework. The paper then discusses the methodology, followed by a detailed analysis of the empirical data. It concludes with recommendations, limitations and suggestions for future research.

**Background**

The key terms used in this research are Capability and Enterprise Mobility. Several definitions of capability exist depending on the context in which it is being used (Harris, 2007). This research followed the definition that “organisational capability refers to an organisational ability to perform a co-ordinated task, utilizing organisational resources, for the purpose of achieving a particular end result” (Helfat, 2003, p. 1). Enterprise mobility is when work interaction is mobilized using mobile and ubiquitous information technology (Sørensen, 2014). Enterprise mobility can therefore be defined as “the use of mobile IT for the accomplishment, coordination and management of organizational activities” (Sørensen, 2011, p. 476).

**Enterprise Mobility Management**

Enterprise Mobility Management is designed to address the risk of unauthorised access of organisational information on mobile devices by implementing some level of control on such devices without compromising the privacy of the device owner (Peraković et al., 2014). In achieving this goal, there are methods developed and used to separate and secure business data and private data on a mobile device. These methods fall under the term Mobile Content Management. The methods include Mobile Device Management (MDM), Mobile Application Management (MAM), Mobile Information Management (MIM) and Mobile Email Management (MEM). These methods share the common purpose of managing and securing a mobile device’s data and applications.
Using wireless communication technologies such as WiFi and over-the-air (OTA), **Mobile Device Management**, “supports centralized control of an entire fleet of smartphones and other mobile devices by applying and ensuring pre-defined configuration settings using an app on the smartphone” (Beimborn et al., 2013, p. 2). The app that is used to apply configurations on the MDA system is called an MDM agent. Security settings such as password length and certain device functionality are governed by the MDA agent (Hemker, 2012).

Adopting MDM systems helps enhance the security of mobile devices; however, if the system is exploited, mobile devices and the data on them may be compromised. A study by Rhee et al. (2013) identified and listed all possible threats against an MDA system through analysis of threat agents, assets and adverse actions. Developers need to consider all these possible threats in order to secure and prevent the mobile devices from being exploited.

Organisational content is mainly delivered through mobile applications to users. **Mobile Application Management** is, described by Winthrop (as cited in Beimborn et al., 2013, p. 2) who states that “MAM focuses on managing the life cycle of an app from development, procurement, distribution, configuration, and update to the removal of an app.” Some of the essential functions of MAM are application containerisation, support for application-specific containers, secure access to email and disabling copying of its contents and copying of files between applications (Peraković et al., 2014).

Proceeding from MAM is **Enterprise App Store** (EAS). EAS is a platform for internal organisational distribution of mobile apps limited to business apps. The firm pre-defines or pre-qualifies apps in the organisation’s context which employees can use and put them in a container (Beimborn et al., 2013).

With **Mobile Information Management**, the focus is shifted to securing critical corporate information. The main purpose of MIM is to store enterprise information on a central location, possibly a private cloud, then share it with different endpoints in a secure manner (Eslahi et al., 2014). These endpoints could be a limited number of devices which can access or manage the encrypted data. It should be noted, however, that MIM on its own is not a defence against hacking or malware attacks but is a way of managing access to sensitive corporate data by mobile devices (Allan, 2014).

**Enterprise Mobility Benefits**
There are benefits to the organisation; these include cost savings, competitive advantage, a high return on investment, etc. Benefits to the employee include flexibility, increased productivity, etc., while customer or client benefits include convenience and efficiency. Basole (2007a) argues that there are five types of enterprise mobility benefits: strategic benefits – which include creating a competitive advantage through aligning business goals with strategies; informational benefits – i.e. easier access to correct information; transactional benefits – cutting operational and staff costs; enterprise transformation – enhanced structure and procedures; and business value benefits – which in cooperates all these aforementioned benefits.

**Enterprise Mobility Impacts**
Enterprise Mobility (EM) can have a number of impacts on business; positive impacts may also be termed benefits. A sharp increase in **employee productivity** may perhaps be the greatest impact an organisation may experience, with 75% of enterprises adopting EM reporting increased employee productivity (Kumar, 2012).
Tech savvy employees working from mobile devices are more likely to continue working outside of work hours and thus have quicker turnaround times on their assigned tasks (Pillay et al., 2013).

Direct access to inventory levels and pricing, ability to access and update customer profiles, and carrying out transactions in real-time enables elimination of redundant procedures which in turn **shortens sales cycles and increases sales** (Ortbach et al., 2014). Using ERP mobile applications optimises real time access to customer orders and inventory levels for sales staff while management has access to time critical performance indicators through dashboards.

**Cost savings, and thus an increased Return on Investment (ROI),** can be realised by an organisation when a shift from purchasing expensive desktop computing equipment is replaced by cheaper mobile devices (Basole, 2007b). Significant reductions in IT support costs can also be realised when employees use their own devices. Employees would then manage their own devices or get support from their vendor, which in turn reduces IT administration by the organisation.

EMM also impacts on various intangible aspects such as **employee and customer satisfaction,** although measuring such impacts has proven to be difficult due to a lack of assessment tools (Vuolle, 2011). However, it is acknowledged that some positive factors in EM do contribute to the overall satisfaction of the user or customer. Carden (2007) argues that the ability to check the status of a request using a mobile application like an ERP app increases customer assurance and overall satisfaction. When a customer of an insurance company is able to file a claim using a mobile app, the result is process improvement and increased efficiency as well as customer satisfaction (Giessmann et al., 2012).

**Enterprise Mobility Challenges**

As smartphones and tablets become common in the workplace, **securing** corporate information on these devices has become a great concern to enterprises. The main challenge is to put in place appropriate security policies while exploiting the usability of consumer applications (Sammer et al., 2013).

Another challenge is **lack of control** of the device. When the employee owns the device, it is up to them to keep the device physically secure from use or access by others and, in the event that the device is lost or stolen, the device will become a security threat to the organisation. IT practices and policies, password protection and remote wipe need to be enforced; they can also be intentionally averted by employees for various reasons (Pillay et al., 2013).

Developing compatible applications has become a headache for developers trying to produce applications that work on as many mobile devices as possible. **Fragmentation of mobile device platforms** presents challenges such as app support, enforcing security updates, monitoring and provisioning. In an attempt to address this issue, some vendors are offering cross platform enterprise app stores as a solution since they only need a web browser (Balakrishnan et al., 2015).

**Enterprise Mobility Enablers**

According to Basole (2008), **mobile applications** are one of the most significant enablers of enterprise mobility. He notes that mobile work specific applications have been developed in many cases by encompassing the existing business applications into the mobile sphere. This has led to the development of mobile app stores. App stores can be described as “digital platforms that provide users a central location to
effectively browse, purchase, download, and update their mobile applications” (Jin et al., 2014, p. 1).

Advancements in mobile network technologies have also enabled not only voice transfers but also data transfers. Widespread availability of 3G and 4G mobile spectra and advanced technologies like LTE, bandwidth and browsing capabilities are drastically improving on mobile devices (Kumar, 2012).

The introduction of large screen smartphones called ‘phablets’, brought about more possibilities of users using these devices to access cooperate information. Davis (2014) notes that users interact with these devices in different and unconsidered ways whether they are controlled or managed. He further notes that the number of employees using mobile devices to work is increasing—a confirmation of how mobile device advancements is enabling enterprise mobility.

BYOD (Bring Your Own Device) is when employees use non-corporate owned devices including their own software to access company resources within or outside the environment of their organisation (Ghosh et al., 2013). BYOD is one of the major enablers of enterprise mobility, as organisations do not have to purchase and provide any mobile devices for its employees. The number of organisations taking advantage of BYOD is increasing globally with countries such as Spain, Malaysia and Brazil reporting up to 80% adoption (Eslahi et al., 2014).

Conceptual Model for Organisational Capabilities
The TOE (Technology-Organisation-Environment) framework and other technology frameworks such as the Diffusion of Innovation (DOI) available in literature tend to mainly focus on the adoption of IT (Kabanda et al., 2015, Oliveira et al., 2011, Molla et al., 2005). No framework is available for measuring IT capabilities at firm level. However, in cases where available frameworks fail to address the research requirements, there is evidence of available studies which combined theories to address this gap (Oliveira et al., 2011). Based on the TOE framework, this research used the conceptual framework below to identify the essential capabilities for improving enterprise mobility.

Figure 1
Conceptual model for research based on the TOE framework

<table>
<thead>
<tr>
<th>Technology: Systems; Service Providers</th>
<th>Capabilities (What)</th>
<th>Impacts/Outcomes (Why)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation: Lack of HR; Culture; Mgt Support; Awareness; Size; Governance</td>
<td>TO BE DETERMINED</td>
<td>Customer Experience</td>
</tr>
<tr>
<td>Environment: Regulations; Suppliers; Industry; Characteristics; Competitors</td>
<td></td>
<td>Return on Investment</td>
</tr>
</tbody>
</table>

This study used the Technology-Organisation-Environment (TOE) framework (Tornatzky et al., 1990) to identify the capabilities for improving enterprise mobility (Figure 1). The model has three components. The first component is the factors that
influence certain capabilities. The factors are grouped under three contexts i.e. technological factors, organisational factors and environmental factors. These factors would have a positive or negative effect on the capabilities listed in the middle section. The second component is the capabilities which will be determined during data collection. These capabilities will in turn influence certain outcomes, also to be determined in this research.

Methodology

The main research question was “What are the must-have capabilities for enterprise mobility?” The secondary questions were:

1. What are the technologies, organisational and environmental factors that influence enterprise mobility?
2. What impacts or outcomes does enterprise mobility have?

This research study is qualitative and used a post-positivist philosophy. Unlike positivism which works with an observable social reality and provides law-like generalizations as its findings (Saunders et al., 2009), the post-positivism approach recognises “that all cause and effect is a probability that may or may not occur” (Creswell, 2013, p 23). This research was cross sectional. Our population was large organisations, which befit the term enterprise. Our findings are not necessarily generalizable to small and medium-sized enterprises.

Five organisations were selected from each of the following sectors: Insurance, Accounting, Auditing, and Wholesale and Retail Industry. The reason of this selection is for diversification. Purposeful sampling was used in selecting these organisations in order to find senior managers who understood the study phenomenon best. Data was collected using semi-structured interviews. Questions were prepared beforehand and served as a guideline so as to cover the entire required topic field. New questions emerged during the conversation, giving the interviewee an opportunity to further elaborate their responses. Open-ended questions were used to allow the interviewee to fully express himself or herself, thereby providing rich data.

Interviews were recorded and transcribed; thereafter, thematic analysis and coding was used to uncover themes and patterns in the data. Thematic analysis makes use of coding themes from the data using NVivo. NVivo is a qualitative data analysis tool, which facilitates shaping, and making sense of unstructured data by producing trends and enabling hypothesis construction and demonstration.

Candidates participated in this research on a voluntary basis. The details of participants and their organisations were treated as highly confidential and aliases are used where necessary.

Results

Interviews were conducted with 5 senior managers and 1 enterprise mobility consultant (referred to as P1 to P6) as shown in Table 2.

The data was transcribed and analysed using thematic analysis. The following section presents the themes that came up from the interviews, grouped into the categories of Factors, Capabilities and Impacts.
Table 2
Interview Participants

<table>
<thead>
<tr>
<th>Participant</th>
<th>Industry</th>
<th>Job Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Accounting</td>
<td>Senior Manager IT</td>
</tr>
<tr>
<td>P2</td>
<td>Retail</td>
<td>Senior IS Manager</td>
</tr>
<tr>
<td>P3</td>
<td>Accounting</td>
<td>Service Delivery manager</td>
</tr>
<tr>
<td>P4</td>
<td>Insurance</td>
<td>Mobility Architect</td>
</tr>
<tr>
<td>P5</td>
<td>Wholesale</td>
<td>IT Manager</td>
</tr>
<tr>
<td>P6</td>
<td>IT Service</td>
<td>Mobility Consultant</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

Adoption Factors
From our theoretical framework, we have technological, organisational and environmental factors. The following are the themes that came up under each section.

The existing themes that were originally listed in the theoretical framework were **technical systems and service providers**. However, during the analysis, none of these themes came up. Instead the theme that came up under technology was hardware as mentioned by one participant: “So you need hardware with good battery life, good connectivity options, WiFi, 3G, and as I have mentioned the right form factor screen size to be able to work” (P1). This assertion suggested that there is a need to have the right tools in place in terms of the required hardware that will run, maintain, support and manage the mobile devices.

The findings suggest that **organisational** culture seemed to be a big issue across all the participants’ organisations, as stated by the participants: “I think the most important factor is the internal cooperate culture” (P1); “People are very used to having offices, having computers and sitting doing work. Now we are telling them listen forget about that” (P2); “Some people are very paper driven so they don’t… almost have resistance to change…” (P5); However, other participants did not agree as they state that users already have a culture of technology; And “A lot of the users (at…) already have a culture of technology” (P4). Organisational culture then seems to be a problem to the older generation of staff members who may struggle to embrace new technologies.

The only **environmental** theme that emerged was government regulation, although this does not seem to affect enterprise mobility much as mentioned by the participants: “Basically the factors we will have to consider is that also the POPI act is one factor (that is the Protection of personal information) so we can’t, we can not just have e-mail on the phone with normal technology because there is no security measures put in place. So we have to consider the structured and unstructured data how it’s handled how it’s shared how it’s stored where it’s stored and those kind of things yah” (P4). However, Participant 1 did not agree as he states that, “Those can be complied with and still have mobility as a big aspect of our business so there is no regulations as far as I know or any other factors really that affects us” (P1).

Capabilities
This section presents the major capabilities that emerged during the interview process, based on conversation density.

At the core of enterprise mobility is **connectivity**. Without connectivity, the whole concept of enterprise mobility is disabled as emphasised by this participant: “I think
one of the biggest challenges that we have experienced is the connectivity so when people are trying to work offsite or remotely and there is a slow or unstable connection back to the office that causes the biggest issues so then people aren’t able to work...So that’s the single biggest issue or barrier to enterprise mobility for us (P1).

The ability to have the right hardware for enterprise mobility came out as one of the dominant themes. This includes the mobile devices themselves and their ability to connect to a network as mentioned by the participants. “Second most important is the hardware itself. So you need hardware with good battery life, good connectivity options, WiFi, 3G, and as I have mentioned the right form factor screen size to be able to work” (P1). “Laptops that we issue [have] built in 3G cards and we supply the users with sim cards and make sure you are always connected to the internet (P1).

Most participants agreed that in order to have buy-in for enterprise mobility from users, you need to have a change management strategy. Most organisations are dealing with people who are used to their old way of thinking and working, and when new ways of doing the same tasks are introduced, proper change management is essential to achieve the main goals and purposes of enterprise mobility as mentioned by these participants. “So I think the change management is critical. Making sure that people understand why you are doing it and it is there to make their lives easier” (P2).

The need for a proper device management setup was agreed upon by most participants interviewed. This is in line with the literature, which also placed emphasis on the need for a mobile device management setup to ensure secure enterprise mobility. The main purpose of mobile device management, as discussed by the participants, is to have a level of control on the devices’ functions and usage with the purpose of ensuring the organisation’s systems are secured from outside threats, internal abuse and malicious activities.

The need to have secure enterprise mobility was raised by most participants. This theme also relates to the above previous discussion on Mobile Device Management as MDM works to ensure security. “If you look at South Africa and you look at Kenya, to them enterprise mobility is not something that they discussed because they believe everyone to be mobile and people in organisations has mobile but are they mobile secure? Can they do remote wipe?” (P6). “Enterprise mobility it’s about basically securing information on mobile devices” (P4).

Most participants feel there is a need to have mobile applications made specifically to run on mobile devices. This may include optimising the current applications such as e-mail to run on mobile.

Most participants placed emphasis on choosing the right use cases as being very important. “You need to understand where they need mobility and what they get. You need to have a requirement, and that requirement needs to be understood” (P6). “But I think more importantly on all those is picking the right use cases I think is what you call them. Start there first because the danger is you start with the technology and then you look at the processes” (P2). Letting technology drive mobility has a negative impact of having the systems and applications which do not really serve any purpose. This would in turn affects the usability of the technology.

Impacts
This section presents a list of the impacts, outcomes and benefits that are as a result of an organisation’s enterprise mobility.

Most participants were of the view that, to them, enterprise mobility has brought a significant increase in productivity. “I think people have become more productive
because of mobility” (P3). “What enterprise mobility on the mobile devices has enabled us to do is to increase productivity” (P1). “I think the biggest impact is gotta be on store productivity” (P2). This is in line with findings from the literature, which listed increased productivity as a major benefit. Increased productivity is due to the flexibility that comes with working from anywhere.

Increased efficiency or effectiveness also came up in the interviews. Participants mentioned that with mobility comes efficiency in doing and carrying out tasks, as emphasized by participant 5: “I mean that was the main thing to be a little more efficient” (P5). This is in line with the literature findings that enterprise mobility allows work to be done more efficiently, resulting in significant time savings.

Another benefit is increased sales. “So there is a full impact across the system. It starts with store efficiency and productivity that actually leads to increase in sales” (P2). It is worth noting that the increase in sales is as a result of the other impacts like efficiency and productivity as mentioned by the participant.

Satisfaction is dependent on successful change management. Once the idea has been properly sold to the staff on how it’s all going to work and how it will make their jobs and lives easier and they actually realise the benefits of using such, their satisfaction increases. “I think you have to tell your staff why you are doing what you are doing and explain to them how the process is going to change and why it’s going to change and how it’s going to make their jobs easier” (P6).

Discussion

The data analysed from the interviews provided the researchers with the following findings. Most of the factors that were provided in the theoretical framework were not validated by the data. However, several new factors were uncovered (Figure 2).

Under technological factors, technology systems and service providers were not validated by the data. However, hardware came up as a new theme and is an important factor, as emphasised by participants. The hardware referred to includes the file servers and the mobile devices themselves that lie at the root of mobility.

![Figure 2
Organisational Mobility Capability Model](image)

The organisational factors that most affect enterprise mobility are culture. The other factors were not validated. However, it can be noted that lack of awareness is closely associated with culture as raised by Participant 4: “It’s a matter of how to do those things and there is always requests from users to see how they can counter from mobile devices” (P4).
The findings show that under *environmental* factors, only two factors were considered to affect enterprise mobility: government regulations, such as the POPI act, and a new theme network infrastructure. Interestingly, the other factors originally identified were not mentioned, such as suppliers and competitors.

Capabilities were identified from the interview data. Some capabilities themes came out dominant and were in line with the literature. Although Use Cases and Change Management did not receive many references in the interviews, the emphasis that was placed on them is of much significance.

Taking a look at impacts, the findings reveal four main impacts as a result of enterprise mobility. These are increases in satisfaction, sales, productivity and efficiency. User satisfaction and increased productivity were new themes that came up. The major impact highlighted by participants was increased productivity. This is due to the ability to work from ‘anywhere’. Other impacts such as customer experience, return on investment and competitive advantage were not validated.

The list of capabilities that has been presented in the middle block of the framework all came from the data, which was analysed. New themes of capabilities were identified and analysed as they came up from the interviewed participants. An inductive process was then applied to complete the framework’s constructs and initially the block was blank as there were no capabilities identified in literature by which we could validate. It is important to note that some capabilities themes came out dominant and were in line with the literature. The dominant themes that were identified based on conversation density in terms of the number of times the theme was mentioned in the interview are shown in the Table 3.

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Summary of Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P 1</td>
</tr>
<tr>
<td>Security</td>
<td>1</td>
</tr>
<tr>
<td>MDM</td>
<td>2</td>
</tr>
<tr>
<td>Connectivity</td>
<td>5</td>
</tr>
<tr>
<td>Use Cases</td>
<td>1</td>
</tr>
<tr>
<td>Change Management</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

Although Use Cases and Change Management did not receive much reference in the interviews, the emphasis that was placed on them is of much significance.

“You need to understand where they need mobility and what they get...You need to have a requirement, and that requirement needs to be understood” (P6). “I think the change management is critical. Making sure that people understand why you are doing it and it is there to make their lives easier” (P2).

Based on conversation density and emphasis, the capabilities which came up top are Security, Mobile Device Management, Right Use Cases, Change Management and Connectivity.

Taking a look at impacts, the findings reveal that there are four main impacts that are as a result of enterprise mobility. These are increased satisfaction, sales, productivity and efficiency. User satisfaction and increased productivity were new themes that came up. The major impact highlighted by participants being increased productivity. This is due to the ability of to work from ‘anywhere’. Other impacts such as customer experience, return on investment and competitive advantage were not validated.
Conclusion

The purpose of this research was to determine the main capabilities for enterprise mobility. We also investigated what technological, organisational and environmental factors influence enterprise mobility and what impact or outcome enterprise mobility has.

The most important capabilities required for enterprise mobility which were uncovered in our empirical study were:

- Security- the ability to secure information being transmitted to and from mobile devices.
- Mobile Device Management: the ability to manage the mobile devices issued to staff. This includes the remotely wiping of the devices.
- Right Use Cases. An organization should be able to choose the Right Use Cases on which services and processes to offer on mobile devices.
- Change Management: the ability to effectively manage the change in shift to enterprise mobility.
- Connectivity: the ability to offer or operate in an environment where the mobile devices could be connected to a network.

In answering the secondary questions, the following findings were discovered. The factors that affect enterprise mobility are: hardware availability, culture and/or awareness, government regulations and network infrastructure. The most important impacts or outcomes of enterprise mobility to an organisation are user satisfaction, increased sales, productivity and efficiency.

The research findings are of significant importance to organisations seeking to either adopt an EM strategy or to organisations currently employing an EM strategy but needing to improve it. This list of must-have capabilities acts as a reference point to organisations as to what is it they need for EM.

The major limitation for the research was the small sample size. A larger sample size might have provided much richer data and possibly revealed other factors, capabilities and impacts. Also, since most of the organisations were mainly based in South Africa, the findings might not be generalizable to organisations worldwide. Future research may wish to look at a particular industry in an effort to have a more accurate set of capabilities for enterprise mobility for that particular industry type. Also, an extension of this research in other country contexts is necessary in order to determine the generalizability of our findings.

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Corporate Social Responsibility Reporting - a Stakeholder`s Perspective Approach

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Abstract

Background: International financial reporting standards have constantly been facing fast-growing significant development. This has mainly been driven by the aim of better serving the needs of the investors. Awareness that corporate financial reporting provides short-sighted information and measures has been rising among politicians, in the society and on the financial markets. Therefore, Corporate Social Responsibility (CSR) reporting as a form of non-financial reporting has made it to limelight. Various reporting types developed, but the type of reporting is hardly codified. Objective: The goal of this paper is to identify the superior CSR reporting type from a stakeholder’s perspective. After identifying and analyzing central guidelines on CSR reporting and presenting different approaches, the authors will apply a positive-empirical methodology. Methods/Approach: In this first innovative joint attempt, eye-tracking technology is combined with a questionnaire for approaching CSR quality. Results: This study demonstrates the validity of the used methodology for the analysis of search and information browsing behavior in various types of sustainability reports. Conclusions: Overall our findings indicate that the reporting type “reference sustainability report” may not be advisable from a stakeholder’s perspective.

Keywords: sustainability reporting, information quality, eye-tracking, stakeholder perception
JEL classification: M 14, M 48
Paper type: Research article, Empirical Case Study

Introduction

The EU directive 2014/95/EU amending EU directive 2013/34/EU will obligate public interest companies to report on nonfinancial information (e. g. environment, employee-related matters, human rights, anti-corruption and bribery, future Art. 19a of the directive 2013/34/EU). Hence, the preparation of a sustainability report will become one of the major accounting challenges for the companies concerned.
While the directive turns the voluntary reporting on nonfinancial information into compulsory, it does not regulate how to report. As a result preparers keep orientating towards different initiatives on national and international level that provide various frameworks and guidelines. To this very day, a lack of unified and precise legal regulations can be noticed. In consequence, companies bear on various, so far voluntarily applied guidelines when it comes to reporting on CSR. On a more national (German) level e.g. the (German) Sustainability Code provides a framework for reporting on sustainability management regardless of company size or legal form (Rat für Nachhaltige Entwicklung, 2016a). On an international level the United Nations Global Compact (UNGC) recommend its voluntary members to take accepted sustainable principles into account - e. g. for ensuring environmental measures or protection of human rights (United Nations, 2016). The guidelines provided by the Global Reporting Initiative (GRI) are closely connected to the UNGC including general principles and indicators to transparently present economic, ecologic and social activities of a company. The absence of unified and binding legal sustainability reporting guidelines results in various sustainability reporting types. The companies’ focus on guidelines (e.g. the GRI G4-guidelines) is on hand as far as the content is concerned, but they are almost free in their decision on how to report. Being based on such different frameworks and guidelines the different reporting types according to Figure 1 developed: Some companies prepare a separate sustainability report, there are prepares with an embedded sustainability report and others prepare a report that uses references to the annual report, the internet presence or other already existing documents and data of the company. The separate sustainability report contains only information and business figures with regard to economic, ecologic and social sustainability. This report may (partly) be based on the same database as the preparer’s financial annual report, but published independent of it. The embedded sustainability report presents information on sustainability in a separate chapter within the annual report.

A topic recently addressed in the broad media strongly related to economic sustainability is the amount of and the country where taxes resulting from the value creation are paid. Here as well as in the aspect of market activities, a sustainable behaviour necessitates a strong local and regional anchorage and the inclusion of its markets (Global Reporting Initiative, 2015, pp. 48 et seqq.).

Directly linked to the concept of sustainability are new challenges that companies are increasingly facing because considering the ecological and social dimension may not have been the focus of a company’s day-to-day management. Since buying decisions are more and more depending on the company behind the product (Köppl et al., 2004), a concept called “Corporate Social Responsibility” (CSR) developed. The public call for a comprehensible Sustainability Reporting has been getting louder (see for a literature review Hahn et al. (2013) in conjunction with Eccles et al. (2012) and Eccles et al. (2011). The Commission of the European Communities describes the concept of CSR as a “concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with stakeholders on a voluntary basis” (Commission of the European Communities, 2001). Therefore, it should be pointed out that CSR includes business activities trying to fulfil a company’s duty to take economic as well as ecologic and social responsibility into account.
Figure 1
Reporting Types

Source: Author’s illustration

Depending on the choice of reporting type, structure and level of knowledge, the information behaviour of viewers with regard to the perception of CSR/Sustainability Reporting is hardly investigated. The purpose of the paper is to promote awareness for preparers as well as stakeholders that the choice of different reporting types is not only a question of subjective liking (Figure 1). It is a question on how barrier-free reported aspects are perceived by the stakeholders. In order to determine differences in perception and degree of differences eye-tracking technology is applied.

In general, up to 90% of the perceived information is visually conveyed (Schub von Bossiazky, 1992). Yet, eye-tracking provides the opportunity to capture perceptual processes with technical equipment. Eye-tracking employs infrared cameras measuring where, how long and in what sequence individuals focus on specific objects. Nowadays eye-tracking is used in a wide range of areas, for instance in neuroscience, marketing, computer science and industrial engineering (Duchowski, 2002; Duchowski, 2007). A small number of empirical surveys demonstrate that the application of these instruments for the analysis of visual perceptions in the field of financial reporting is promising. The objective here was to improve the readability of those reports by increasing the visibility of key information and enhance the precision of the information. Eisl et al. (2015) provide a detailed report on the state of the art of designing company reports. As demonstrated in Eisl et al. (2015) many empirical eye-tracking studies focus on the question of how to design tables and figures. To date there is no published eye-tracking study available comparing types of sustainability reports in a holistic way. Due to the fact that eye-tracking alone is not sufficient to find out what recipients think while observing a stimulus or how they process and interpret the perceived information, a mixed-method approach is recommended in literature (Geise, 2011; Duchowski, 2007). In order to make sensible use of Eye-Tracking technology here it is combined with a paper-based survey approach and visual monitoring to capture comments and emotions during the eye-tracking study. The contribution will present the perception
of the different sustainability reporting types (oriented towards GRI G4-guidelines) with the help of an eye-tracking system from a stakeholder’s perspective. Especially the mutual dependence of sustainability reporting type and the participants’ information behavior takes centre stage. The results will be used determining future possible measures to be taken against the overall goal of improving companies’ sustainability reports. Primarily it shall be analysed whether or not particular reporting types are perceived as being especially user friendly for the general public and relevant for the perception of the enterprises’ degree of sustainability.

**Background**

Originally risen from the Latin word “sustinere” (endure, support, hold back), the roots of the sustainability-idea can be reduced to Carl von Carlowitz (1645-1714) who defined the main principle of sustainability for the area of forestry for the first time by claiming that a forest needs to be harvested in a way which ensures taking only as much wood as can grow back for future generations (Carlowitz, 1713, pp. 86 et seq.). The so called Brundtland Report (United Nations, 1987) defines today’s common understanding and generally accepted definition of sustainability: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. As it can be seen, the conception of sustainable development clearly demands an assumption of responsibility for future generations as well as for the environment. The following years the topic of sustainable development was determined as a guiding political principle as the first United Nations Conference on Environment and Development took place in Rio de Janeiro in the year 1992 and the Agenda 21 (United Nations, 1992) was decided: A programme of action for a worldwide sustainable development. As one result the European Union defined in the Treaty of Amsterdam in 1997 (European Union, 1997) an initial approach of the Three-Pillar-Model of Sustainability as shown in Figure 2.

**Figure 2**

Sustainability’s Three-Pillar-Mode

![Three-Pillar-Model of Sustainability](source: Author’s illustration following Ernst et al. (2015), p. 25 et seq.)
The Ecology pillar concentrates on corporate environment protection efforts and policies. Central aspects are usage and management of natural resources as well as greenhouse gas emissions. Awareness, the ability to measure and the ability to account for are the basis of this pillar. Strategies and aims on reduction of non-renewable consumption while strengthening renewable sources are a way to sustainability in the Ecology pillar (Rat für Nachhaltige Entwicklung, 2016b). The Economy pillar highlights financial flows to and from stakeholders as well as market activities. Such a stakeholder is e.g. the municipal in which a company operates. While the ability to measure financial flows is usually already implemented by accounting regulation awareness of quality respectively strategies and aims are advised to ensure sustainability.

The Social Aspects pillar works both within the company and its suppliers as well as with the company’s local communities. In addition, here awareness and ability to measure and ability to account for are the basis for respective strategies and aims. Employment policies of the company itself and those of its suppliers are as well in focus as civic interaction with the local communities a company operates in. Finally yet importantly sustainably, behavior as anticorruption and compliance is subsumed under the Social Aspects pillar (Global Reporting Initiative, 2015, pp. 64 et seqq.).

Methodology
The objective of this pilot study is to explore whether and to what extent the combination of an eye-tracking approach with an opinion survey can deliver valuable information about the search behavior of potential stakeholders analyzing sustainability reports of companies. The following questions are of particular interest: a) does the difference in reporting types influence the search behavior of stakeholders, and b) do particular reporting types support potential stakeholders in their search for specific information and their judgment of the sustainability of companies.

Such quality of the sustainability reports/reporting types are measured by using the following questions:
- Is the preparer able to present a sustainability strategy?
- Is the structure of the sustainability report useful and clearly structured?
- Is the information content of the sustainability report (too) high or (too) low?
- Is the information provided by the preparer credible?
- Is the information provided by the preparer essential?

The participants of this exploratory study were 12 business students specialized in financial accounting. During a prior course taken by these students the focus was on sustainability reporting. The sustainability reporting of a number of companies was analyzed with the result that the participating students acquired a notable degree of expertise in this field.

The underlying material for every report format in this study was a distinguished sustainability report developed by an SME with less than 250 employees. The format of their report received an award by the Institut für Ökologische Wirtschaftsforschung (Institute for Ecological Economy Research) (Gebauer et al., 2012). The study focused on SMEs in order to provide comparability and decrease the complexity for the 12 students participating in the study. The following best-practice reports have been selected: a) an embedded report by Stadtwerke Heidelberg, b) a separate report by memo AG and c) a reference report by the Märkisches Landbrot GmbH. All reports are of high quality and have been provided to the students one week prior to the beginning of the study.
During the study the 12 students were randomly and evenly assigned to the three different reporting types. In practice, stakeholders are only interested in specific information within a sustainability report. In order to simulate these particular interests each of the students received specific questions for the criteria associated with the three presented dimensions of sustainability supplemented by regional engagement. Even though the questions were simple, e.g. “Could the company save energy?”, a pretest conducted with three member of staff revealed a lack of time to answer all questions. For this reason, the time allocated was increased from previously planned 10 to 20 minutes. The type of questions and tasks, proofed comprehensible and traceable.

The mobile eye-tracking system “Tobii Pro Glasses 2”, enabling the actimetry and analysis of individual gaze behavior was employed for the documentation of the search and response behavior of the 12 students. In order to assess the quality of responses in relationship to the three criteria and the search behavior of the students, an expert for CSR applied a one-to-five order Likert scale. In order to detect whether the search behavior correlates with the judgment of sustainability reports, students were asked to: 1) participate in the eye-tracking test, 2) judge the sustainability reports according to the available criteria, and 3) express an overall judgment. Here, the Likert scale was applied for purposes of consistency (Litfin et al., 2016).

**Results**

The applied methodology was successful in terms of reconstructing and analyzing the search and information browsing behavior of the participants. With the exception of one individual, all students used the table contents as a reference after a short period of orientation. This means the search behavior may be referred to as targeted.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Time of Interest Fixation Duration (Page including Contents)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type of Sustainability Report</td>
</tr>
<tr>
<td></td>
<td>Reference</td>
</tr>
<tr>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Total time of interest Duration in seconds</td>
<td>268.56</td>
</tr>
<tr>
<td>% of total recording</td>
<td>22.22</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

*Note: The upper figure provides the fixation durations of an entire page, whereas the lower figure lists the fixation duration of the table of contents.

In order to determine the fixation duration on the table of contents or the index the eye-tracking data collected were automatically mapped onto these areas of interest (AOI) by using snapshots of the relevant pages. These fixation durations are listed in Table 1.

The table of contents of the embedded report was analyzed in the shortest period of time both in relative and absolute terms in comparison with the entire recording period. The separate report has additional information and a figure placed next to
the table of contents. For this reason the table of contents was defined as additional AOI. Taking into account an adjusted fixation duration of the table of contents the overall duration of the reference report is significantly longer than the other two reports.

The heat maps as displayed in Figure 3 reveal which elements are most intensely observed. The attention map of the separate report shows that most of the visual attention is directed towards the figure which distracts the viewer from the table of contents. In comparison to the duration of the entire page the table of contents attracted only 40.6% of it. The analysis of the reference report reveals a wide scattering of the fixation. In contrast, the embedded report shows an aggregation of fixation.

Figure 3
Heat maps of pages including their contents (absolute duration)

The sustainability ratios of the embedded report are consolidated over four consecutive pages. The focus here is on environmental protection, labor force and the company’s regional commitment. The sustainability dimensions “social” and “ecology” are bundled. The students remained on those four (of 116) pages for 35% of the recorded time.

While the four students of the embedded report were able to entirely answer the questions in the sequence provided, the participants of the other two groups partly responded unsystematically, e.g. they jumped back and forth and - especially the reference group - with no recognizable pattern. Furthermore, the students of the separate and reference report responded partly incomplete. As illustrated in Table 2 the reference group took the longest time for the first orientation and to answer the questions.
Table 2
Time needed for orientation and answering questions

<table>
<thead>
<tr>
<th>Time needed for orientation and answering questions (in seconds)</th>
<th>Type of Sustainability Report</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reference</td>
</tr>
<tr>
<td>Orientation</td>
<td>Mean 90.50</td>
</tr>
<tr>
<td>Economy: How did the company's sales develop?</td>
<td>313.67</td>
</tr>
<tr>
<td>Ecology: Could the company save energy?</td>
<td>398.00</td>
</tr>
<tr>
<td>Social: Which information about employee development can be found?</td>
<td>225.00</td>
</tr>
<tr>
<td>Regional: Does the report contain information on regional commitments and / or regional economic activities?</td>
<td>252.00</td>
</tr>
<tr>
<td>Overall</td>
<td>1279.17</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

The fast and fine orientation of the embedded report group is also supported by the analysis of the course of gaze in comparison to the other two groups. In general, every course of gaze can be subdivided into fixations in which the view lasts about 300 milliseconds. Then it moves at high speed into saccades in which the gaze "jumps" to fix another point (Leven, 1991, pp. 14). This process becomes visible when fixation points and saccade lines are traced. Such a visualization of the course of a gaze is called a gaze plot, whereas each group of interlinked fixation points represents the gaze of a single subject. The digits indicate the order of fixation and the size of the points symbolizes the dwell time.

For example, the view of the four students is analyzed during the search for the relevant information in the embedded report on the question "Could the company save energy?". The appropriate information to this question is shown in Figure 4 with the resulting gaze sequences of the four students. For illustration, a period of 5 seconds has been selected for reasons of clarity. The relevant headings are used at an early stage for orientation, but the overall small circle sizes indicate that they are fixed for less time. The remaining fixation points are concentrated on the left-hand side of the report, on which a table with the summarized facts for answering the question was printed. Definitely the focus of fixations is on categories that are relevant for a proper answer. First relevant categories in the table followed by
corresponding values are headed for. Remarkably little attention is given to less relevant categories of the table.

Backgrounds of facts and data are explained in detail on the right-hand side of the report. However, this information is not necessary for the solving the question. It is indicated by the number of fixations and the low fixation period that little attention had been paid to this background information. After the task has been solved, the scarce resource time is used to solve the next task. It is verified that the gaze is significantly influenced by given tasks (Geise, 2011, pp. 174; Yarbus, 1967, pp. 174). Headers and tables fulfilled their role to provide guidance. Especially they were used to convey factual knowledge.

Figure 4
Gaze plots of embedded report (Page including information on ecology issues)

Source: Authors’ work
Note: Each group of interlinked fixation points represents the gaze of a single subject. The digits indicate the order of fixations. The size of the points symbolizes the dwell time.

In spite of the explicit focusing (Table 3) the analysis of responses of the embedded report group resulted in high quality responses. The separate report group performed almost as well as the embedded group. In contrast, the reference report group was just rated as having satisfactory results.

The analysis of perceived reporting quality by the students resulted in comparable grades as the results of the embedded and the separate report groups are on the same level as the analysis of duration fixations. However, the reporting structure and the sustainability strategy of the reference report are not convincing. This is in contradiction to the credibility and the application of the CSR idea.
Table 3
Evaluated response and perceived reporting quality

<table>
<thead>
<tr>
<th>Type of Sustainability Report</th>
<th>Reference</th>
<th>Embedded</th>
<th>Separate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of the response quality of the questions (eye-tracking-study)</td>
<td>Economy</td>
<td>2.25 1.64</td>
<td>4.00 0.00</td>
</tr>
<tr>
<td></td>
<td>Ecology</td>
<td>3.25 1.48</td>
<td>5.00 0.00</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>3.00 0.00</td>
<td>5.00 0.00</td>
</tr>
<tr>
<td></td>
<td>Regional</td>
<td>2.50 0.50</td>
<td>4.00 0.71</td>
</tr>
</tbody>
</table>

Subsequent assessment of the sustainability report

<table>
<thead>
<tr>
<th>Perceived reporting quality</th>
<th>Sustainability strategy</th>
<th>2.00 0.00</th>
<th>3.00 0.71</th>
<th>3.50 0.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>1.50 0.50</td>
<td>4.00 0.71</td>
<td>3.75 1.09</td>
<td></td>
</tr>
<tr>
<td>Information content</td>
<td>3.50 0.50</td>
<td>3.75 0.43</td>
<td>3.75 0.43</td>
<td></td>
</tr>
<tr>
<td>Credibility</td>
<td>4.50 0.50</td>
<td>4.00 0.71</td>
<td>3.75 0.83</td>
<td></td>
</tr>
<tr>
<td>Essentiality</td>
<td>2.50 0.50</td>
<td>3.25 0.43</td>
<td>3.25 1.09</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment of sustainability</th>
<th>Economy</th>
<th>4.00 0.00</th>
<th>2.25 0.43</th>
<th>2.75 0.83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecology</td>
<td>3.75 1.09</td>
<td>3.75 0.43</td>
<td>3.75 0.83</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>4.00 1.22</td>
<td>3.50 1.12</td>
<td>3.50 0.87</td>
<td></td>
</tr>
<tr>
<td>CSR idea</td>
<td>4.25 0.83</td>
<td>3.50 0.50</td>
<td>3.50 0.50</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ calculation
Note: Likert scale where 1 = very poor; 5 = very good

Discussion

The analysis of the eye-tracking study demonstrated that tables of contents play a significant role in orientating the reader of those reports. A search begins with the Table of contents that also guides the viewer decisively. This enhances the identification of relevant information. The analysis of the page with the table of contents in the separate report revealed that figures and miscellaneous information on the same page distract from the relevant contents since they attract much of the visual attention. According to our results a table of contents requires a distinct page in order to enhance the orientation of a viewer.

In the reference report references were distributed over three pages according to the GRI index for sustainability dimensions, “economy”, “ecology” and “social”. The participants rated the structure of this report more negatively than the other groups. In addition, the students showed more uncertainty in their search behaviour and had more difficulty in responding to the questions on the reference report. The reasons for this may be the reference structure on the one hand and the scattering of information over several pages on the other. As a consequence, the quality of responses to this report was remarkably lower in comparison with the other two reports. Moreover, the students became frustrated while processing the questions, and they expressed their dissatisfaction with this task. Our findings indicate that the reporting type “reference sustainability report” may not be advisable.

In contrast, it was easier for the students to respond to the questions for the embedded report. They evaluated the reporting structure positively, and at the same time delivered answers of higher quality. The reason may be the condensed representation of sustainability figures in a low number of pages. This study supports
the trend towards the application of an embedded sustainability report in practice as postulated e.g. by Kolk (2010) and Hahn et al. (2013).

Conclusion
This pilot study of a combined eye-tracking and survey approach demonstrated the validity of this methodology for the analysis of search and information browsing behavior in various types of sustainability reports.

Thus, empirical research towards the enhancement of the readability does not need to be constraint to the design of tables and figures (Eisl et al., 2015), but may examine the visual perception and the resulting assessment of sustainability reports in a holistic way.

Our results indicate that preparer of sustainability reports should pay more attention on creating the table of contents in a manner that supports the orientation for the reader. That means a distinct page without pictures or miscellaneous information. Furthermore the application of an embedded sustainability report in practice is recommendable whereas a reference sustainability report is not advisable.

Notwithstanding this our study faced limitations. These are in particular types and numbers of participants, the not mapped heterogeneity of real-world stakeholders and drawing on reports of different business fields. Subsequent studies should try to overcome these limitations. Subjects might be recruited from various vocations such as investors, clients, non-governmental organizations and employees. In future studies three reporting types may be applied to one enterprise. This means that these three reports have the same contents but different structures. In ideal the results would permit a direct conclusion about the reporting type that is the superior information provider to stakeholders. Another interesting task despite the perception of the information might be to examine what the potential stakeholders can remember from the perceived information after a period of time.

References


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Mining for Social Media: Usage Patterns of Small Businesses

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Abstract

Background: Information can now be rapidly exchanged due to social media. Due to its openness, Twitter has generated massive amounts of data. In this paper, we apply data mining and analytics to extract the usage patterns of social media by small businesses. Objectives: The aim of this paper is to describe with an example how data mining can be applied to social media. This paper further examines the impact of social media on small businesses. The Twitter posts related to small businesses are analyzed in detail. Methods/Approach: The patterns of social media usage by small businesses are observed using IBM Watson Analytics. In this paper, we particularly analyze tweets on Twitter for the hashtag #smallbusiness. Results: It is found that the number of females posting topics related to small business on Twitter is greater than the number of males. It is also found that the number of negative posts in Twitter is relatively low. Conclusions: Small firms are beginning to understand the importance of social media to realize their business goals. For future research, further analysis can be performed on the date and time the tweets were posted.

Keywords: social media, analysis, data mining, small business
JEL classification: C2, F23, L82
Paper type: Research article

Introduction

Social media are computer-facilitated tools that enable the faster exchange of information in virtual networks (Buettner, 2016). Millions of users use social media websites every day. The most widely used social media websites are Facebook, WhatsApp, Instagram, Twitter, and YouTube. Social networking websites are now primary means of communication for people among all age groups. In this paper, we apply data mining and analytics to extract the usage patterns of social media by small businesses. Specifically, we look at the Twitter posts related to small business. Businesses in the United States that have lower than 500 employees are defined as small business and they represent 99.7% of all firms. Hence, it is vital to study how small businesses are using social media as a means to promote their business.

In a business setting, social media analytics is a subset of Business Intelligence (BI) that is focused on methodologies and technologies that transforms unstructured
data from social media into meaningful information for business purposes (Stieglitz et al., 2014). Business Intelligence (BI) refers to techniques used for analyzing data (Cebotarean et al., 2017).

Data analytics are critical in supporting decision making. Analytics is helping organizations to reduce costs. Social media offers opportunities for social communications for a business (Fischer et al., 2011). Social media analytics can be applied to understand the user sentiments about a company or a product (Mosley, 2012). To make this sort of prediction, business analytics and intelligence is applied to this research. Huff (2015) mentions that business intelligence can allow companies to save time and to focus resources on more profitable opportunities. BI tools can predict future outcomes based on historical data.

According to Chesbrough (2003), small businesses can use social media to reach out to customers thus increasing their revenue. Apenteng and Doe (2014) state that a survey from LinkedIn displayed that 80% of small businesses are moving to social media sites.

Cardon and Marshall (2015) state that social networking sites are now more commonly used for online communication than email. As social media has started to impact people’s lives, a study of its usage would thus be significant. In this research, the patterns of social media usage for Twitter posts on small business are examined using IBM Watson Analytics. Further, sentiment analysis is applied to the data. Sentiment analysis refers to “the use of natural language processing, text analysis and computational linguistics to identify and extract subjective information in source materials” (Tejwani, 2014, p1). The following research questions are examined in this study:

1. Is there a gender difference in social media usage for small businesses?
2. What is the sentiment analysis of social media users for small businesses? Is the sentiment of the small businesses users using social media positive or negative or neutral?
3. Is there a relationship between the small business posts on social media and the language in which the posts are made?
4. Which state in the United States uses social media the most for small businesses?

**Research Background**

Social media has impacted customer perceptions and decisions. Kaplan and Haenlein (2010) state that social media has generated massive content due to users sharing their opinions and experiences on several topics.

Small enterprises can use social media such as forums and blogs to build relationships (Eid et al., 2013). They can also use crowdsourcing opportunities (Howe, 2006) for technical problems.

Analytics can be applied to social media to identify expressions that provide insights to the social media posts. Currently, research efforts have been focused on issues toward understanding social media. For example, in social media data analysis, companies see the opportunity in advertising, and social customer relationship management (Coen, 2016).

Social media is a means to connect to a larger audience. It promotes social capital (Hetz et al., 2015), which is the network of relationships among people. According to Kiron et al. (2013), social media is a low-cost means to increase customer awareness of products and services.

Currently, many firms have huge quantities of data generated due to the presence of social media. Social media is one of the major data sources for many
companies. Companies need to analyze these huge quantities of data to manage customer preferences to improve the firm’s performance and to stay ahead of competition.

Small businesses are able to reach a larger market on the Internet (Community Futures PA and Districts, 2012, Merill et al., 2011). With the help of social media, businesses are able to increase the growth in their number of customers. For example, when one customer or client selects the ‘like’ button of the firm’s page on Facebook, it is shown on the customer’s friend’s feeds. This could lead to potential customers.

The use of social media provides the insight about a buyer’s dynamics. Some scientists from the University of Milan and the Massachusetts Institute of Technology (MIT) found that users display physical and psychophysiological reactions when they log onto Facebook.

One popularly used social media website is Twitter. Twitter is a social networking website that allows users to send short messages. According to Felt (2016), Twitter is one of the largest social media platforms. Twitter was created in 2006 (Mosley, 2012). The growth of Twitter has been extraordinary. As of 2011, there were 200 million registered accounts in Twitter (Banking.com, 2011). Twitter is appealing due to the openness of the data. Burgess et al. (2015) noted that the openness of Twitter has created an enormous amount of social media data.

In this paper, usage patterns of Twitter posts on small businesses are examined using IBM Watson Analytics. Watson Analytics is a cloud-based service intended to provide the ability to analyse data without much difficulty. Further, a sentiment analysis is conducted on the data.

Methodology
As stated previously, in this research, IBM Watson Analytics is used to observe the patterns of social media usage on Twitter posts related to small business. In this paper, we particularly analyse tweets on Twitter for the hashtag #smallbusiness. The tweets from Twitter were extracted using IBM Watson Analytics. The dataset extracted from Twitter is from January 2017 to February 2017.

The data extracted from Twitter contains information about authors, their posts, their genders, the location from where the tweets are posted, and the time at which they have been posted.

The data analysis performed in this research using IBM Watson Analytics provides insights on the usage patterns of Twitter by small business users. Further, the sentiment analysis of the data is also analysed using IBM Watson Analytics. The analysis results are described in the Results and Analysis section. Before analysing the data, the unstructured data extracted from Twitter had to be cleaned and organized.

Data Cleaning and Data Refinement
This section describes the data cleaning and refinement performed on the data sets used for this research. Most often, data involves unnecessary or ambiguous content. Any ambiguous fields and empty or missing values in the data need to be managed appropriately. For example, ambiguous fields could be deleted from the data set if it is not possible to edit these fields with accurate data.

The data set needs to be refined to make it more meaningful for analysis. Before analysing the data, we examined the data to ensure it was cleaned. Following are the primary steps we performed for data cleaning:
Null values: We examined the Twitter data set extracted for any null or ambiguous values. We did not find null or ambiguous values in the data set.

Missing values: We examined the Twitter data set to check for missing values. For the twitter data analysed, we did not find any missing values.

Identifying relevant columns for analysis: Any columns not used for analysis were removed from the dataset. Only the columns required for analysis are retained. For example, the time the tweet was posted was not taken into consideration. Also, the author location was not taken into consideration. For the analysis in this study, we only analysed the tweets and its sentiment.

After refining the data, the quality of the data for analysis improved.

Correlation Analysis
Mosley (2012) applied Cramer’s V statistic to find the association between two variables. In this paper, we apply the Cramer’s V statistic for pairs of hashtag associations using Mosley’s methodology. To calculate the Cramer’s V statistic, we use similar methodology as that of Mosley (2012). Consider a 2 x 2 matrix indicating the frequency of the combination of two hashtags. Cramer’s V formula is as follows:

\[
Cramer's \ V = \frac{n_{11} n_{00} - n_{01} n_{10}}{\sqrt{n_{00} n_{11} n_{01} n_{10}}}
\]

The representation \( n_{ab} \) symbolises the frequency of the combination of hashtags in the dataset. For example, \( n_{00} \) is the number of tweets where neither hashtag1 nor hashtag2 were present. \( n_{b} \) is the frequency for column b, while \( n_{a} \) is the frequency for row a.

The result ranges between -1 and 1, where a value of -1 indicates a negative correlation, a value of 1 indicates a perfect positive correlation, and 0 indicates no correlation.

Results and Analysis
This section describes the findings of our analysis for the Twitter hashtag #smallbusiness. Table 1 lists some hashtags that were co-associated to the hashtag #smallbusiness. For example, hashtags #website, #entrepreneur, #webhosting and #blog were most co-associated to the hashtag #smallbusiness.

<table>
<thead>
<tr>
<th>Co-associated Hashtags with #smallbusiness</th>
<th>Cramer’s V statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>#website</td>
<td>0.85</td>
</tr>
<tr>
<td>#entrepreneur</td>
<td>0.65</td>
</tr>
<tr>
<td>#webdesign</td>
<td>0.54</td>
</tr>
<tr>
<td>#webhosting</td>
<td>0.61</td>
</tr>
<tr>
<td>#startup</td>
<td>0.59</td>
</tr>
<tr>
<td>#mobile</td>
<td>0.44</td>
</tr>
<tr>
<td>#google</td>
<td>0.34</td>
</tr>
<tr>
<td>#blog</td>
<td>0.67</td>
</tr>
</tbody>
</table>

Source: Author’s work
Table 2 shows that most of the tweets for small businesses are posted by females. 72.36% of the tweets on small business are posted by females while only 27.63% of the tweets are posted by males. This shows that women participate in small business discussions more than men. The most of the tweets related to small business were posted in English and Spanish. Also, the number of neutral tweets is more than the number of positive or negative tweets for the hashtag #smallbusiness.

Table 2
Tweet Count for the Hashtag #smallbusiness

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Author Tweet Count percentage for #smallbusiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>27.63%</td>
</tr>
<tr>
<td>Female</td>
<td>72.36%</td>
</tr>
<tr>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>47.53%</td>
</tr>
<tr>
<td>English</td>
<td>40.06%</td>
</tr>
<tr>
<td>Dutch</td>
<td>6.73%</td>
</tr>
<tr>
<td>French</td>
<td>5.67%</td>
</tr>
<tr>
<td>Author Sentiment</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>22.72%</td>
</tr>
<tr>
<td>Neutral</td>
<td>72.72%</td>
</tr>
</tbody>
</table>

Source: Author’s work

Table 3 shows that the most number of tweets related to small business in the United States were posted in the state of South Dakota.

Table 3
Top 9 states in United States by Tweet count for the Hashtag #smallbusiness

<table>
<thead>
<tr>
<th>Author State</th>
<th>Ranking of State in United States by Author Tweet Count for #smallbusiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Dakota</td>
<td>1</td>
</tr>
<tr>
<td>South Carolina</td>
<td>2</td>
</tr>
<tr>
<td>Minnesota</td>
<td>3</td>
</tr>
<tr>
<td>New Jersey</td>
<td>4</td>
</tr>
<tr>
<td>California</td>
<td>5</td>
</tr>
<tr>
<td>New York</td>
<td>6</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>7</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>8</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Author’s work

Discussion
Businesses are using social media as well. Every post or tweet on a social media site may be valuable to companies. Del Rowe (2016) states that analytics is a core component of all major decisions in business as it could help in achieving specific business goals. Table 4 shows a sample list of positive and negative words extracted and compiled for the hashtag #smallbusiness. However, the overall number of negative posts was low as seen in Table 2. Small businesses can gain enormous value from social media data. For example, for businesses, social media analytics can help to understand customer preferences on various products.
Table 4
Example of positive and negative words compiled for the hashtag #smallbusiness

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Positive words</th>
<th>Negative words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amazing</td>
<td>Avoid</td>
</tr>
<tr>
<td>2</td>
<td>Authentic</td>
<td>Mistakes</td>
</tr>
<tr>
<td>3</td>
<td>Best</td>
<td>Bad</td>
</tr>
<tr>
<td>4</td>
<td>Benefits</td>
<td>Complicated</td>
</tr>
<tr>
<td>5</td>
<td>Better</td>
<td>Error</td>
</tr>
<tr>
<td>6</td>
<td>Great</td>
<td>Fail</td>
</tr>
<tr>
<td>7</td>
<td>Happy</td>
<td>sad</td>
</tr>
<tr>
<td>8</td>
<td>Inspiring</td>
<td>Unhappy</td>
</tr>
<tr>
<td>10</td>
<td>Productive</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Thankful</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s work

Conclusion and Future Research

Small businesses are increasingly using social media. This growth in social media has increased the amount of data generated and this can provide further insights to companies.

Fluss (2013) states that social media is going to change the business setting for many organizations within the next few years. This is because the volume of comments and posts on social media sites is expected to grow rapidly. Further, Fluss (2013) mentioned that those organizations that will invest in incorporating social media will have a major advantage over their competitors.

Social media is important for all businesses because it allows businesses to easily communicate with their customers (Grewal et al., 2013; Smith et al., 2011). However, social media has been extremely important for small businesses because these businesses lack the resources to market their products or services (Barnes et al., 2012; Levy et al., 2003). The internet has increased the ability of the organizations as well as the customers to connect with one another (Taneja et al., 2014).

In the current social media driven setting, it is vital that small businesses understand the strategies in using social media. Social media marketing helps firms to better understand their customer needs. To maximize the number of people a business can reach, a business must have a social media presence. It is found that Twitter is a good medium for reaching out to people and around 29% of small businesses stated that social media marketing is the primary focus area.

Social media provides businesses the opportunity to communicate with their customers. Generally, customers do not want to follow a business that only posts about their products without interactivity with the customers. Businesses should include photos and videos of their product instead of simply posting messages about their business. One of the ways to engage customers is by asking the customers for their feedback on the products.

Small firms are beginning to realize the importance of social media for their business purposes. For future research, further analysis can be performed on the date and time the tweets were posted. This may provide further analysis of the social media usage patterns for small businesses. In addition, the number of retweets can be taken into consideration while performing sentiment analysis.
References


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Data Mining Usage in Corporate Information Security: Intrusion Detection Applications

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Abstract

Background: The globalization era has brought with it the development of high technology, and therefore new methods of preserving and storing data. New data storing techniques ensure data are stored for longer periods of time, more efficiently and with a higher quality, but also with a higher data abuse risk. Objective: The goal of the paper is to provide a review of the data mining applications for the purpose of corporate information security, and intrusion detection in particular.

Methods/approach: The review was conducted using the systematic analysis of the previously published papers on the usage of data mining in the field of corporate information security. Results: This paper demonstrates that the use of data mining applications is extremely useful and has a great importance for establishing corporate information security. Data mining applications are directly related to issues of intrusion detection and privacy protection. Conclusions: The most important fact that can be specified based on this study is that corporations can establish a sustainable and efficient data mining system that will ensure privacy and successful protection against unwanted intrusions.

Keywords: data mining, instruction, privacy, corporate information security

JEL classification: O32, O33, G34
Paper type: Research article

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Introduction

Information security is one of the most important issues in every company. It is important to note that information security is not just a technology issue. This is a business issue as well. In today’s high-tech and interconnected world, if companies want to protect information they need well-thought-out security policies. The importance of information security is best illustrated by the fact that “corporate investments on information security are highly evaluated as intangible assets in the stock market especially for IT-oriented firm” (Ishiguro et al., 2006).
Companies have to take special precautionary measures regarding two types of information. The first type includes internal secrets of the company (recipes, projects, models, strategies), and the second type refers to business relationships and contracts with clients. Both types of data are very important for every company and therefore the investment and the establishment of information security is completely justified. The increased data security risk has led to increased obligations of managers. Managerial responsibilities nowadays do not only include improving business operations through quality management decision, but also finding ways to adequately protect information. Results in this segment, has become an integral part of the management engagement, measured in an effort to protect the information assets of the organization (Trompeter et al., 2001). Regarding the importance of studying corporate information security it is important to note that this is a very complex area that does not involve only the use and storage of usernames and passwords. The concept of information security has been significantly expanded compared to an earlier definition that included only a username and password. (Von Solms et al., 2004). At the same time, organizations are threatened from various sides. These raids result in large losses for organizations. These losses include data theft and disclosure of business strategies (Toval et al., 2002). In addition to these requirements, there are also related damages, as well as the fact that the competition becomes familiar with the business strategy of the organization. For all these reasons we can say that any organization that wants to effectively manage its information assets must actively use an information security management system (Kim et al., 2014).

Data mining and privacy are the two opposing goals. Yet, it is possible to satisfy the criterion of privacy and to use data mining. The main tendency in the study of data mining is to develop tools that will ensure private data are protected, and that will enable the efficient use of data mining capabilities. This issue is especially relevant in the field of e-commerce. The problem of data privacy protection is particularly pronounced in e-commerce. Solutions such as the Secure Socket Layer (SSL) can be useful, but in addition to e-commerce, there are many other traps that increase the risk of loss or misuse of personal information (Fienberg, 2006). Although significant efforts have been invested into establishing a system of complete security policy, in the area of e-commerce, a perfect solution still has not been found. It is important to note that privacy protection is guaranteed in separate databases, while integrated databases present a more complex situation.

In recent years, in which the application of computers has increased, the number of intrusions has increased significantly as well, resulting in the need for a system which will identify those intrusions. Intrusion detection is a process based on monitoring the event of a computer or network, recognizing the signs of intrusion and analysing data on which signs of intrusion have been observed (Vigna et al., 1999). Intrusion detection has been present in research since 1980s, but in recent years this area has become an extremely active area of research (Kim et al., 2007).

Information technologies have become a key component of business support, and corporate governance has become unthinkable without the application of data mining. As noted above, the increased use of new technologies has increased the risk of data misuse. The concept of intrusion detection includes events in a computer or network, and analysing and recognizing signs of possible incidents. Signs of possible incidents are based on the recognition of threats to information security policies, violations of acceptable use policies or deviations from standard safety practices (Sayed et al., 2014). In practice, we encounter two types of intrusion
detection: anomaly detection and misuse detection. Anomaly detection involves identifying behaviour that deviates from normal behaviour patterns. The detection of misuse can be ensured by the software which uses clearly defined patterns to identify misuse (Chen et al., 2007). In companies that follow modern developments data protection techniques present a priority. The reason for this approach is the fact that data security is of great importance for the company for several reasons. First, it is important to ensure data protection against intrusions of competition that could use certain information to gain a market advantage. Second, data security helps leaving a strong impression of a company that cares about its customers. And finally, by establishing information security management a company protects its own dignity and autonomy that could be endangered by the data abuse. The abovementioned facts are the key reasons for investing into and studying the area of intrusion detection and privacy protection.

**Literature review**

**Data mining**

Data mining, or as it is often referred to as knowledge discovery, is the modern process of analysing vast amounts of data and extracting those most important and most relevant. Data mining tools allow the process of data analysis and forecasting of future developments spending much less time and energy compared to using the traditional method. Data mining is an area that encompasses a variety of fields such as technology, databases, statistics, information, artificial intelligence, data visualization and so on (Thamaraiselvi et al., 2004). Given the importance of understanding the term data mining, we will list a few explanations and definitions of the said term referring to the eminent names in the field. One such definition is given and an article published in the International Journal of Computer Trends and Technology (Matatov et al., 2010). From the previous definition it can be concluded that data mining includes a wide range of tools which in a very short time provide very useful and specific information that can form the basis for making managerial or other decisions.

Data mining tools are incredibly practical in everyday use. Data mining is applied in the areas unimaginable to many people, but due to the fact that in a short period of time a huge amount of data is analysed, and that as a result of this analysis, summary data are obtained and used further as the basis for many decisions, data mining has found its application in many areas such as: market segmentation, customer churn, direct marketing, interactive marketing, market basket analysis, trend analysis and others.

Application of data mining in companies is increasingly present. The ultimate goal is profit, and it all starts with the customer information. When companies have more information on customers (their habits and needs) they can provide more value to the customers. The higher the value a company provides to customers, the higher the profit that can be achieved. The best possible data mining application is for achieving that aim. By analysing a large number of simple data on the client conclusions about their behaviour and their needs are created. Based on these data, a company gives them the value they look for. Although there are many areas in which companies can apply data mining, most buyers of these technologies emerge from information intensive industries such as the financial and the marketing sector. These technologies are used by companies that want to take advantage of a large database to enhance their relationships with customers. The main
prerequisites for a successful application of data mining are an extensive and well-integrated database, and a well-defined understanding of the business processes within the company. Data mining applications are most commonly used by the following types of companies: marketing companies, pharmaceutical companies, credit card companies, transportation companies and large consumer package goods companies (to improve the sales process to retailers). All these organizations have something in common. They use their knowledge of clients to help them offer more value with lower costs. As a result, these organizations are able to fully define customer needs and create a marketing campaign adjusted to the needs and desires of customers. A common application of data mining in companies is in marketing and in creating a marketing strategy. The reason for this lies in the fact that simple data mining applications get very sophisticated and reliable data that are the key to the future strategy. There are many examples of companies using new technology to get closer to the customer. Banks use extremely intensive data mining applications especially in creating marketing campaigns and tracking marketing campaigns results. Also, the telephone companies are among the most intensive users of new technologies, especially in the creation of appropriate offers to their clients. Offers are created based on previous consumption and customer behaviour. Data mining analysis is based on the use of large amounts of data. The working principle of a data mining application is easy to understand. Such an application analyses valuable data about customers and the results of the analysis are used as a basis for quality decisions that will positively affect the revenue and profits of the company.

The following list contains some of the commonly used data mining software: R, Rattle, SAS Enterprise Miner, Rapid Miner, and Weka. Data mining applications have certain prerequisites for a successful implementation. First, the computer memory must be adequate. Second, the use of data mining applications requires an understanding of marketing problems and certain statistical skills.

**Intrusion detection system**

Whitman et al. (2010) define computer information security (CIS) as the “protection of information and its critical elements, including systems and hardware that use, store, and transmit that information”, with using tools such as policy, awareness, training, education, and technology. CIA triad is a broadly accepted information security model that is based on the confidentiality, integrity and availability of the information (Greene, 2006). Therefore, these are the three main objectives of CIS. In order to full-fill these objectives, four layers are used: (1) application access layer, (2) infrastructure access layer, (3) physical access layer, and (4) data-in-motion-layer. Application access layer is based on the principle that not every user in the corporation should have access to read, write and store all of the data available, but only the data to which she or he is entitled based on the description of their working place (Poirier et al., 2011). Infrastructure access layer is based on the principle that the access infrastructure components, e.g. servers should be protected from both outside and inside intruders (Mlitwa, et al., 2011). Physical layer is based on the principle that the physical access to any system, computer, data, should be available only to the authorized persons. Data-in-motion layer is based on the principle that the data outside the organization (e.g. e-mails, lap-tops, smart-phones) should be also protected according to the same rules, as the data inside the organization. Therefore, corporation information security effectiveness could be defined as the extent to which the corporation achieves to full-fill the goals of
confidentiality, integrity and availability of the information, with the means available in application, infrastructure, and physical and data-in-motion access layer (Green, 2006).

In order to achieve CIS effectiveness, organizations typically based their corporation information security measures on two types of efforts: deterrent efforts (Yeh et al., 2007; Herath et al., 2009) and preventive efforts (Willison, 2006). Both efforts are effective on insider threats (Theoharidou, et al., 2006; Dlamini et al., 2009) and intruder threats (Workman, 2007; Viega, 2009).

Malicious intrusions are focused on networks, web clients and servers, databases, and operating systems. There are several types of intruders. Net-work intrusions are intruders who attempt to enter into the networks in order to find and use important information. There are two types of intruders: human intruders or automated malicious software. There are also intruders who are focused on files or on database.

Cyber security presents security mechanisms in order to offer explanations which enable prevention for cyber-attacks. The best example is Intrusion Detection Systems (IDS). The purpose of the IDS is to monitor the system activity and inform responsible person. Intrusion detection tools should be strategically located at the network and application levels. However, the main purpose of the intrusion detection tools is to differentiate usual system activity from criminal activity.

**Methodology**

This paper evaluates the state of data mining applications in corporate information security from 1995 to 2013. It includes data mining applications in corporate information security regarding issues such as: malicious executables, anomalous insiders, intrusion detection.

As a basis for writing this paper we used previous research in this area elaborated in the literature, studies and other relevant sources. In accordance with the practice of scientific investigative work, the following scientific methods have been applied in this article:

Methods of analysis and compilation methods have been used in the theoretical part of the paper for the purpose of analysing and defining data mining multidimensionality, and the importance of data mining in modern corporations. The method of deduction has been applied in order to be the basis of general conclusions of data mining role in the improving privacy protection and intrusion detection.

**Results**

In the recent years, intelligent tools have also emerged as one of the important leverages towards CIS (Stoel et al., 2011; Yen, 2007). Data mining has been widely used in establishing CIS (Baesens et al., 2009). These applications employ intelligent tools like neural networks, cluster analysis, nearest neighbors, outlier detection systems and association rules, with the goal of increasing CIS. These intelligent tools are based on the exploration of the data available in vast number of data sources (e.g. transaction data, web logs, databases logs), and could therefore be referred to as exploratory corporate information systems efforts. Number of applications has been developed, that aim towards early warnings on intrusion attempts and frauds (Bose, 2006; Pejic-Bach, 2010). Data mining can be used to monitor large databases, to improve efficiency and quality of data. However, knowledge discovery methods can be also used in order to detect unusual behavior and threats in corporations.
Intrusion detection can give better results when is combined with some data mining techniques, such as a flexible neural tree model (Chen et al., 2007). The model showed significant improvements in intrusion detection because of reducing the input characteristics and because of hybrid approach for combining base classifiers. Data mining techniques can be used to predict intrusion in local area network (Mohammad et al., 2011). Data mining can generate accurate and applicable intrusion patterns from a huge amount of data which means that intrusion detecting system can be used to any logical or network environment (Yu et al., 2007). Chen et al. (2005) investigated how data mining methodologies can be used to detect intrusions of information systems. Their research showed that support vector machine method achieved the best performance, while artificial neural networks with simple frequency-based scheme achieved the worst. Similar research was made also by Zhu et al. (2001). They investigated three different knowledge discoveries in databases methods in detecting network intrusion. Their results showed that data mining method had a important influence on classification accuracy. Among knowledge discoveries in databases techniques, rough sets have higher accuracy followed by neural networks and then inductive learning.

The main cause of threat to privacy is the rapid development of modern technology, which is not accompanied by sufficiently rapid development of the related education and legislation.

However, when we talk about data mining applications and their use in corporations, the facts elaborated in this paper as well as those that can be found in the used literature lead to the conclusion that these applications protect the privacy of customers. Large corporations use data mining in their business practice in the way that they remove data associated with the identification of the customer or client while analysing relevant data (on shopping, habits, etc.). In this way private identification information is completely ignored in the analysis, and only those data which are essential for future management and marketing decisions are used. By using these approach companies foster good relationships with their customers and clients who have confidence in the company and are willing to come back. This relationship is perfect. Why? The company will protect the privacy of the client. The customer will be satisfied, and the company will use analysed data to form an offer that suits the client’s wishes. The customer will be satisfied. The client will have confidence in the company. The company will benefit.

For such a system to be sustainable companies have to constantly care for data security. Companies continually need to analyse potential threats and invest in data protection. Companies are aware of the importance of investment into data mining applications and applications for data protection because these investments ensure profit. By investing in the field of contemporary data protection, corporations protect against competition because if the competition came to their data their business would be totally compromised, and customer confidence shaken. It is clear that companies have a huge interest in establishing data mining applications and their use in business because these applications provide incredible opportunities for analysing huge amounts of data critical for making future decisions.

Intrusion detection refers to security management system for computers and networks. This system operates in a way to collect and analyse data from different areas of a computer or a network in order to determine security breaks. A security breach can occur in two different forms: (i) intrusions - attacks from outside the organization; (ii) misuses - attacks from within the organization.
A key feature of this system is using vulnerability assessment when checking the security of computer systems or networks. Intrusion detection functions include: monitoring and examining the user and the system activities, examining system configurations and weaknesses, evaluating the system and the file reliability, capability to recognize patterns typical of attacks, examination of irregular activity forms and following user policy violations.

Intrusion detection has become one of the major tasks in corporate information security because a number of attacks to computer systems have occurred in the last few decades causing significant damage. The intrusion detection system consists of two steps: (i) Host Intrusion Detection System (HIDS) can be run on individual hosts or devices on the network. A HIDS observes the inbound and outbound packages from the device in order to warn the user when a questionable action is noticed; (ii) Network Intrusion Detection System (NIDS) is located at a strategic point in the network in order to monitor traffic.

Intrusion detection systems (NIDS or HIDS) cannot be considered an unbeatable protection against intrusion, but if used in combination with some of the physical methods such as firewalls or security personnel then they provide much greater security. Firewalls are mostly used to stop disputable traffic.

As we have said, implementing intrusion detection which results in protection from unwanted intrusions is in every company’s best interest as it helps ensure privacy protection. It is certainly reasonable to establish an intrusion detection system that will help to achieve higher level of security of the database because the losses from the misuse of valuable and confidential data are much higher than the cost of investment in intrusion prevention. The costs of these investments are generally insignificant compared to the overall volume of business, and therefore managers of modern corporations easily opt for improvement of the protection system.

**Conclusion**

Modern corporations have recognized the importance of data mining applications and use them in many business areas. Data mining applications are very often used in marketing. There are many marketing campaigns, and even political ones, which are fully designed according to the analysis of specific surveys, questionnaires or other forms of primary data. A marketing campaign created in this way is extremely effective because clients are presented the values they appreciate and companies gain customer confidence finally resulting in successful business operations.

This research was fully based on secondary data and the already available literature. The quality of such research would be much higher if it were accompanied by the presentation of data and information obtained through interviews with some of the eminent personalities in the field of data mining. This approach would be much more complete and much more intelligible to the reader. In the end we can conclude that such research contributes to the understanding and popularization of data mining. After this complex area becomes familiar and understandable, managers can expect a wider application of data mining applications with all the qualities and benefits that they offer.

**References**


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Social Business Process Management: Croatian IT Company Case Study

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Abstract

**Background:** Social business process management is an integration of social software into the business process management (BPM). Its main goal is to overcome the limitations of classical BPM by applying social software principles within the BPM lifecycle. Since BPM is a holistic discipline it is important to also include cultural and social aspects into BPM studies. **Objectives:** The main aim of this paper is to examine the link between organizational culture, social software usage and BPM maturity in the observed company. **Methods/Approach:** A case study methodology has been used for this study. An interview has been conducted in combination with a survey approach. **Results:** Results of the research revealed a high usage of social BPM within the observed company in combination with a high level of BPM maturity and a clan organizational culture. **Conclusions:** The observed IT company has knowledge intensive processes and uses social BPM to deal with the process change and optimization. The clan culture is, by its characteristics, a favourable organizational culture for social BPM.

**Keywords:** social business process management, knowledge intensive processes, business process management maturity, process performance index, case study, Croatia

**JEL classification:** M15

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**Introduction**

Business process management (BPM) is a management discipline focused on improving organizational performance by managing its business processes (Harmon, 2007). According to Pritchard et al. (1999) there is a growing understanding of BPM
usage with the purpose of achieving competitive advantage by improving performance through adopting a process view of business. However, recent work has revealed an increasing awareness of the limitations of traditional approaches to BPM (Bruno et al., 2011). A new term - “social BPM (SBPM)” has been introduced. It describes the synthesis of social media applications like wikis, blogs, forums or social networks with classical BPM. The aim of SBPM is to enhance BPM lifecycle by using controlled participation of external stakeholders from the initial stages of process discovery all the way to final phases of BPM life cycle, such as the phases of process execution and evaluation (Dengler et al., 2010; Erol et al., 2010). Besides, a number of researchers indicate the need for further investigation of the role of organizational culture in BPM and its maturity (Rosemann et al., 2015; Buh et al., 2015). However, further empirical confirmation of those theses should be made. Therefore the research objective of this study is to examine the role of organizational culture and social software usage on BPM maturity in one Croatian IT company.

This work has been fully supported by Croatian Science Foundation under the project PROSPER - Process and Business Intelligence for Business Performance (IP-2014-09-3729). Among others, two objectives of the PROSPER project are (1) to investigate the adoption of social BPM in organizations and (2) to explore different combinations of organizational culture types and different business process maturity levels. With the purpose to achieve stated objectives, the PROSPER research group conducted a series of interviews. One of them is being presented in this paper in form of a case study.

This paper begins by providing the theoretical background through the definition of BPM holistic approach. In this section a BPM maturity model (Process Performance Index – PPI) is described (Röglinger, Pöppelbuß, Becker, 2012). Besides, this part of the paper brings a brief literature review on the organizational culture in BPM and presents the Organizational Culture Assessment Instrument. Moreover, this section also gives an overview of social BPM background. The third section describes employed methodology in form of a case study of one Croatian IT company. Further, the analysis of the research results is presented combined with a discussion. Final section brings a short conclusion with the research limitations and plans for future research.

**Background**

**BPM as a holistic concept**

There is an increasing number of authors accepting and emphasising the holistic approach to BPM. According to Rosemann et al. (2005) definitions of BPM range from the focus on IT and process improvement activities to the focus on developing both a culture and strategies receptive to BPM. The holistic nature of BPM requires alignment to corporate goals and strategy, focus on customers, top management commitment, process measurement, improvement and benchmarking. This approach is reflected within the design of BPM maturity models.

Maturity models refer to certain sequences of stages or levels leading from some initial phase to maturity along desired, logical or anticipated path (Röglinger et al., 2012). During the decades numerous authors developed, described and compared different BPM maturity models (Harmon, 2009; Rosemann et al., 2015). In this research Process Performance Index (PPI) has been used. It is a descriptive model which defines statements for ten BPM critical success factors and describes three levels of BPM maturity. Respondents state their level of agreement on a 5-point scale for ten
success factors, being: (1) alignment with strategy, (2) holistic approach, (3) process awareness by management and employees, (4) portfolio of process management initiatives, (5) process improvement methodology, (6) process metrics, (7) customer focus, (8) process management, (9) information systems and (10) change management. The cumulative score for an organization represents its PPI which describes one of the levels of BPM maturity, respectively: (1) process management initiation (PPI from 10 to 25 points); (2) process management evolution (PPI from 26 to 40); and (3) process management mastery (PPI from 41 to 50).

Organizational culture and BPM

By definition, organizational culture is a complex system of values, customs, ethics, beliefs, and rituals, written and unwritten rules which employees follow and which define the way of doing business within the company (Barney, 1986; Economic lexicon, 2011). Organizational culture can be understood as a way of life within the organization, an organizational lifestyle, which displays the personality of the organization and determines employees' actions and behaviour. According to Schein (1985), organizational culture includes shared invented, discovered or developed assumptions which are considered valid and taught to the new employees.

Although there have been a great deal of researches studying organizational culture as a factor in achieving business success, there are relatively few studies investigating the link between organizational culture and BPM or indicating the influence of organizational culture to BPM (e.g. Alibabaei et al., 2010; Rosemann et al., 2015; Buh et al., 2015). In the sense of holistic BPM approach, organizational culture is a critical BPM success factor (Rosemann et al., 2005). In accordance to that, Sidorova et al. (2010), view it as a central issue in the implementation of BPM. Hribar et al. (2014) reported clan culture to be the most favourable when it comes to BPM adoption. Zairi (1997) introduced specific BPM culture, but never elaborated that idea. However, Schmiedel et al. (2013) conducted a global Delphi study and defined four key values for BPM culture, being: (1) customer orientation, (2) excellence, (3) reliability and (4) teamwork.

When talking about organizational culture within the organization, it is important to understand that there is no consensus on exact types of organizational culture. Literature review revealed that, so far, numerous authors developed different tools for assessing organizational culture and thus have different classification of organizational culture types (e.g. Glaser et al., 1987; Zammuto et al., 1991; Mackenzie, 1995). For the purpose of this research, Organizational Culture Assessment Instrument (OCAI), developed by Cameron et al. (2006), has been used for assessing the current organizational culture of our respondents’ organizations. Originally, OCAI assesses both the current and preferred organizational culture of the organizations. Respondents divide 100 points between 4 statements in each of the six groups of statements. In each group each statement represents one of the four types of organizational culture, being: (1) clan, (2) adhocracy, (3) market and (4) hierarchy. The type of the organizational culture with the highest average of divided points is the dominant organizational culture of the observed organization.

Social BPM

Today, a feedback from business practice reports on the shortcomings of classical BPM approaches. Several issues have been identified. “The model-reality divide” describes the divide between designed process models and those executed in
reality (Schmidt et al., 2009). According to Bidder et al. (2010) this issue specially concerns loosely structured and evolutionary processes, also known as knowledge-intensive processes. These processes typically appear in many scenarios, their sequences and participants are not known in advance and they involve distributed and evolving knowledge (Markus et al., 2002). Substantial contribution to these processes comes from human knowledge, while knowledge related to the processes is perishable and quickly outdated (Gronau et al., 2012). Moreover, knowledge intensive processes are ad-hoc processes that emerge spontaneously, cannot be planned in advance and have a high interactivity (Bögel et al., 2013). As a consequence, in designing and execution, knowledge intensive processes require significant flexibility.

The next issue is related to the incapability of BPM to rapidly react to both internal and external events (Cummins, 2008). The standard BPM lifecycle consists of a number of phases that follow ordered steps and procedures while the flow of information and the role of the participants are strictly defined (Nurcan et al., 2008). In this manner, the capability to deal with external events is limited to those which are already built in the structure of BPM lifecycle (Bruno et al., 2011). Besides, the pre-defined BPM roles and actors could impede the flow of information and knowledge sharing among stakeholders. “Loss of innovation” and “information pass-on threshold” are the issues described by Schmidt et al. (2009). Even if the processes are implemented successfully, due the “information pass-on threshold” the ideas for innovation are not passed on to the responsible because this takes too much effort for the user.

Nowadays, in order to overcome these situations, the researchers propose the integration of social software in the BPM lifecycle (Brambilla et al., 2012; Rangiha et al., 2013; Khider et al., 2015). The purpose is to overcome the limitations with the classical BPM by deploying social software and the collaborative Web (Web 3.0) as a platform for collaboration between individuals and groups in BPM projects (Rangiha et al., 2013; 2014). According to Meske et al. (2013) social media enable participation of all members of an organization and improve a company’s knowledge management. Implementing social BPM enables organizations to establish an “architecture of participation” by which all stakeholders are encouraged and can participate in certain process management task (Pflanzl et al., 2014).

**Methodology**

For the purpose of this paper, a case study methodology has been used. As a valid method, case studies have been used before in BPM maturity researches (e.g. Rosemann et al., 2005; Rohloff, 2009). This case study is based on the interview, which has been conducted in February 2016 as part of exploratory analysis for the evaluation of the draft version of questionnaire within the PROSPER project. As an appropriate case, we sought a company in the IT sector that has knowledge intensive business processes and had engaged in a BPM project in the past five years. A special focus is put on the organizational culture as a driver of BPM implementation success. The interviewees were executives familiar with the BPM implementation progress. According to Gable (1994), case studies should not be exclusively qualitative but rather include an embedded quantitative survey. Following this recommendation, we conducted an interview which lasted about 3 hours and consisted of two parts: (1) a semi-structured interview based on the draft questionnaire and (2) in-depth interview.
First, the interviewees evaluated the statements of PPI framework in order to assess the BPM maturity of their organizations. They rated their organization’s performance success factors using a 5-point scale, with a 1 representing “strongly disagree” and a 5 representing “strongly agree”. Next, the slightly modified OCAI has been used to assess only the current organizational culture of the observed company where the interviewees stated to what extend the statements representing certain organizational culture are similar to the situation in their company. Finally, the interviewers conducted an in-depth interview asking questions related to the social BPM usage within the company.

Results and discussion

The total cumulative PPI score has been calculated in order to measure BPM maturity within our observed IT consultant company. The average PPI is 46 – almost the highest on the PPI scale that runs from 10 to 50. The result shows that this company is at the upmost maturity level or “process management mastery” stage of BPM maturity. Further, the interviewees commented each of ten PPI framework factors. The PPI score on “alignment with strategy” success factor is 5: this company is aware that processes should be tightly linked to a strategy; its business processes are executed, managed and measured according to the strategic priorities and situations. The score on “holistic approach” is 5. This shows that the approach to improvement efforts is done “through” a process perspective. BPM practice is institutionalized company-wide and a continuous improvement approach is evident. A “process awareness by management and employees” exists (the PPI score on this success factor is 4), the importance of managing processes when seeking performance goals is recognized by all employees in a company – from top management to individual contributors, but the place for improvements still exists. The score on “portfolio of process management initiatives” is 5: key business processes are well-documented, business process repository has been developed, several business process improvement initiatives were finished and a new one is started. A standard approach to process design and analysis is utilized (the PPI score on “process improvement methodology” is 5). BPMN diagrams and Oracle Process Modeler software are used to model business processes. Process performance indicators and metrics are defined, but process measurement system is still not fully implemented. Consequently, the score on “process metrics” is 4. Strong efforts are made to focus process analysis and design efforts on delivering value to customer (the PPI score on “customer focus” success factor is 5). The process owners are assigned to several core business processes, their responsibilities and authorities are not well-defined, but they still do not monitor process metrics for continuous improvement efforts on a regular basis, thus the score on “process management” factor is 3. The observed company has the highest PPI score - 5 on the “information systems” factor. A potential of information system to provide support to business processes is fully recognized. People and cultural issues are effectively addressed when process changes are introduced; a collaborative IT platform is implemented, thus employees are enabled to suggest and create process content and context, or to share ideas and knowledge on business processes (the score on “change management” factor is 5). Process performance index results for each of the PPI success factors are presented by figure 1.
For the purpose of this study, we have assessed only the current organizational culture of the observed company. Our organization’s OCAI results showed clan culture to be dominant (with the score of 38 from 100) within the organization, while adhocracy is at the second place with the average score of 30 from 100 points. The least dominant organizational culture type in this organization is market culture with the average score of 13 from 100 points.

During the interview, our interviewees emphasized teamwork, consensus and collaboration as main characteristics of the management style in the organization. Furthermore, the interviewees stressed out that employees consider their leaders as mentors who facilitate and nurture their work but also coordinate and organize them, which enables smooth-running efficiency within the organization. Moreover, interviewees commented that their management is not highly results oriented nor have extraordinary expectations and requirements for the employees so they do not compete with each other but feel strong commitment for the organizations. In the organization, there is a very high mutual trust and loyalty among the employees, as well as commitment to innovation and development. In terms of strategy, observed company emphasizes human development, participation, openness and high trust, while the organizational focus is neither on competitive activities and achievements nor on winning the greater market share. The results of this interview are in line with the theoretical background regarding organizational culture assessment instrument. The overall OCAI score results for the current organizational culture of the observed company are presented by the figure 2.
By definition, clan culture is characterized by high commitment, teamwork, consensus, participation and a friendly workspace while defining success in terms of concern for people and internal climate (Cameron et al., 2006). Furthermore, the core values within clan culture organizations are loyalty, high cohesion, morale and tradition, emphasizing the long-term benefit of individual development (Cameron et al., 2006). On the other hand, the adhocracy culture is characterized by innovativeness, readiness for change, meeting new challenges and risk taking while working in highly dynamic, creative and entrepreneurial workspace (Cameron et al., 2006). The OCAI results, combined with high PPI score of observed company could be the step closer in confirmation of clan culture as the most favourable organizational culture for BPM, as indicated in Hribar et al. (2014).

When looking at the data collected through OCAI online website (http://www.ocai-online.com) regarding current organizational culture in companies from IT sector and from Croatia, the results reveal very similar, almost identical situation between those two. This website has collected 457 responses from IT sector companies and 611 responses from Croatian companies. The results show clan culture to be the dominant culture in both IT companies (OCAI average score being 33.87) and in Croatian companies (OCAI score being 32.03). In both cases, adhocracy is the culture with the least dominant characteristics (with the average score of 19.84 for IT sector and 19.64 for Croatia). Figure 3 presents the results of the comparative analysis of current organizational culture in our observed company, IT sector companies and Croatian companies. Our observed company follows the
trend of IT sector companies and Croatian companies regarding dominant clan culture, in slightly higher extent. Looking at the figure 3, the main difference between our company and overall results can be seen in adhocracy and market part of the chart. Our company has adhocracy culture characteristics expressed in visibly greater extent while market culture characteristics are present in visibly smaller extent.

Figure 3
Comparative Analysis of the Current Organizational Culture of the Observed Company, IT Sector Companies and Croatian Companies

Regarding social BPM results, an in-depth interview revealed high level of using social software for BPM purposes within the observed company. Employees are self-organized and interactively design and change business processes in bottom-up fashion. Their BPM approach highly relies on the idea of giving all participants the same rights to contribute to business process design and change which are based on the ideas and knowledge of a group rather than individual experts or external influences. This kind of approach to group knowledge is highly important for successful management of knowledge intensive processes. Also, the characteristics of a clan organizational culture an in line with the principles of social software which is a very good base for successful social BPM implementation and usage. Moreover, interviewees commented how some of their stakeholders use social software and Enterprise 2.0 tools (e.g. blogs, wikis, social networks, Lync, Yammer) to suggest and create process content and context.
Conclusion

Business processes are the core of the organizations. In that sense, BPM is getting increasing attention among both researchers and organizations. Understanding the holistic nature of BPM brought organizational culture in the light as an important factor influencing BPM. Moreover, social BPM is slowly becoming a popular topic of interest. This paper presented a case study of one Croatian IT consultant and software implementation company which has knowledge intensive processes. This company use social BPM in order to deal with process change and optimization. Having in mind the characteristics of the clan culture which is dominant in the presented company, successful use of social BPM does not come as a surprise.

This paper extends the body of knowledge regarding the role of organizational culture in BPM. However, it has some limitations as well. Since the study has been limited to a single case study, it is not possible to generalize our findings. Further research in this area should be made in order to correct the limitations of this study and shed some more light on the role of the organizational culture in BPM.

References


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A Multi-Country Trade and Tourism with Endogenous Capital and Knowledge

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Abstract

Background: The study models a dynamic interaction among economic growth, structural change, knowledge accumulation, international trade and tourist flows. Objective: The purpose of this study is to introduce endogenous knowledge into a multi-country growth model with trade and tourism proposed by Zhang. The study models a dynamic interaction among economic growth, structural change, knowledge accumulation, international trade and tourist flows. Methods/Approach: The model is based on Arrow’s learning by doing, the Solow one-sector growth model, the Oniki-Uzawa neoclassical trade model, and the Uzawa two-sector growth model. We first build the multi-country neoclassical growth model of endogenous knowledge with international tourism. Then we show that we can follow the motion of the $J$-country world economy with $J+1$ differential equations. Results: We simulate the motion of the three-country global economy. We carry out a comparative dynamic analysis by simulation with regard to the knowledge utilization efficiency, the efficiency of learning by doing, the propensity to save, the propensity to tour other countries, and the population. Conclusions: The global economy has a unique equilibrium.

Keywords: trade pattern, tourism, knowledge accumulation, wealth accumulation, income and wealth distribution
JEL classification: F11
Paper type: Research article

Introduction

The purpose of this study is to introduce endogenous knowledge into a multi-country growth model with trade and tourism proposed by Zhang (2015). The study models a dynamic interaction among economic growth, structural change, knowledge accumulation, international trade and tourist flows. Our goal is to integrate the basic economic growth mechanisms in the capital-based neoclassical growth
theory and knowledge-based contemporary growth theory. As far as the neoclassical
growth theory is concerned, our model is built on the basis of the Solow growth model,
the Uzawa two-sector model, the Oniki-Uzawa trade model. Our approach to
technological change is based on Arrow's learning-by-doing. Arrow (1962) first
introduces endogenous technical progress by emphasizing learning-by-doing. Uzawa
(1965) introduces education as a source of knowledge accumulation. The education
sector is specified in creating knowledge. This sector utilizes labor and the existing stock
of knowledge to produce new knowledge. The Productivity of the production sector
with be enhanced with new knowledge. Many other sources of knowledge
accumulation are introduced in the literature of economic growth. But on the whole
theoretical research on endogenous growth and knowledge had been relatively silent
from the end of the 70s till the publication of the early 1980s. There has been a new
interest in theoretical research on endogenous knowledge and economic growth since
Since then different problems about innovation, diffusion of technology and
management have been examined in the literature. Many studies show that
productivity differences between countries explain much of the variation in incomes
across countries, and the key determinant in productivity is technology (Manasse et
al., 2001; Agénor, 2004; Aghion et al. 2009; Gersbach et al. 2013). International
technology diffusion plays an important role in the pattern of worldwide technical
change. In order to explain global economic growth and technological change, we
consider knowledge as an international public good. In our approach all countries
can access knowledge. One country utilizes knowledge without affecting any other
country. This approach is different from most of recently developed trade models
with endogenous knowledge (e.g. Chari et al., 1991; Martin et al., 2001; Brecher et al.
2002; Nocco, 2005; Hinloopen et al., 2013). Most studies of the recent theoretical
literature models trade patterns with endogenous technological change and
monopolistic competition. These studies don’t take treat capital and knowledge in a
consistent framework. This paper deals with interactions between endogenous
wealth accumulation, knowledge creations and utilization, trade, and tourism within
a compact analytical framework.

Only a few formal economic theories properly address inequalities in income and
wealth among nations with microeconomic foundation. This study explains inequalities
among nations with endogenous wealth accumulation and knowledge dynamics. As
far as modelling production and trade patterns is concerned, we follow the
neoclassical growth trade model, particularly the Oniki-Uzawa model. A dynamic
model with endogenous capital accumulation and capital movements was initially
developed by Oniki and Uzawa and others (e.g., Oniki et al., 1965; Johnson, 1971), in
the framework of the two-country, two-good, two-factor global economy. The model
has been extended and generalized to reveal dynamic interactions between
economic growth and trade patterns (e.g., Jones et al., 1984; Ethier et al., 1986;
Bhagwati, 1991; Wong, 1995; Vellutini; 2003). Although there are many analytical
difficulties in studying two-country, dynamic-optimization models with wealth change,
many studies are made to study the effects of saving, technology, and various policies
on global growth and international trade within this framework (e.g. Frenkel et al., 1987;
Jensen, 1994; Valdés, 1999; Nishimura et al., 2002; and Sorger, 2002). This study are
different from these studies in describing household behaviour. Moreover, this study
makes another contribution to the literature of endogenous global growth and
endogenous knowledge by introducing international tourism.
This study is to introduce tourism into a dynamic general equilibrium model with endogenous wealth and knowledge. Tourism has a special feature. Tourism converts some non-traded goods into tradable ones. In association with rapid economic globalization and global economic growth in different regions tourism has been increasingly expanded in national economies (Sinclair, 2002; Lee et al., 2008; Schubert et al., 2011; Seentanah, 2011; Sun, 2014). There is an increase in studies of tourism in economics (e.g., Sinclair et al., 1997; Hazari et al., 2004; and Hazari et al., 2011). As reviewed by Chao et al. (2009) most studies of development of tourism are static. As there are dynamic interdependent relations between economic growth, tourism and other economic activities (e.g. Corden et al., 1982; Copeland, 1991; Dwyer et al., 2004; Oh, 2005; Blake et al. 2006; Zeng et al., 2011), there is a need to build some analytical frameworks in which tourism has endogenous relations with other economic activities. This paper studies the issues of trade and tourism with endogenous capital and knowledge by synthesizing the two models by Zhang. Zhang (1992) built a multi-country model of wealth accumulation with endogenous knowledge utilization and creation. The model does not take account of international tourism. Zhang (2015) deals with tourism and global economic growth in a general equilibrium framework. This study applies the ideas in Zhang (1992) to the trade model with tourism. The rest of the paper is organized as follows. In section 2 we build the basic model. In section 3 we show how to solve the differential equations and simulate the dynamic movement of the international economy. In section 4 we conduct comparative dynamic analysis to study the effects of changes in some parameters on the motion of the global economy. In section 5 we conclude the study. We prove the main results of section 3 in the appendix.

The Model

We consider a global economy which consists of any number of national economies. Following Zhang (2015), we apply the Uzawa two-sector growth model to model national economies (Uzawa, 1961, 1963). Except endogenous knowledge (Zhang, 1992), almost all aspects of the model in this study are based on Zhang (2012, 2015). Production sectors employ capital and labor inputs. We assume that all markets are perfectly competitive. The outputs of production sectors are sold to households and other sectors. Households supply labor and assets to production sectors. Input factors are inelastically supplied and the available factors are fully utilized at every moment. Saving is only by households. This implies that all earnings of firms are distributed in the form of payments to factors of production. The modelling framework is neoclassical with Zhang’s utility function. The neoclassical growth theory is based the pioneering works of Solow (1956). The Solow one-sector model with homogenous population has been extended and generalized by in different ways (e.g., Diamond, 1965; Stiglitz, 1967; Burmeister et al., 1970; Benhabib et al. 1994; Drueon et al., 2001; Ortigueira et al., 2002). The two-sector model uses capital and labor as input factors. One sector produces industrial good and the other consumer good. In this study the capital good in this study is the same as the capital good in the Solow model. It can be used for consumption and investment. This differs from the Uzawa model in which the capital good can be used only for investment. We base the traditional neoclassical trade model to describe international trade (Oniki and Uzawa, 1965, see also, Brecher, et al., 2002; Sorgaer, 2002). Following Ikeda et al. (1992), we assume that the international economy produces a homogenous tradable commodity. Each country supplies one (national) consumer good/service. Different from all the formal models in the traditional trade growth theory, Zhang (2015) introduces tourism into the trade growth theory. This
study extends Zhang's tourism trade model by introducing knowledge as an endogenous variable.

The global economy has multiple countries, indexed by \( j = 1, \ldots, J \). Each country has a labor force, \( N_j \), \( \{ j = 1, \ldots, J \} \), which are constant. The households in each country consume goods and services. Foreign tourists consume services, not traded goods. Tourism converts the non-traded good into an exportable commodity. The assets of the economy are owned by households. The households' incomes are used to consume and save.

We use \( K_j(t) \) and \( \overline{K}_j(t) \) to represent respectively for the capital stocks employed and the wealth owned by country \( j \). We use \( K_y(t) \) and \( K_s(t) \) to stand for the capital stocks employed by country \( j \)'s capital good sector and service sector. There is no migration between countries. Labor is completely mobile within the country. We use \( w_j(t) \) and \( r_j(t) \), respectively, to stand for wage and interest rates in the \( j \)th country. We neglect transaction costs. The interest rate is equal across the world economy, i.e., \( r(t) = r_j(t) \). Let subscripts, \( i, s \), denote the industrial and services sectors, respectively.

We use \((q, j)\) to represent sector \( q \) in country \( j \). Let \( F_{qj}(t) \) represent the output levels of \((q, j)\)'s sector at time \( t \).

**Behavior of producers**

Knowledge is supposed to be a public good which can be freely used by different producers. We assume that the sector employs two productive factors, capital, \( K_{qj}(t) \), and labor, \( N_{qj}(t) \), at each point in time \( t \). As in Zhang (1992), we specify the production functions as

\[
F_{qj}(t) = A_{qj} Z_{qj}^{\alpha_{qj}}(t) K_{qj}^{\alpha_{qj}}(t) N_{qj}^{\beta_{qj}}(t), \quad \alpha_{qj}, \beta_{qj} > 0, \quad \alpha_{qj} + \beta_{qj} = 1, \quad j = 1, \ldots, J, \quad q = i, s, \quad (1)
\]

in which \( Z(t) > 0 \) is the knowledge stock at time \( t \), \( \alpha_{qj} \) and \( \beta_{qj} \) are positive parameters. Here, we call \( m_{qj} \) \((q, j)\)'s knowledge utilization efficiency parameter. If we interpret \( Z_{qj}^{\alpha_{qj}/\beta_{qj}}(t) N_{qj}(t) \) as \((q, j)\)'s qualified labor force, we see that the production function is a neoclassical one and homogeneous of degree one with inputs.

We use \( p_j(t) \) to stand for country \( j \)'s price of consumer goods. Markets are competitive, thus labor and capital earn their marginal products, and firms earn zero profits. The rate of interest and wage rates are determined by markets. The production sectors chooses the two variables, \( K_{qj}(t) \) and \( N_{qj}(t) \), to maximize the following profits

\[
F_{qj}(t) - (r(t) + \delta_j)K_{qj}(t) - w_j(t)N_{qj}(t),
\]

\[
p_j(t)F_{qj}(t) - (r(t) + \delta_j)K_{qj}(t) - w_j(t)N_{qj}(t).
\]
The marginal conditions are given by
\[
(r(t) + \delta_{kj} = \frac{\alpha_{ij} F_{ij}(t)}{K_{ij}(t)} = \frac{\alpha_{ij} p_j(t) F_{sj}(t)}{K_{sj}(t)}, \quad w_j(t) = \frac{\beta_{ij} F_{ij}(t)}{N_{ij}(t)} = \frac{\beta_{ij} p_j(t) F_{sj}(t)}{N_{sj}(t)},
\]
where $\delta_{kj}$ is the depreciation rate of physical capital in country $j$. Many studies show that many factors affect location choice of firms in different ways (e.g. Lee et al., 1996; Henisz, 2000; Busse et al., 2007; Almazan et al., 2007; De Beule et al., 2012; Colombo et al., 2014). For simplicity of analysis this study uses the marginal conditions (2) to determine behaviour of the sectors.

**Behavior of households**
Consumers choose consumption level of commodity, how much to travel, and how much to save. This study applies the approach to consumers' behavior proposed by Zhang in the early 1990s (Zhang, 1993, 2015). We use $k_j(t)$ to represent the per capita wealth in country $j$. The representative household has the following current income
\[
y_j(t) = r(t)k_j(t) + w_j(t).
\]
The variable $y_j(t)$ is called the current income. We assume that selling and buying wealth can be conducted instantaneously without any transaction cost. The disposable income is
\[
\hat{y}_j(t) = y_j(t) + k_j(t).
\]
The disposable income is distributed between saving and consumption. The consumer has the total amount of income $\hat{y}_j$ to use for consumer goods, $c_j(t)$, capital goods, $c_k(t)$, tourist consumption in country $q$, $c_{jq}(t)$, and savings, $s_j(t)$.

The total cost for touring countries is
\[
\sum_{q, q \neq j} (t_{jq} + p_q(t) c_{jq}(t)) d_{jq}(t),
\]
where $d_{jq}(t)$, and $p_q(t) c_{jq}(t)$ are respectively, the visit times from country $j$ to country $q$, and consumption of country $q$'s services by the tourist from country $j$.

The budget constraints are
\[
c_{ij}(t) + p_j(t) c_{sj}(t) + \sum_{q \neq j} p_q(t) d_{jq}(t) + s_j(t) = \hat{y}_j(t),
\]
where $d_{jq}(t) = c_{jq}(t) d_{jq}(t)$. We take on the following form of utility functions
\[
U_j(t) = c_{ij}^{\xi_{ij}}(t) c_{sj}^{\gamma_j}(t) s_j^{\lambda_j}(t) \prod_{q \neq j} d_{jq}^{\varepsilon_{jq}}(t), \quad \xi_{ij}, \gamma_j, \lambda_j > 0, \varepsilon_{0,jq} \geq 0.
\]
in which $\xi_{ij}$, $\gamma_j$, $\lambda_j$, and $\varepsilon_{0,jq}$ are the elasticity of utilities of country $j$'s representative household with regard to industrial goods, services, saving, and travels to country $q$. We call
\[ \xi_{0j}, \gamma_{0j}, \lambda_{0j}, \text{and } \varepsilon_{0jq}, \text{respectively, the propensities to consume industrial goods, to consume services, to hold wealth, and to travel to country } q. \]

Maximizing \( U_j \) subject to budget (5) yields
\[ c_q(t) = \xi_j \hat{y}_j(t), \quad p_j(t)c_{sq}(t) = \gamma_j \hat{y}_j(t), \quad s_j(t) = \lambda_j \hat{y}_j(t), \quad p_q(t)d_{jq}(t) = \varepsilon_{jq} \hat{y}_j(t), \quad q \neq j, \quad j, q = 1, ..., J, \]
(7)
where
\[ \xi_j = \rho_j \xi_{0j}, \quad \gamma_j = \rho_j \gamma_{0j}, \quad \lambda_j = \rho_j \lambda_{0j}, \quad \varepsilon_{jq} = \rho_j \varepsilon_{0jq}, \quad \rho_j = \frac{1}{\xi_{0j} + \gamma_{0j} + \lambda_{0j} + \sum_{q \neq j} \varepsilon_{0jq}}. \]

These equations imply that there are positively proportional relations between the service consumption, consumption of the good and saving and the available income. We mention that in their study on tourism Schubert et al. (2009) apply the following iso-elastic tourism demand function
\[ D_q(t) = a y_f^\phi(t) p^{-\varepsilon}(t), \]
where \( y_f(t) \) is the disposable income of foreign countries, \( \phi \) and \( \varepsilon \) are respectively the income and price elasticities of tourism demand. Our model is similar to the case of \( \phi = 1 \) and \( \varepsilon = 1 \).

**The wealth dynamics**
According to the definition of \( s_j(t) \), the wealth changes as follows
\[ \dot{k}_j(t) = s_j(t) - k_j(t). \]
(8)
The change in the wealth equals the saving minus the dissaving.

**Full employment of capital and labor**
The total capital stocks utilized by country \( j, K_j(t) \), is used for the two sectors. We have full employment of labor and capital as follows
\[ K_{ij}(t) + K_{ij}(t) = K_j(t), \quad N_{ij}(t) + N_{ij}(t) = N_j, \quad j = 1, ..., J. \]
(9)

**Balance conditions for global wealth**
The total capital stock employed by the production sectors equals the total wealth owned by all the countries
\[ \sum_{j=1}^{J} K_j(t) = \sum_{j=1}^{J} k_j(t) N_j. \]
(10)
Equilibrium conditions for national consumer goods

For each country, the demand for services is equal to the supply of services

\[ N_j c_j(t) + \sum_{q\neq j} d_q(t) N_q = F_{sj}(t). \]  

Knowledge creation

Following Zhang (1992), we use knowledge as an international public good. We assume that knowledge growth is through Arrow’s learning by doing (Arrow, 1962). We suggest the equation for knowledge growth as follows

\[ \dot{Z}(t) = \sum_{j=1}^{J} \left( \frac{\tau_{ej} F_{ej}(t)}{Z^e(t)} + \frac{\tau_{ej} F_{sj}(t)}{Z^e(t)} \right) - \delta Z(t), \]  

in which \( \delta \geq 0 \) stands for the depreciation rate of knowledge, and \( \varepsilon_{ej} \) and \( \tau_{ej} \) are parameters. The parameters \( \tau_{ej} \) are non-negative. The term \( \tau_{ej} F_{ej}(t)/Z^e(t) \) implies the contribution to knowledge accumulation through learning by doing by country \( j \)'s capital good sector. To explain this term, consider that knowledge has the following relation with country \( j \)'s total industrial output during some period

\[ Z(t) = a_1 \left( \int_0^\theta F_j(\theta)d\theta \right)^{a_2} + a_3 \]

in which \( a_1, a_2 \) and \( a_3 \) are positive parameters. The knowledge accumulation through learning by doing exhibits decreasing (increasing) returns to scale in the case of \( a_2 < (>) 1 \). Take the derivatives of the equation

\[ \dot{Z}(t) = \frac{\tau_{ej} F_{ej}(t)}{Z^e(t)} \]

where \( \tau_{ej} \equiv a_1 a_2 \) and \( \varepsilon_{ej} \equiv 1 - a_2 \).

We thus built the dynamic growth model. The model includes distributions of income and wealth, consumption and labor distribution, international patterns of tourism, and capital and knowledge accumulation as endogenous variables. The rest of the paper examines dynamic behavior of the system.

The Dynamics and Equilibrium

The global economy has any number of national economies countries. Both wealth and knowledge change over time. We have nonlinear and differential equations to describe the motion of wealth and knowledge. It is almost impossible to analytically solve such nonlinear differential equations. This study relies on computer simulation to plot the motion of the dynamic system. First we provide a computational procedure to plot the motion of the global economy. Before showing the result, we have a new variable \( z_1(t) \)

\[ z_1(t) = \frac{r(t) + \delta_{11}}{w_1(t)}. \]
Lemma

The motion of the economic system is determined by $J + 1$ differential equations with $z_i(t)$, $\{k_j(t)\}$, and $Z(t)$, where $\{k_j(t)\} = (\bar{k}_2(t), \ldots, \bar{k}_J(t))$ and as the variables

$$
\begin{align*}
\dot{z}_i(t) &= \Phi(z_i(t), \{k_j(t)\}, Z(t)), \\
\dot{k}_j(t) &= \Phi_j(z_i(t), \{k_j(t)\}, Z(t)), & j = 2, \ldots, J, \\
\dot{Z}(t) &= \Lambda(z_i(t), \{k_j(t)\}, Z(t)).
\end{align*}
$$

(13)

in which $\Phi_j(t)$ and $\Lambda(t)$ are unique functions of $z_i(t)$, $\{k_j(t)\}$, and $Z(t)$, defined in the appendix. At any point in time the other variables are unique functions of $z_i(t)$, $\{k_j(t)\}$, and $Z(t)$ by the following procedure: $r(t)$ by (A2) $\rightarrow w_j(t)$ by (A4) $\rightarrow p_j(t)$ by (A5) $\rightarrow \tilde{k}_i(t)$ by (A15) $\rightarrow \tilde{y}_j(t)$ by (A8) $\rightarrow c_j(t)$, $d_j(t)$ and $s_j(t)$ by (7) $\rightarrow N_{sg}(t)$ by (A9) $\rightarrow N_{sy}(t)$ by (A10) $\rightarrow K_{gy}(t)$ and $K_{gy}(t)$ by (A1) $\rightarrow K_j(t)$ by (9) $\rightarrow F_{gy}(t)$ and $F_{sy}(t)$ by the definitions $\rightarrow K(t) = \sum_{j=1}^J K_j(t)$.

The lemma enables us to plot the motion of the economic system with any number of national economies. It should be remarked that we don’t provide the explicit functional forms of (13) as the expressions are tedious. We simulate the model by specifying the parameter values as follows

$N_1 = 10$, $N_2 = 20$, $N_3 = 60$, $A_1 = 1.2$, $A_2 = 1$, $A_3 = 0.8$, $A_4 = 1.1$, $A_5 = 0.9$, $A_6 = 0.7$, $m_{i1} = 0.4$, $m_{i2} = 0.2$, $m_{i3} = 0.1$, $m_{i4} = 0.4$, $m_{i2} = 0.2$, $m_{i3} = 0.1$, $\delta_2 = 0.06$, $\tau_i = 0.02$, $\epsilon_{i1} = 0.01$, $\epsilon_{i2} = 0.01$, $\epsilon_{i3} = 0.04$, $\alpha_{i1} = 0.31$, $\alpha_{i2} = 0.33$, $\alpha_{i3} = 0.32$, $\alpha_{i4} = 0.32$, $\alpha_{i5} = 0.36$, $\delta_{i1} = 0.05$, $\alpha_{i1} = 0.33$, $\delta_{i2} = 0.04$, $\delta_{i3} = 0.045$, $\lambda_{i1} = 0.7$, $\gamma_{i1} = 0.15$, $\xi_{i1} = 0.1$, $\epsilon_{i12} = 0.002$, $\epsilon_{i12} = 0.007$, $\lambda_{i2} = 0.65$, $\gamma_{i2} = 0.07$, $\xi_{i2} = 0.12$, $\epsilon_{i21} = 0.004$, $\epsilon_{i23} = 0.008$, $\lambda_{i3} = 0.6$, $\gamma_{i3} = 0.08$, $\xi_{i3} = 0.15$, $\epsilon_{i31} = 0.004$, $\epsilon_{i32} = 0.008$. (14)

Country 1, 2 and 3’s populations are respectively 10, 20 and 60. Country 3 has the largest population. Country 1’s total productivities of the two sectors, $A_1$ and $A_4$, are highest, country 2’s second and Country 3’s lowest. Country 1 utilizes knowledge mostly effectively; country 2 next and country 3 utilizes knowledge least effectively. We assume that the capital good sectors make contribution to knowledge with decreasing returns to scale. We neglect possible contributions to knowledge growth by the service sectors. The values of the parameters, $\alpha_j$, in the Cobb-Douglas productions are specified near 0.3. Country 1’s propensity to save is 0.7, country 2’s propensity to save is 0.65, and country 3’s propensity to save is 0.6. We specify the depreciation rates of physical capital near 0.05. Countries vary in their propensities to consume tourism between countries. Many empirical studies on income elasticity of tourism demand (Syriopoulos, 1995; Lanza et al., 2003), and price elasticities (Garín-Münos, 2007). We have the following initial conditions

$z_i(0) = 0.0065$, $k_2(0) = 15$, $k_3(0) = 4.5$, $Z(0) = 49$. (15)
The motion of the system is given in Figure 1. In Figure 1 each country’s total product and the global product are defined as follows

\[ Y_j(t) = F_j(t) + p_j(t)F_{ij}(t), \quad Y(t) = \sum_{j=1}^{J} Y_j(t). \]

The global product falls and rises. The knowledge rises and the global wealth falls. The three countries’ total products and capital stocks employed by the three countries also fall. The other variables are plotted in Figure 1.

**Figure 1**

The Motion of the Global Economy

From Figure 1 we observe that all the variables become stationary in the long term. The simulation results hint on the existence of a stable equilibrium point. Following the lemma under (14), we calculate the equilibrium values of the variables as follows

\[ Y = 561.3, \quad K = 1408.3, \quad Z = 51.1, \quad r = 0.059, \quad Y_1 = 205.9, \quad Y_2 = 116.5, \]
\[ Y_3 = 238.9, \quad K_1 = 596.3, \quad K_2 = 383.9, \quad K_3 = 428.1, \quad F_{11} = 142.4, \quad F_{12} = 77.1, \]
\[ F_{13} = 86.8, \quad K_{11} = 40.3, \quad K_{12} = 256.6, \quad K_{13} = 266.8, \quad N_{11} = 6.98, \quad N_{12} = 13.2, \]
\[ N_{13} = 39.85, \quad F_{11} = 63.2, \quad F_{22} = 34.5, \quad F_{33} = 144.1, \quad K_{11} = 191.98, \quad K_{r2} = 127.2, \]
\[ K_{s3} = 161.3, \quad N_{s1} = 3.02, \quad N_{s2} = 6.84, \quad N_{s3} = 20.2, \quad p_1 = 1.01, \quad p_2 = 1.14, \]
\[ p_3 = 1.06, \quad w_1 = 14.08, \quad w_2 = 3.92, \quad w_3 = 1.48, \quad \bar{k}_1 = 83.81, \quad \bar{k}_2 = 15.6, \quad \bar{k}_3 = 4.3, \]
\[ c_{i1} = 11.97, \quad c_{i2} = 2.88, \quad c_{i3} = 1.08, \quad c_{s1} = 5.96, \quad c_{s2} = 1.47, \quad c_{s3} = 0.54, \]
\[ d_{i1} = 0.21, \quad d_{i3} = 0.79, \quad d_{21} = 0.01, \quad d_{23} = 0.18, \quad d_{31} = 0.03, \quad d_{32} = 0.05. \]

It is straightforward to calculate the values of the four eigenvalues as follows \([-0.22, -0.18, -0.12, -0.02]\).

The eigenvalues are real and negative. This implies the existence of a locally stable equilibrium point. This means that we can effectively conduct comparative dynamic analysis. We now study what will happen to the global economy when some parameters are changed.
Comparative Dynamic Analysis

This section is studies effects of changes in some parameters. The lemma makes it easy to calibrate the motion of all the variables as it gives a computational procedure. It is straightforward to study effects of change in any parameter on transitory processes and stationary states of all the variables. We use variable $\Delta x_j(t)$ to stand for the change rate of the variable, $x_j(t)$, in percentage due to changes in the parameter value.

An improvement in country 1’s knowledge utilization efficiency in the capital good sector

We first examine what happens to the motion of the global economy if country 1’s knowledge utilization efficiency in the capital good sector is improved as follows: $m_1: 0.4 \Rightarrow 0.41$. The simulation results are plotted in Figure 2.

Figure 2
An Improvement in Country 1’s Knowledge Utilization Efficiency

Source: Author’s work

As sector $(i, 1)$ uses knowledge more effectively, the sector’s output is improved and country 1’s wage rate is improved. Sector $(i, 1)$ employs more labor and more capital stock. Sector $(s, 1)$ employs less labor. The output level and capital of sector $(s, 1)$ are lowered initially and are enhanced in the long term. The labor distribution in country 2 is slightly affected. Some of labor is shifted from the capital good sector to the service sector in country 3. The output levels and capital inputs of the two sectors are all enhanced in the long term in countries 2 and 3. The global product, knowledge stock and wealth are all augmented. Country 1 produces more and uses more capital stocks. Country 2 (3) produces less and uses less capital stocks initially and produces more and uses more capital stocks in the long term. In the long term all countries’ total products are increased. The price of service in country 1 is increased and the prices of services in countries 2 and 3 are slightly affected. The rate of interest rises initially and falls in the long term. The representative household in country 1 initially has less wealth, consumes less goods and services, travels less to the other two countries; in the long term the
The household in country 1 increasing the propensities to travel

We now study what will happen to the global and national economies when country 1’s household increase the propensities to travel to country 2 and 3 as follows: \( \varepsilon_{012} : 0.002 \Rightarrow 0.003 \) and \( \varepsilon_{012} : 0.007 \Rightarrow 0.008 \). The simulation results are plotted in Figure 3.

As country 1’s household augments the propensities to tour the other two countries, the households of country 1 travel more to the other two countries. Sectors \((s, 2)\) and \((s, 3)\) enhance their outputs and employ more labor and capital stocks. Sectors \((i, 2)\) and \((i, 3)\) lower their outputs and employ less labor and capital stocks. It should be noted that as we omit possible contributions to knowledge growth from the service sectors, the knowledge stock does not rise as the output levels of the service sectors are enhanced. The knowledge stock is slightly affected. The global product rises initially and falls slightly in the long term. The global capital and capital stocks employed by the three economies are all reduced. Country 3’s national product is increased and the other two countries’ national products are reduced. The rate of interest is enhanced in association with falling capital stocks. The wage rates are reduced and prices of services are slightly affected. Sector \((s, 1)\) reduces the output and employs less labor and capital stocks. Sector \((i, 1)\) increases the output, and employs more labor and more capital stocks. All the households have less wealth and consume less goods and services. The households from countries 2 and 3 travel less to any other country.

Figure 3
Country 1’s Household in Increasing the Propensities to Travel

Source: Author’s work
An improvement in country 1’s learning by doing efficiency

We now study what will happen to the global and national economies when country 1’s learning by doing efficiency is improved as follows: ε_{11}: 0.02 → 0.022. The simulation results are plotted in Figure 4. Comparing Figures 2 and 4, we see that the effects are similar. As sector \((i, 1)\) makes more effectively to knowledge growth via learning by doing, the knowledge stock is augmented. The global product and global wealth are increased. Each country has more total product and uses more capital stocks. The output levels of all the sectors are enhanced. Each household has more wealth, consumes more goods and services, and travels more to the other countries.

Figure 4
An Improvement in Country 1’s Learning by Doing Efficiency

Source: Author’s work

Country 3’s return to scale being enhanced

We now study what will happen to the global and national economies when country 3’s return to scale is enhanced as follows: ε_{33}: 0.4 ⇒ 0.3.

The simulation results are plotted in Figure 5. The wage rates in all the countries are increased. The rate of interest rises initially and falls in the long term. The price of service in country 2 rises and the prices of services in the other two countries fall. The knowledge stock is augmented. The global product and global wealth are increased. Each country has more total product and uses more capital stocks. The output levels of all the sectors are enhanced. Each household has more wealth, consumes more goods and services, and travels more to the other countries.
Country 3’s population being increased
We now study how the motion of the global economy is affected when if country 3’s population is increased as follows: $N_3: 60 \rightarrow 65$. The simulation results are plotted in Figure 6.

The knowledge stock is slightly affected. The global product and wealth are enhanced. Country 3’s total product and capital stocks are increased, and the other two countries’ total products and capital stocks are reduced. Country 3 increases the output level and employs more the input factors, and the other two countries reduce the output levels and employ less the input factors. The countries’ output levels and
labor force of the service sectors are increased. The rate of interest rises in tandem with falling in the wage rates. The prices of the services are slightly affected. The household of country 3 (2) has less wealth, consumes less goods and services, and travels less to the other two countries. The household of country 1 has more wealth, consumes more goods and services, and travels more to the other two countries. We see that as country 3 increases its population, in macroeconomic level country 3 benefits and the other two countries lose; in microeconomic level the household in country 1 benefits, and the household in country 2 (3) loses.

**Country 1’s population being increased**

We now study how the motion of the global economy is affected when if country 1’s population is increased as follows: \( N_1 = 10 \rightarrow 11 \). The simulation results are plotted in Figure 7. Comparing Figures 6 and 7, we see that different from the rise in country 3’s population, as country 1’s population is increased, all the households in the global economy benefit. This occurs as country 1 has highest knowledge utilization efficiency and is most efficient in learning by doing.

**Figure 7**

*Country 3’s Population Being Increased*

![Figure 7](image)

Source: Author’s work

**A rise in country 1’s propensity to save**

We now deal with the effects of the following rise in country 1’s propensity to save: \( \lambda_{01} \Rightarrow 0.72 \). The simulation results are plotted in Figure 8. As country 1’s propensity to save is increased, in the long term all the households benefit. In the global economy with endogenous knowledge, a rise in the country’s propensity will not only increase other countries’ consumption levels but also the country’s consumption levels in the long term.
Figure 8
A Rise in Country 1’s Propensity to Save

Source: Author’s work

Concluding Remarks
This study introduced endogenous knowledge into a multi-country growth model with trade and tourism proposed by Zhang. We modelled a dynamic interaction among economic growth, structural change, knowledge accumulation, international trade and tourist flows. The model was built on the basis of Arrow’s learning by doing, the Solow growth model, the Uzawa two-sector model, and the Oniki-Uzawa trade model. Capital accumulation is through saving, while knowledge is through learning by doing. The model is unique in this type of neoclassical growth trade models in that it introduces endogenous tourism the general equilibrium trade model with endogenous wealth and knowledge. We first built the multi-growth model with endogenous knowledge and tourism. Then we demonstrated that the motion of the $J$-country world economy can be described by $J+1$ differential equations. We also simulated the global economy with three countries, showing that the world dynamics has a unique equilibrium. We carried out comparative dynamic analysis with regard to one country’s knowledge utilization efficiency, the efficiency of learning by doing, the propensity to save, the propensity to tour other countries, and the population. The analyses provide some insights into interdependence between growth, trade, tourism, wealth accumulation, and knowledge growth. For instance, the simulation shows that when a country’s the propensities to travel to the other two countries are enhanced, the households of the country travel more to the other two countries; the three countries’ economic structures are changed; the global product falls in the long term; the global capital and capital stocks employed by the three economies are all reduced and the rate of interest rises; different national products are affected differently; the wage rates are reduced and prices of services are slightly affected; all the households have less wealth and consume less goods and services. The households from the other two countries travel less to any other country. Our model can be extended and generalized in different directions. For instance, it is significant to examine behavior of the dynamic system when the utility functions or/and production functions are taken on other forms. The Solow model and Uzawa two-sector growth
models are the two key models in the neoclassical economic growth theory and the Oniki-Uzawa growth model is a main key model of global economic dynamics with capital accumulation. These models have been generalized and extended in different ways. We only take account of learning by doing in knowledge accumulation. We may also introduce research and education into the model.

References
Appendix: Proving the Lemma

We now derive dynamic equations for global economic growth. From (2), we have

\[ z_j = \frac{r + \delta_j}{w_j} = \frac{a_j N_{ij}}{K_{ij}} = \frac{b_j N_{sj}}{K_{sj}}, \tag{A1} \]

where

\[ a_j = \frac{\alpha_{ij}}{\beta_{ij}}, \quad b_j = \frac{\alpha_{sj}}{\beta_{sj}}. \]

Insert \( z_j / a_j \equiv N_{ij} / K_{ij} \) in \( r + \delta_{kj} = \alpha_{ij} F_{ij} / K_{ij} \) from (2)

\[ r(z_j, Z) = \frac{\alpha_{ij} A_{ij} Z^{\alpha_{ij}}}{\beta_{ij}} z_j^{\beta_{ij}} - \delta_{ij}, \quad j = 1, ..., J. \tag{A2} \]

From (A2) we get

\[ z_j(z_j, Z) = a_j \left( \frac{r + \delta_{sj}}{a_i A_{ij} Z^{\alpha_{ij}}} \right) z_j^{\beta_{ij}}, \quad j = 2, ..., J. \tag{A3} \]

From (A1) and (A2), we have

\[ w_j(z_j, Z) = \frac{r + \delta_{sj}}{z_j}. \tag{A4} \]

From \( z_j = b_j N_{sj} / K_{sj} \) and (1), we have

\[ p_j(z_j, Z) = \frac{b_j^{\beta_{ij}} \left( r + \delta_{ij} \right)}{\alpha_{ij} A_{ij} Z^{\alpha_{ij}} z_j^{\beta_{ij}}}. \tag{A5} \]

From (11) and (7) we have

\[ \gamma_j \hat{y}_j N_j + \sum_{q \neq j} \epsilon_{qj} \hat{y}_q N_q = p_j F_{sj}. \tag{A6} \]

Insert (1) in (A6)

\[ \gamma_j \hat{y}_j N_j + \sum_{q \neq j} \epsilon_{qj} \hat{y}_q N_q = \frac{w_j N_{sj}}{\beta_{sj}}. \tag{A7} \]

By (3) we have

\[ \hat{y}_j(z_j, Z, \bar{k}) = (1 + r)\bar{k} + w_j. \tag{A8} \]

Substituting (A8) into (A7) yields
Taking derivatives of equation (A15) with respect to $t$ yields
\[
\ddot{k}_i = \frac{\partial \Phi}{\partial z_i} \dot{z}_i + \Lambda \frac{\partial \Phi}{\partial Z} + \sum_{j=2}^{l} \Phi_j \frac{\partial \Phi}{\partial k_j},
\]
where we use (A17). Insert (A18) in (A16)
\[
\dot{z}_i = \Phi_i(z, \{k_j\}) = \left( \Phi_0 - \Lambda \frac{\partial \Phi}{\partial Z} - \sum_{j=2}^{l} \Phi_j \frac{\partial \Phi}{\partial k_j} \right) \left( \frac{\partial \Phi}{\partial z_i} \right)^{-1}.
\]
Following the procedure in the lemma we describe the dynamics of the economic system.

**About the author**

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How to Choose Your Next Top Salesperson: Multiple-Criteria Approach

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Abstract

Background: Choosing the most suitable candidate for the position of salesperson is indeed a complex task for managers because several criteria important for the position should be taken into consideration. Such a choice should be considered as a multiple-criteria problem, which can be solved by using the AHP method.  
Objectives: The main goal is to investigate which criteria are the most important for the managers in the process of selecting a candidate for the position of salesperson, and on that basis to develop an AHP model for ranking of applicant candidates for this position. Methods/Approach: A questionnaire was created, which was sent to 100 sales managers in companies of different industries in Macedonia, in order to grade the importance of the given criteria. Out of the criteria graded, nine that have the highest average grade of importance comprise one of the levels of the AHP model. Results: An average grade of importance for the criteria for choosing a candidate for the position of salesperson is gained, and an AHP model is developed. Conclusions: The developed AHP model is illustrated through a hypothetical example, and its solution serves as a recommendation for who is the best candidate.

Key words: sale, sales managers, salesperson, multiple-criteria approach, AHP  
JEL classification: C44, C83, M21  
Paper type: Research article

Introduction

Everything starts from sales; nothing happens until a sale happens. Moreover, the sale itself does not merely represent a final transaction for selling products or services, but it also stands for negotiation, finding the best employees, transmitting the idea for the business, keeping up a good atmosphere in the company, building strategic alliances, opening new businesses, establishing good relations with the suppliers and the rest of the stakeholders, etc., i.e. a sale is every communication of any type that we utilize to achieve our goals. Consequently, it requires daily investing in oneself (in one’s complete personal development) and as such represents one of the most
complex profiles, especially because of the fact that human nature is immeasurable and there is no formula for successful communication in different situations.

Out of the people that are included in sales, 55% have chosen the wrong profession, while another 20-25% have the essential attributes so as to be able to sell, yet they don’t need to sell that which they are given but rather something else (Greenberg et al., 2001, p. 9).

According to Mayer et al. (1964), two basic principles are essential for a good salesperson, and they are: empathy and ego-drive. In addition, according to Kurlan (2009, pp. 2-3) the following four elements are crucial to sales success: desire, commitment, outlook and, responsibility. Successful salespeople possess five key qualities: empathy, focus, responsibility, optimism, and ego-drive. Choi et al. (2015) investigate the influence of the characteristics of the salesperson on the behaviour of a buyer in the buyer-supplier relationship. Sales professionals (a number of 155) of manufacturers in Japan have provided the data, and in order to analyse it the structural equation modelling approach was used. Loveland et al. (2015) examine the relationship between personality traits and job satisfaction and career satisfaction in the case of salespeople. The sample comprised 299 salespeople and the latent profile analysis (LPA) was used to assess this sample along with the following personality dimensions: emotional stability, extraversion, work drive, teamwork orientation, customer service orientation, optimism, job satisfaction and career satisfaction. Job satisfaction and career satisfaction were used as dependent variables. Yakasai et al. (2015) investigate the impact of the Big Five Factors of personality traits on the performance of salespeople. Moreover, the five personality dimensions are: extraversion, agreeableness, conscientiousness, neuroticism, and openness.

For the purpose of determining which criteria are most important for sales managers when choosing a candidate for the position of salesperson in companies that belong to different industries in Macedonia, a research was conducted through a questionnaire, and the chosen criteria are the basis for the development of the multiple-criteria AHP (Analytic Hierarchy Process) model.

A literature review for multiple-criteria decision making (MCDM) techniques and their application has been made by Mardani et al. (2015). The authors considered 393 articles, published in more than 120 international peer-reviewed journals from the Web of Science database in the period 2000-2014 (Cvetkoska et al., 2016). According to the frequency of application of decision-making techniques (AHP, ELECTRE, DEMATEL, PROMETHEE, TOPSIS, ANP, aggregation DM methods, hybrid MCDM and VIKOR), the one used the most is the AHP (128 articles), followed by: the hybrid MCDM (64 articles), aggregation DM methods (46 articles), TOPSIS (45 articles), ELECTRE (34 articles), ANP (29 articles), PROMETHEE (26 articles), VIKOR (14 articles), and DEMATEL (7 articles) (Cvetkoska et al., 2016, p. 242). The analytic hierarchy process is the best known and most frequently used multiple-criteria method that allows for the choice of the best alternative from those available, which are evaluated on the basis of several criteria, i.e. sub-criteria. The decision-making problem is structured as a hierarchy, for details see (Saaty et al., 1994, p. 2), and on the same level there should be $7 \pm 2$ elements, for more details, see (Miller, 1956). Following the development of the hierarchy model, its constituent elements are compared in pairs. According to cognitive psychologists, people make two types of comparisons: absolute and relative comparisons. With the former, the alternatives are compared to a standard, while with the latter, the alternatives according to which the attribute is mutual are compared in pairs, and the AHP method can be
used both for absolute and relative comparisons (Saaty et al., 1994, Saaty, 2005). In this paper, the AHP method is used for absolute comparisons.

In Macedonia, Cvetkoska et al. (2014) have developed an AHP model for ranking the candidates for the position of project manager. In the existing literature we were not able to find a paper containing a research like ours, regarding the choice of best candidate for the position of salesperson by implementing the multiple-criteria approach, which leads to the conclusion that this is an original research.

The paper is structured as follows: apart from the Introduction that is given in Section 1, Section 2 refers to the methodology. The results are presented in Section 3, whereas the discussion is presented in Section 4. At the end, the Conclusion is given in Section 5.

**Methodology**

In the focus of this paper is the selection of relevant criteria and defining a relevant multiple-criteria model for choosing the best salesperson.

A questionnaire, which consisted of a total of 36 questions, was prepared; the target group being the sales managers employed in companies in different industries in Macedonia. The questionnaire is given in Appendix 1.

Aside from the questions regarding gender, age, level of education, and where the sales managers had acquired their highest level of education, we wanted to gain information as well about the industry of the company they work at, the number of employees in the company, and the number of employees in the sales sector. Additionally, we wanted to observe how many years the new salespeople needed to reach the point of being sales experts who could train future salespeople.

Additionally, answers were obtained about the best way of doing sales, the best way of paying managers and salespeople, as well as the benefits for sales managers and salespeople. Moreover, we wanted every sales manager to identify the three largest advantages and disadvantages that building one’s career in sales has.

This paper places emphasis on the last question of the questionnaire, with the aim of choosing the most important criteria for the choice of candidate for the position of salesperson. The last question contained 22 criteria (formal education, attended trainings in the required field of expertise, attended trainings aside from the required field of expertise, previous working experience related to sales, candidate’s motivation, knowledge of English, knowledge of a foreign language other than English, organizational skills, communication skills, negotiation skills, computer skills, time management, leadership, teamwork, integrity, problem management, vision for oneself, change management, self-discipline, looks, coming from an entrepreneurial family, and coming from a family that was involved in sales) that the sales managers had to grade according to the importance they placed in regards to the choice of candidates for the position of salesperson. In order to grade the importance of every criterion, a scale from 1 to 5 was given, where 1 stands for the least important, while 5 stands for the most important. In addition, the sales managers were given the chance to add and grade the criteria that according to them is also important, but has not been mentioned. The questionnaire was sent to 100 sales managers by email in March 2016, and they were given a period of one week to fill it in and send it back to the authors of this paper.

The Analytic Hierarchy Process is the most commonly used MCDM method when a choice of best alternative from several alternatives has to be made, or when alternatives should be ranked so that multiple criteria are taken into consideration on the basis of which alternatives are graded. In our paper a multiple-criteria AHP
model will be developed, consisting of a goal (the choice of best candidate for the position of salesperson), criteria (on the basis of the answers received, nine that have the highest average grade of importance will be chosen), and intensities, while the solution will serve as a recommendation of the best candidate for the position of salesperson. The Analytic Hierarchy Process is further explained.

**The Analytic Hierarchy Process (AHP)**

Thomas L. Saaty in the late seventies of the previous century developed the multiple-criteria decision-making method Analytic Hierarchy Process (Saaty, 1977, 1980). This method is designed to solve MCDM problems, which can be decomposed into the following elements: goal, criteria, sub-criteria and alternatives, and these elements comprise a hierarchy structure. The elements of each level of the constructed hierarchy are compared in pairs by a decision-maker and they express their preferences by using the scale of relative importance (Table 1). The weights of the criteria and the priorities of the alternatives are the outputs of this method, and in order to calculate them an appropriate mathematical model is used, see more in (Saaty, 1990; Saaty et al., 1991).

<table>
<thead>
<tr>
<th>Intensity of importance</th>
<th>Definition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equal importance</td>
<td>Two activities contribute equally to the objective</td>
</tr>
<tr>
<td>2</td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Moderate importance</td>
<td>Experience and judgment slightly favour one activity over another</td>
</tr>
<tr>
<td>4</td>
<td>Moderate plus</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Strong importance</td>
<td>Experience and judgment strongly favour one activity over another</td>
</tr>
<tr>
<td>6</td>
<td>Strong plus</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Very strong or demonstrated importance</td>
<td>An activity is favoured very strongly over another; its dominance demonstrated in practice</td>
</tr>
<tr>
<td>8</td>
<td>Very, very strong</td>
<td>The evidence favouring one activity over another is of the highest possible order of affirmation</td>
</tr>
<tr>
<td>9</td>
<td>Extreme importance</td>
<td>A reasonable assumption</td>
</tr>
<tr>
<td></td>
<td>Reciprocals of above</td>
<td>If activity ( i ) has one of the above non-zero numbers assigned to it when compared with activity ( j ), then ( j ) has the reciprocal value when compared with ( i )</td>
</tr>
<tr>
<td></td>
<td>Rationals</td>
<td>If consistency were to be forced by obtaining ( n ) numerical values to span the matrix</td>
</tr>
</tbody>
</table>

*Source: Saaty et al., 2012.*
In this paper the focus is on the absolute measurement. “After setting priorities for the criteria (or subcriteria, if there are any), pairwise comparisons are also made between the ratings themselves to set priorities for them under each criterion and dividing each of their priorities by the largest rated intensity to get the ideal intensity. Finally, alternatives are scored by checking off their respective ratings under each criterion and summing these ratings for all the criteria. This produces a ratio scale score for the alternative. The scores thus obtained of the alternatives can in the end be normalized by dividing each one by their sum” (Saaty et al., 1994, p. 5). More details about absolute measurement can be found in (Saaty et al., 1994, pp. 17-19; Saaty, 2005, pp. 20-23).

By calculating the Consistency Ratio (C.R.) it can be investigated whether the decision-maker was consistent or not in the process of comparing in pairs the elements of the hierarchy.

\[
C.R. = \frac{C.I.}{R.I.}
\]

where the Consistency Index (C.I.) \(\frac{(\lambda_{\text{max}}-n)}{(n-1)}\) and \(\lambda_{\text{max}}\) represents the largest eigenvalue of the matrix of pairwise comparisons (A), (Saaty and Vargas, 1994, pp. 8-9). In Table 2 the values of the Random Index (R.I.) are given. If it is obtained that the Consistency Ratio is about 10% (0.10) or less, the decision-maker is considered to be consistent; if that is not the case then the consistency should be improved (Saaty, 1990, p. 13).

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Random Consistency Index</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random Consistency Index (R.I.)</td>
<td>0</td>
<td>0</td>
<td>.52</td>
<td>.89</td>
<td>1.11</td>
<td>1.25</td>
<td>1.35</td>
<td>1.40</td>
<td>1.45</td>
<td>1.49</td>
</tr>
</tbody>
</table>

Source: Saaty et al., 1994.

Some of the advantages of using this multiple-criteria method are (Cvetkoska, 2013, p. 55) that in the decision-making process it integrates both the quantitative factors and the factors of a qualitative nature, it identifies the inconsistency of the decision-maker, in group decision-making it helps to structure the discussion and thus achieve a consensus, quality software tools have been developed for its support, it enables a sensitive analysis which examines the sensitivity, i.e. the stability of the results obtained, etc. However, aside from the advantages, there are also disadvantages of the AHP method (Cvetkoska, 2013, p. 55): for certain problems in the decision-making process, the intensity of importance scale is not comprehensive enough for comparing the elements in pairs, for a large part of the problems, a high number of comparisons in pairs is needed, it is well-known that it is difficult to achieve an acceptable C.R., and incomparable alternatives can not be taken into consideration. Regarding how the last disadvantage can be overcome, see (Saaty, 2006, p. 225).

In the application of the method of Analytic Hierarchy Process, an integral part is sensitive analysis through which it can be seen:

1. How the change of the input data (criteria/sub-criteria if included) influences the final results, i.e. the overall priorities of the alternatives, and
2. Whether the change of the input data means that the ranking of the alternatives will remain the same or that it will change.
According to Bayazit (2005) if the input data in every possible combination change for 5%, while the ranking of the alternatives remains the same, then it is thought that the results obtained are stable.

Out of the software tools that serve as support for the AHP method, Expert Choice, has five options for sensitivity analysis: 1. Performance; 2. Dynamic; 3. Gradient; 4. Head to Head and 5. 2 D, details can be found in Babic (2011, pp. 182-185).

Results
The questionnaire was fully filled in by 52 sales managers, and what follows are the analysed results from the given questions.

Out of 52 respondents, 27 are male, and 25 are female. According to age, the youngest respondent is 25 years old, and the oldest is 57 years. Regarding their level of education, the largest number of the respondents have acquired higher education (35), 10 of them have MA degrees, 6 have vocational education, and 1 is a PhD. Out of the respondents, 47 have gained the highest level of education in Macedonia, while 5 have gained it abroad.

According to the National Classification of Activities – NCA Rev. 2 (Republic of Macedonia State Statistical Office, 2013) (Financial and insurance activities; wholesale and retail trade, repair of motor vehicles and motorcycles; manufacturing; professional, scientific and technical activities; transportation and storage; arts, entertainment and recreation; human health and social work activities; construction; real estate activities; electricity, gas, steam and air conditioning supply), 12 respondents are sales managers in institutions that function in the following industries: financial and insurance activities, wholesale and retail trade, repair of motor vehicles and motorcycles; 10 of them are sales managers in institutions in the framework of the manufacturing industry; etc., and there is 1 respondent each as a sales manager in the industries of construction, real estate activities, and electricity, gas, steam and air conditioning supply (Figure 1).

According to the number of employees in the companies, it is confirmed that 13 of them are micro, 15 are small, and an equal number of companies are medium-sized and large (12 of them). The average number of employees in the sector of sales in micro, small, medium-sized and large companies is 5, 18, 91 and 301, respectively. According to 24 sales managers, the new salespeople will need up to three years to become sales experts who could train the future salespeople. 18 sales managers think that they will need between three and five years, while 10 sales managers think that five to ten years are necessary. According to 46 respondents the best way of doing sales is in person. Out of the respondents, 47 think that advancement in their career is due to their success in sales. According to 44 respondents, the best way for the sales managers to get paid is by means of commission. Aside from that, on the basis of the answers received, it was concluded that motivating salespeople is not done by way of punishment (no respondent chose this answer). According to 29 respondents, the sales manager has equal benefits with the managers of the other sectors, while according to 23 respondents the sales manager has more benefits. Out of the respondents, 31 answered that if salespeople achieve what is required from them or if they overachieve, then they can be given additional benefits. According to 37 respondents the company that they work for invests in their employees in the sales sector by enabling them to participate in trainings.
When selecting candidates for the position of salesperson, the sales managers pay the most attention to the criterion of communication skills (the average grade of importance is 4.86), followed by the criteria of negotiation skills (4.82), self-discipline (4.74), and motivation of the candidate (4.58), while the least important are the following criteria: coming from a family that was involved in sales (2.02), and coming from an entrepreneurial family (1.82) (Table 3). Aside from the stated 22 criteria that the sales managers graded on the given scale, additional criteria were not added.

In order to choose the best candidate for the position of salesperson, we have developed a multiple-criteria AHP model. The goal is to choose the best candidate for the position of salesperson, while the alternatives are the candidates who will apply for this position, and there have been 9 criteria chosen that have the highest average grade of importance from Table 3, those being: communication skills (criterion 1), negotiation skills (criterion 2), self-discipline (criterion 3), motivation of candidate (criterion 4), problem management (criterion 5), teamwork (criterion 6), integrity (criterion 7), change management (criterion 8), and time management (criterion 9). For each of the criteria there have been introduced intensities, so for the criteria of communication and negotiation skills, the intensities are: excellent, average, below-average, weak, unsatisfactory; for the criterion of self-discipline the intensities are: high and low degree of self-discipline; for the criterion of candidate motivation the intensities are: high and low level of motivation; for the criteria of problem management, change management, and time management, the intensities are: excellent, very good, good, weak, and unsatisfactory; for the criterion of integrity the intensities are a high or a low level of integrity; for the criterion of teamwork, if the candidate is a team player, they shall be given the priority value of this criterion, whereas if they aren’t a team player, then they shall get 0. The constructed model is shown in Figure 2.
Table 3
Average grade of importance for criteria for the choice of candidate for the position of salesperson

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication skills</td>
<td>4.86</td>
</tr>
<tr>
<td>Negotiation skills</td>
<td>4.82</td>
</tr>
<tr>
<td>Self-discipline</td>
<td>4.74</td>
</tr>
<tr>
<td>Motivation of candidate</td>
<td>4.58</td>
</tr>
<tr>
<td>Problem management</td>
<td>4.48</td>
</tr>
<tr>
<td>Teamwork</td>
<td>4.44</td>
</tr>
<tr>
<td>Integrity</td>
<td>4.38</td>
</tr>
<tr>
<td>Change management</td>
<td>4.36</td>
</tr>
<tr>
<td>Time management</td>
<td>4.34</td>
</tr>
<tr>
<td>English proficiency</td>
<td>4.24</td>
</tr>
<tr>
<td>Organizational skills</td>
<td>4.22</td>
</tr>
<tr>
<td>Vision for oneself</td>
<td>4.20</td>
</tr>
<tr>
<td>Leadership</td>
<td>4.04</td>
</tr>
<tr>
<td>Computer skills</td>
<td>4.00</td>
</tr>
<tr>
<td>Attended training in the required field of expertise</td>
<td>3.74</td>
</tr>
<tr>
<td>Previous working experience related to sales</td>
<td>3.72</td>
</tr>
<tr>
<td>Looks</td>
<td>3.62</td>
</tr>
<tr>
<td>Knowledge of a foreign language other than English</td>
<td>3.58</td>
</tr>
<tr>
<td>Formal education</td>
<td>3.48</td>
</tr>
<tr>
<td>Attended training out of the required field of expertise</td>
<td>2.84</td>
</tr>
<tr>
<td>Coming from a family that was involved in sales</td>
<td>2.02</td>
</tr>
<tr>
<td>Coming from an entrepreneurial family</td>
<td>1.82</td>
</tr>
</tbody>
</table>

Source: Author’s calculations

Figure 2
AHP model for applicant candidates ranking for the job position of salesperson

Source: Author’s illustration
A Hypothetical Example for Applicant Candidates’ Ranking for the Job Position of a Salesperson

Table 4 shows the matrix of pairwise comparisons, whereas Table 5 shows the normalized matrix and the priorities. The first criterion, i.e. communication skills, has the highest priority (0.2023), followed by the second and the fourth criterion, i.e. negotiation skills and motivation, etc.

Table 4
Matrix of pairwise comparisons of the criteria

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
<th>C9</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>C2</td>
<td>1/2</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>C3</td>
<td>1/3</td>
<td>1/3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1/2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>C4</td>
<td>1/2</td>
<td>1/4</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>C5</td>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td>1</td>
<td>1/3</td>
<td>1/3</td>
<td>2</td>
<td>1/4</td>
</tr>
<tr>
<td>C6</td>
<td>1/3</td>
<td>1/4</td>
<td>1/2</td>
<td>1/3</td>
<td>3</td>
<td>1</td>
<td>1/3</td>
<td>2</td>
<td>1/3</td>
</tr>
<tr>
<td>C7</td>
<td>1/2</td>
<td>1/2</td>
<td>2</td>
<td>1/2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>C8</td>
<td>1/3</td>
<td>1/2</td>
<td>1/3</td>
<td>1/4</td>
<td>1/2</td>
<td>1/5</td>
<td>1</td>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>C9</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/4</td>
<td>4</td>
<td>3</td>
<td>1/5</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Author’s calculation

Table 5
Normalized matrix and priorities

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
<th>C9</th>
<th>Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>0.2353</td>
<td>0.3529</td>
<td>0.2368</td>
<td>0.2202</td>
<td>0.1569</td>
<td>0.1513</td>
<td>0.2335</td>
<td>0.1154</td>
<td>0.1188</td>
<td>0.2023</td>
</tr>
<tr>
<td>C2</td>
<td>0.1176</td>
<td>0.1765</td>
<td>0.2368</td>
<td>0.4404</td>
<td>0.1176</td>
<td>0.2017</td>
<td>0.2335</td>
<td>0.0769</td>
<td>0.1188</td>
<td>0.1911</td>
</tr>
<tr>
<td>C3</td>
<td>0.0784</td>
<td>0.0588</td>
<td>0.0789</td>
<td>0.0550</td>
<td>0.1176</td>
<td>0.1008</td>
<td>0.0584</td>
<td>0.1154</td>
<td>0.1188</td>
<td>0.0869</td>
</tr>
<tr>
<td>C4</td>
<td>0.1176</td>
<td>0.0441</td>
<td>0.1579</td>
<td>0.1101</td>
<td>0.1569</td>
<td>0.1513</td>
<td>0.2335</td>
<td>0.1538</td>
<td>0.2376</td>
<td>0.1514</td>
</tr>
<tr>
<td>C5</td>
<td>0.0588</td>
<td>0.0588</td>
<td>0.0263</td>
<td>0.0275</td>
<td>0.0392</td>
<td>0.0148</td>
<td>0.0389</td>
<td>0.0769</td>
<td>0.0149</td>
<td>0.0398</td>
</tr>
<tr>
<td>C6</td>
<td>0.0784</td>
<td>0.0441</td>
<td>0.0395</td>
<td>0.0367</td>
<td>0.1176</td>
<td>0.0504</td>
<td>0.0389</td>
<td>0.0769</td>
<td>0.0198</td>
<td>0.0558</td>
</tr>
<tr>
<td>C7</td>
<td>0.1176</td>
<td>0.0882</td>
<td>0.1579</td>
<td>0.0550</td>
<td>0.1176</td>
<td>0.1513</td>
<td>0.1167</td>
<td>0.1923</td>
<td>0.2970</td>
<td>0.1438</td>
</tr>
<tr>
<td>C8</td>
<td>0.0784</td>
<td>0.0882</td>
<td>0.0263</td>
<td>0.0275</td>
<td>0.0196</td>
<td>0.0252</td>
<td>0.0233</td>
<td>0.0385</td>
<td>0.0149</td>
<td>0.0380</td>
</tr>
<tr>
<td>C9</td>
<td>0.1176</td>
<td>0.0882</td>
<td>0.0395</td>
<td>0.0275</td>
<td>0.1569</td>
<td>0.1513</td>
<td>0.0233</td>
<td>0.1538</td>
<td>0.0594</td>
<td>0.0908</td>
</tr>
</tbody>
</table>

C.I. = 0.1386 C.R. = 0.0956
Source: Author’s calculation

Table 6 demonstrates the matrix of pairwise comparisons of the intensities with respect to the first criterion, i.e. communication skills, the priorities and the idealized priorities, whereas the matrixes of pairwise comparisons of the intensities with respect to the other criteria are given in Appendix 2. The author was consistent in the process of comparing the elements of the constructed hierarchy (Consistency Ratio is less than 0.10).

Table 6
Matrix of pairwise comparisons of the intensities with respect to the criterion 1, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 1</th>
<th>Excellent</th>
<th>Average</th>
<th>Below average</th>
<th>Weak</th>
<th>Unsatisfactory</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>0.5028</td>
<td>1.0000</td>
</tr>
<tr>
<td>Average</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>0.2501</td>
<td>0.5175</td>
</tr>
<tr>
<td>Below average</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0.1344</td>
<td>0.2672</td>
</tr>
<tr>
<td>Weak</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>0.0678</td>
<td>0.1348</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1/9</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>0.0348</td>
<td>0.0693</td>
</tr>
</tbody>
</table>

C.I. = 0.0607 C.R. = 0.0546
Source: Author’s calculation
Table 7 presents a short version of how the applicant candidates’ ranking for the job position of salesperson shall be made.

Three alternatives i.e. three candidates (A, B, C), are taken into consideration and what follows is an illustration how the total score for Candidate A is calculated:

\[0.2023 \times 0.5175 + 0.1911 \times 0.2672 + 0.0869 \times 1.0000 + 0.1514 \times 1.0000 + 0.0398 \times 0.3445 + 0.0558 \times 0.1438 \times 1.0000 + 0.0380 \times 0.3445 + 0.0908 \times 0.3445 = 0.3169\]

The total score for the rest of the candidates is calculated in an analogical way. Then, the normalized priorities are calculated, and the last row in Table 7 (Ranking) shows that ranked first is Candidate B, followed by the Candidates A, and C.

Table 7
Ranking Candidates

<table>
<thead>
<tr>
<th>Source</th>
<th>Author’s calculation</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>0.2023</td>
<td>Average</td>
<td>Excellent</td>
</tr>
<tr>
<td>C2</td>
<td>0.1911</td>
<td>Below average</td>
<td>Average</td>
</tr>
<tr>
<td>C3</td>
<td>0.0869</td>
<td>A high degree</td>
<td>A high degree</td>
</tr>
<tr>
<td>C4</td>
<td>0.1514</td>
<td>A high level</td>
<td>A high level</td>
</tr>
<tr>
<td>C5</td>
<td>0.0398</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>C6</td>
<td>0.0558</td>
<td>Is not a team player</td>
<td>Is a team player</td>
</tr>
<tr>
<td>C7</td>
<td>0.1438</td>
<td>A high level</td>
<td>A high level</td>
</tr>
<tr>
<td>C8</td>
<td>0.0380</td>
<td>Good</td>
<td>Very good</td>
</tr>
<tr>
<td>C9</td>
<td>0.0908</td>
<td>Good</td>
<td>Very good</td>
</tr>
<tr>
<td>Total score</td>
<td>0.5960</td>
<td>0.8550</td>
<td>0.4299</td>
</tr>
<tr>
<td>Priorities (normalized)</td>
<td>0.3169</td>
<td>0.4546</td>
<td>0.2286</td>
</tr>
<tr>
<td>Ranking</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

**Discussion**

With the development of technology a great number of professions that exist nowadays will become extinct in the near or distant future. Moreover, a significant number of people who have dedicated their whole life to acquiring certain skills will have to develop new ones or face a dramatic fall of the cost of their hard work. The respondents were asked the question as to what, in their opinion, is the best way to do sales (face-to-face, group presentations, via the internet, via a phone call, or they could add another option) – 88.46% of them (46 respondents) answered that the best way to do sales is face-to-face, while 86.5% of them (45 respondents) already do sales in this way. Can this lead us to the conclusion that this area is immune to the development of technology and that it can’t become extinct even after thousands of years of continuous development of technology, because nothing can replace human contact? The wholesome impression that we leave on
other people depends on what we say, the way we say it, and our body language. According to Albert Mehrabian only 7% depends on “what” we say, 38% depends on the way we say it, and as much as 55% depends on our body language (Belludi, 2008). Consequently, does this imply that when a sale is being done via the internet the chances to leave the correct impression are around 7%, while via a phone call they are 45%, and the chances to send the message in the correct way are around 55% higher, i.e. around 93%, if it is done in person?

From the very first moment human beings stood upright up to today on a daily basis they have had one goal: to move forward in their development. Those who want to work in sales should bear in mind that their career development will depend on their success in sales, 90.38% of the respondents answered that their personal advancement in sales is due to their success in sales, and 86.54% of the respondents answered that advancement of salespeople in their whole career is due to their success in sales.

According to 84.62% of the respondents (44 in number) the best way for the managers to get paid is by commission, while 55.77% of them (29 respondents) answered that in the company they work for, the sales managers are paid by managerial and sales commission, as a percentage of the sales. According to 88.46% of the respondents (46 in number) the best way to pay the salespeople is by commission, and according to 55.77% (29 respondents) the salespeople are paid by commission as a percentage of their sales. Such a way of getting paid creates additional pressure on the salespeople and sales managers, from the aspect of fulfilling the assigned tasks (in the financial sector, on a quarterly level). However, if it is taken into consideration that every line of work brings along certain pressure with it, as opposed to the largest part of professions where bad results most often lead to getting fired, in sales, motivating the salespeople by punishing them is 0.00%, which in fact is an advantage because bad results can only lead to decreasing financial benefit, but they get to keep their job and gain a lot of time to better their performance, except in the case of continuous bad results (in two or more quarters).

The sales managers, in regards to the managers from the other sectors, have equal benefits (55.77% or 29 respondents), i.e. more benefits (44.23% or 23 respondents), expressed in higher salaries and additional benefits. According to 59.62% of the respondents (a number of 31), the salespeople have additional benefits, such as: physical rewards, trainings and trips abroad, while according to 40.38% (a number of 21), they don’t have additional benefits. According to 71.15% of the respondents (a number of 37), the company they work for provides trainings for skills advancement in sales, which are held by experienced company employees or trainers who come to the company, or they send their employees to participate in such trainings in Macedonia and abroad. On the basis of the answers received, it can be concluded that the companies invest in their employees, which at the same time presents an investment with the greatest return.

When making decisions from a tactic or/and strategic aspect, those in the company responsible for making decisions often consult the best salespeople (42.3% or 22 respondents), and according to 26.92% (14 respondents) they do it nearly every time.

When selecting candidates for the position of salesperson, the sales managers pay the most attention to: communication skills, negotiation skills, self-discipline, and motivation of the candidate (with average grades of importance of over 4.5), followed by problem management, teamwork, integrity, change management, time management, knowledge of English (which is necessary in a globalized world),
organizational skills, vision for themselves, leadership and computer skills (with the average grades of importance of over 4.00). The criteria with average grades of importance less than 4.00 are: attended trainings in the required field of expertise, previous working experience related to sales, looks, knowledge of a foreign language other than English, formal education, and attended trainings out of the required field of expertise.

As an encouragement to the fact that the candidates are more and more dependent on their own skills in this profession, these two criteria are of the least importance: coming from a family that was involved in sales, and coming from an entrepreneurial family.

The average grade of importance for each criterion, calculated on the basis of the grades given from 1 to 5 by the sales managers, enables the identification of the most significant criteria for the choice of candidate for the position of salesperson. Out of 22 criteria, 9 have been chosen with the highest average grade of importance, which comprise one of the levels of the multiple-criteria AHP model. When the AHP model is applied, the maximum number of elements on the levels is 9, which is why 9 criteria have been chosen.

The developed AHP model is illustrated on a hypothetical example, and it shall enable the sales managers to choose the best candidate for the position of salesperson.

**Conclusion**

In this paper it is determined which are the most important criteria for sales managers in the process of selecting a candidate for the position of salesperson, and on that basis an AHP model for ranking of applicant candidates for this position is developed. A questionnaire and absolute measurement approach of the method analytic hierarchy process were used in that direction. The most important 9 criteria by the sales managers were: communication skills, negotiation skills, self-discipline, candidate’s motivation, problem management, teamwork, integrity, change management, and time management. The goal in the AHP model was to choose the best candidate for the position of salesperson, the criteria being the 9 mentioned ones, while the alternatives are all the candidates who will apply. How the applicant candidates’ ranking shall be made for the job position of salesperson is illustrated in a hypothetical example, and the solution of the developed model shall be used as a recommendation in the process of choosing the best candidate for the position of salesperson by the sales managers.

In Macedonia, Cvetkoska et al. (2014) have developed an AHP model for ranking of candidates for the position of Project Manager. The model consists of a goal (candidates’ ranking for the position of Project Manager); criteria (the following seven criteria that were chosen the most by the interviewees were selected [30 owners and/or managers of small and medium-sized enterprises]: education, specific work experience, level of English proficiency, PM Software usage skills, organization skills, analytical skills, and PMP Certificate); intensities of the criteria; and alternatives (the candidates who shall apply for this job position). In the existing literature there has not been found a paper with a research like ours, which means that this is an original research.

The largest wealth of a company are its employees because the intellectual capital can not be copied by the competition. Therefore, the selection of employees should not be based solely on intuition and experience, but it is necessary quantitative methods to be used, as well as models that will help managers to make
good decisions. In the AHP model that was developed in this paper, the knowledge of sales managers who are experts in sales is incorporated, and it will help companies to select the right people for the job position of salesperson.

The limitations of this study regard the small number of fully filled-in questionnaires by the sales managers, although our opinion is that there would have been no significant differences in the obtained results. Our future research will consist of distributing the questionnaire to sales managers in companies in the Balkan countries, and then we will include all European countries in order to develop a model that will be widely applicable.

References
Appendix 1: Questionnaire

Dear ____,

This survey is done with the aim of demonstrating via research to our present undergraduate students of the SS. Cyril and Methodius University in Skopje, Faculty of Economics-Skopje in Macedonia what sales means, and what they have to be prepared to do if they would like to become a part of it. Thus, we intend to help the companies improve their performance in sales, and in the future to employ salespeople who will be better prepared for the challenges that this profession entails. Since they are very knowledgeable about sales and can easily detect the advantages and disadvantages of this profession, the target group of this survey is sales managers. Your questionnaire answers will not be used separately, but as part of the statistics sample. We ask you to be honest when answering the following questions. Thank you in advance for your cooperation!

1. In what industry does the institution you represent belong to?
2. Position/function that you have:
3. Gender:  
   a) Male  
   b) Female
4. Age: ____ years
5. Level of education:  
   a) Vocational education  
   b) Higher education  
   c) MA  
   d) PhD  
   e) Don’t want to state
6. Your highest level of education is acquired in:  
   a) Macedonia  
   b) Abroad (state where):
7. Number of employees in the institution:
8. Number of employees in the sales sector:
9. Does the institution sell products and/or services, and of what type?
10. What market/s does the institution approach:
11. Does the institution have a higher number of sales in the duration of a month or it makes several sales a year with a higher value?
12. How does the institution sell its products/services? (you can circle more than one answer)  
   a) Telephone  
   b) Internet  
   c) Face-to-face  
   d) Outsourcing  
   e) Other (state):
13. How do you sell the products/services?
   a) The buyers visit the institution
   b) You visit your buyers
   c) Both

14. Does your institution have trainings for its employees?
   a) Yes
   b) No

If the answer to question 14 is positive, please answer question 15. If it is negative, proceed to question 16.

15. How are the sales trainings for the employees held? (you can circle more than one answer)
   a) By more experienced employees in the institution
   b) By trainers from outside the institution
   c) The employees attend trainings in Macedonia
   d) The employees attend trainings abroad

16. Do you attend trainings for the advancement of your knowledge and skills in sales in the duration of a calendar year?
   a) Yes  b) No

If the answer to question 16 is positive, please answer questions 17 and 18, and then proceed to the following questions. If it is negative, proceed to question 19.

17. How often in the duration of a calendar year do you attend trainings for advancement of your skills in sales?
   a) Once a year
   b) Twice a year
   c) Four times a year
   d) More than four times a year (state how many times):

18. The trainings that you attend are held in:
   a) Macedonia
   b) Abroad (state where):

19. How many years of experience do you have in sales:
   a) 1-5
   b) 6-10
   c) 11-16
   d) 16+

20. How have you done sales in your career? (you can circle more than one answer)
   a) Face-to-face
   b) Group presentations
   c) Via internet
   d) Via telephone
   e) Other (state):

21. What is the best way to do sales, according to you?

22. Since they are best acquainted with the market feedback, how often are the best salespeople included in the system of suggesting and bringing future decisions in the institution, from a tactical and/or strategic aspect?
   a) Never
   b) Rarely
   c) Frequently
   d) Almost always
23. How do you motivate the salespeople?
   a) Through rewards
   b) Through punishments (explain):

24. How are the salespeople in your institution paid?
   a) Fixed salary
   b) Sales commission
   c) Fixed salary plus commission
   d) They are given the chance to choose the model of payment

25. According to you, what is the best way to pay salespeople?

26. How are the sales managers in your institution paid?
   a) Fixed salary
   b) Personal and managerial sales commission
   c) Fixed salary plus personal and managerial commission
   d) They are given the chance to choose the model of payment

27. According to you, what is the best way to pay sales managers?

28. Regarding the managers from other sectors, how higher are the benefits for the sales
   manager, expressed in a higher salary or additional benefits?
   a) They have fewer benefits
   b) They are equal to the managers from other sectors
   c) They have more benefits

29. What kinds of additional benefits do the sales managers have after achieving or
   exceeding what was expected from them? (you can circle more than one answer)
   a) Trips abroad
   b) Physical rewards
   c) Training for the most successful managers
   d) Days off work
   e) They don’t have additional benefits
   f) Other (state them):

30. What kinds of additional benefits do the salespeople have after achieving or
   exceeding what was expected from them? (you can circle more than one answer)
   a) Trips abroad
   b) Physical rewards
   c) Training for the most successful salespeople
   d) Days off work
   e) They don’t have additional benefits
   f) Other (state them):

31. The advancement of the sales managers in their career is based on:
   a) Their experience
   b) Their success in sales

32. The advancement of the salespeople in their career is based on:
   a) Their experience
   b) Their success in sales

33. According to you, how much time is needed for the new salespeople to learn sales:
   a) Less than a year
   b) 1-2 years
   c) 2-3 years
   d) 3+ years
34. According to you, how much time is needed for the new salespeople to become experts in sales, who can also train future salespeople:
   a) 3 years
   b) 3-5 years
   c) 5-10 years
   d) 10+ years

35. According to you, what are the three biggest advantages and disadvantages that building a career in sales can bring about?

36. In order for those students who would like to build their career in the field of sales, to prepare for their first employment as salespeople, we ask you to grade the given criteria in the following table according to the importance that you give them when choosing a candidate for this position. You can give the same grade for different criteria. In addition, if there is any criterion that according to you is important but is not stated in the table, we ask you to add and grade it.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Grade of importance (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal education</td>
<td></td>
</tr>
<tr>
<td>Attended training in the required field of expertise</td>
<td></td>
</tr>
<tr>
<td>Attended training out of the required field of expertise</td>
<td></td>
</tr>
<tr>
<td>Previous working experience related to sales</td>
<td></td>
</tr>
<tr>
<td>Motivation of candidate</td>
<td></td>
</tr>
<tr>
<td>English proficiency</td>
<td></td>
</tr>
<tr>
<td>Knowledge of a foreign language other than English</td>
<td></td>
</tr>
<tr>
<td>Organizational skills</td>
<td></td>
</tr>
<tr>
<td>Communication skills</td>
<td></td>
</tr>
<tr>
<td>Negotiation skills</td>
<td></td>
</tr>
<tr>
<td>Computer skills</td>
<td></td>
</tr>
<tr>
<td>Time management</td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
</tr>
<tr>
<td>Integrity</td>
<td></td>
</tr>
<tr>
<td>Problem management</td>
<td></td>
</tr>
<tr>
<td>Vision for oneself</td>
<td></td>
</tr>
<tr>
<td>Change management</td>
<td></td>
</tr>
<tr>
<td>Self-discipline</td>
<td></td>
</tr>
<tr>
<td>Looks</td>
<td></td>
</tr>
<tr>
<td>Coming from an entrepreneurial family</td>
<td></td>
</tr>
<tr>
<td>Coming from a family that was involved in sales</td>
<td></td>
</tr>
<tr>
<td>Additional criteria</td>
<td></td>
</tr>
</tbody>
</table>

Thank you for your time in filling in this questionnaire.
Appendix 2: Matrixes of pairwise comparisons

Table 7
Matrix of pairwise comparisons of the intensities with respect to the criterion 2, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 2</th>
<th>Excellent</th>
<th>Average</th>
<th>Below average</th>
<th>Weak</th>
<th>Unsatisfactory</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>0.5028</td>
<td>1.0000</td>
</tr>
<tr>
<td>Average</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>0.2602</td>
<td>0.5175</td>
</tr>
<tr>
<td>Below average</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>0.1344</td>
<td>0.2672</td>
</tr>
<tr>
<td>Weak</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>3</td>
<td>0.0678</td>
<td>0.1348</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1/9</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1</td>
<td>0.0348</td>
<td>0.0693</td>
</tr>
<tr>
<td>C.I.</td>
<td>0.0607</td>
<td>C.R.</td>
<td>0.0546</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8
Matrix of pairwise comparisons of the intensities with respect to the criterion 3, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 3</th>
<th>A high degree</th>
<th>A low degree</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high degree</td>
<td>1</td>
<td>7</td>
<td>0.8750</td>
<td>1.0000</td>
</tr>
<tr>
<td>A low degree</td>
<td>1/7</td>
<td>1</td>
<td>0.1250</td>
<td>0.1429</td>
</tr>
<tr>
<td>C.I.</td>
<td>0</td>
<td>C.R.</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 9
Matrix of pairwise comparisons of the intensities with respect to the criterion 4, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 4</th>
<th>A high level</th>
<th>A low level</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high level</td>
<td>1</td>
<td>7</td>
<td>0.8750</td>
<td>1.0000</td>
</tr>
<tr>
<td>A low level</td>
<td>1/7</td>
<td>1</td>
<td>0.1250</td>
<td>0.1429</td>
</tr>
<tr>
<td>C.I.</td>
<td>0</td>
<td>C.R.</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 10
Matrix of pairwise comparisons of the intensities with respect to the criterion 5, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 5</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Weak</th>
<th>Unsatisfactory</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>0.4436</td>
<td>1.0000</td>
</tr>
<tr>
<td>Very good</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>0.2618</td>
<td>0.5902</td>
</tr>
<tr>
<td>Good</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0.1528</td>
<td>0.3445</td>
</tr>
<tr>
<td>Weak</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>0.0892</td>
<td>0.2010</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>0.0526</td>
<td>0.1186</td>
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<tr>
<td>C.I.</td>
<td>0.0070</td>
<td>C.R.</td>
<td>0.0063</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Table 11  
Matrix of pairwise comparisons of the intensities with respect to the criterion 7, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 7</th>
<th>A high level</th>
<th>A low level</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high level</td>
<td>1</td>
<td>7</td>
<td>0.8750</td>
<td>1.0000</td>
</tr>
<tr>
<td>A low level</td>
<td>1/7</td>
<td>1</td>
<td>0.1250</td>
<td>0.1429</td>
</tr>
</tbody>
</table>

C.I. = 0  C.R. = 0

Table 12  
Matrix of pairwise comparisons of the intensities with respect to the criterion 8, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 8</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Weak</th>
<th>Unsatisfactory</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>0.4436</td>
<td>1.0000</td>
</tr>
<tr>
<td>Very good</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>0.2618</td>
<td>0.5902</td>
</tr>
<tr>
<td>Good</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0.1528</td>
<td>0.3445</td>
</tr>
<tr>
<td>Weak</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>0.0892</td>
<td>0.2010</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>0.0526</td>
<td>0.1186</td>
</tr>
</tbody>
</table>

C.I. = 0.0070  C.R. = 0.0063

Table 13  
Matrix of pairwise comparisons of the intensities with respect to the criterion 9, priorities and idealized priorities

<table>
<thead>
<tr>
<th>Criterion 9</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Weak</th>
<th>Unsatisfactory</th>
<th>Priorities</th>
<th>Idealized Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>0.4436</td>
<td>1.0000</td>
</tr>
<tr>
<td>Very good</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>0.2618</td>
<td>0.5902</td>
</tr>
<tr>
<td>Good</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0.1528</td>
<td>0.3445</td>
</tr>
<tr>
<td>Weak</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>0.0892</td>
<td>0.2010</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>1/7</td>
<td>1/5</td>
<td>1/3</td>
<td>1/2</td>
<td>1</td>
<td>0.0526</td>
<td>0.1186</td>
</tr>
</tbody>
</table>

C.I. = 0.0070  C.R. = 0.0063
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Knowledge-cum-values Management belongs to the Way out from Global Crisis

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Abstract

Background: The contemporary world-wide socio-economic crisis tends to escalate and contribute to the global crisis. Limitation of education to one-sided ‘knowledge management’ rather than socially responsible ‘knowledge-cum-values management’ is one of the crisis’s causes. Objectives: The limitations to current knowledge management should be analyzed with systemic thinking. Which values are prevailing in it now and which values will enable the survival of humankind?

Methods/Approach: In the first part, literature is reviewed for analysis and conceptual generalization of knowledge management. The theoretical framework based on ‘system theory’, ‘knowledge management’ and ‘knowledge-cum-values management’, and ‘values of social responsibility’ is introduced. In the second part a new theoretical concept “A potential methodological support for human transition from one-sided to requisite holistic behavior via social responsibility” is discussed. Results: Knowledge management is a too narrow concept, it tends to leave aside human values, an impact on the natural environment, and extremely growing differences. Humankind needs consideration of responsibility, interdependence and holism in order to minimize detrimental impact of individual behaviour on society, i.e. humans and nature. Conclusions: The research indicates that individuals should attain more requisite holism, and should not be irrational by trying to attain only rationalism in human decision-making and action.

Keywords: knowledge-cum-values management, Dialectical Systems Theory, corporate social responsibility

JEL classification: M10

Paper type: Research article

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Introduction

People in life usually have multiple, but positively oriented goals: (i) to have and/or to be reliable partners both in business and labor relations; (ii) to prevent no expected cost; (iii) to act for the long-term and less selfish goals; (iv) to preserve your own, your children’s and your grandchildren’s natural preconditions of life, and others.
However, the most influential humans and organizations seem to choose the opposite: the arm race and related business generate huge profits, influencing large number of human losses and migrants. This means that some most influential actors do not take into account social responsibility, i.e.: holism, interdependence and responsibility, which the current humankind has chosen as the crucial preference by passing ISO 26000 (ISO, 2010) etc. (see e.g. Mulej et al., 2013d; Ženko et al., 2013a; Mulej et al., 2013a; Mulej et al., 2016; Mulej et al., 2014; etc.). Their knowledge might be very professional, but one-sided, if their values let them behave as they do, causing the recent world-wide socio-economic crisis from 2008 by promotion of monopolies under the label of free market.

On one hand humankind created United Nations in order to never repeat the terrible period with two world wars and the global depression between them (1914-1945). But the most influential persons and organizations have obviously forgotten about that and the L. v. Bertalanffy’s warning, that he expressed as creator of Systems Theory (right after that period that he had experienced WWII). He believed that the fate of the world depends from the possibility of adoption by humanity of a new set of values, which are based on the general systems Weltanschaung (= worldview). Bertalanffy wrote, that we are seeking another basic outlook of the world as organization (Davidson, 1983, quoted from: Elohim, 1999, in Mulej et al., 2013b).

Hence, humankind needs systemic requisite holistically behavior that includes thinking and feeling, reaching beyond the one-sided knowledge management. A clear case of an influential limitation to knowledge management: Mazour, Chumakov, and Gay (2003), defined the Globalization in the “Global Studies Encyclopedia”, : »Globalization is amalgamation of national economies into united world system based on rapid capital movement, new informational openness of the world, technological revolution, adherence of the developed industrialized countries to liberalization of the movement of goods and capital, communicational integration, planetary scientific revolution, international social movements, new means of transportation, telecommunication technologies and internationalized education«, (quoted from: Ečimović et al., 2016). – Humans and nature are not visible.

Knowledge management is a too narrow concept; it tends to leave aside human values and other emotions, impact over the humankind’s natural environment, the extremely growing differences (and their consequences, such as migrations around the world). The given situation requires transition to ‘knowledge-cum-values management’ exposing interdependence of these two crucial human attributes. The transition needs some bases, process and methodological support. They are briefed here.

We live in a globalized world. The above addressed dilemmas are open and crucial for survival in this world; the daily press is publishing the warnings, many wars are going on, migrants are around in tens of millions, millions are dying due to hunger, unhealthy water and air, nearly a hundred million people need international aid to survive; etc. There is as much knowledge around as never before. Obviously, it is too one-sided to cause good life. The research question hence reads: how can one link human knowledge and values to accomplish the requisite holism instead of the prevailing dangerous one-sided behavior.

As the research method we used in the first part analysis of literature for conceptual generalization. The theoretical framework is based on dialectical system theory as a methodology of requisite holism of interdisciplinary creative cooperation
in human work. The theoretical concepts of knowledge management and knowledge-cum-values management, importance of values, and social responsibility are introduced. In the second part a new theoretical concept “A potential methodological support for human transition from one-sided to requisite holistic behavior via social responsibility” is discussed.

**Literature review**

**Knowledge management and knowledge-cum-values management**

For methodological approach we have used conceptual generalization in the first part of research. The theoretical framework based on ‘system theory’, ‘knowledge management’ and ‘knowledge-cum-values’ management, values of social responsibility is introduced for the goal of this research. In the second part a new theoretical concept “A potential methodological support for human transition from one-sided to requisite holistic behavior via social responsibility” will be discussed.

Another modern idea the “new economy”, addressing economics of surviving and sustainable development of modern societies and their organizations does not address Knowledge-cum-Values either (Leydesdorff, 2006; Carayannis et al., 2009; Howkins, 2001; Dubina et al., 2012; Leiponen et al., 2010; Korten, 2009; Lafley et al., 2010; Ralston et al., 2011; Ralston et alii, 2014). Closer might be discussions regarding the importance of knowledge and education for necessary reliance of intellectual capabilities for development of knowledge-intensive activities (Drucker, 1969; Powell et al., 2004; Mandel et al., 2016). Several authors expose importance of co-evolution between knowledge, innovation and creativity (Peterman et al., 2003; Carayannis et al., 2014; Potočan et al., 2014; Rašič, 2015; Zore, 2015).

Similarly, management studies about utilization of “new economy” in organizations do not address knowledge-cum-values (Teece, 1998; Botsaris et al., 2016; Kaufman, 2015). Researches rather emphasized importance of the “developers of knowledge” for economic growth and welfare of society (Drucker, 1969; Carayannis et al., 2009; Tidd et al., 2009; Carayannis et al., 2014; Kuratko, 2016). But Camelo-Ordaz et al. (2012) exposed influence of entrepreneurs’ demographic attributes and human values about innovation success in creative small firms.

**The role of values in the human work process**

The work process makes humans differ from other living beings. It requires and develops rational behavior for humans to survive, but life shows the rational and irrational human attributes’ interdependence, like right and left part of brain, in management of human activities. In Mulej’s ‘Dialectical Systems Theory’ as a methodology to support the requisite holistic behavior this process is summarized as shown in Table 1.
Table 1
The law of hierarchy of succession and interdependence, applied to the work procedure in general

→ External influences, preconditions, circumstances + ones’ own knowledge-cum-values →

→ Perceived influences, preconditions and circumstances →

→ Definition and development of starting points as requisitely holistic system →

<table>
<thead>
<tr>
<th>The external starting points, part 1: objective / outer needs</th>
<th>The subjective starting points for the given case: ↔</th>
</tr>
</thead>
<tbody>
<tr>
<td>↔ The subjective starting points for the given case: ↔</td>
<td>The external starting points, part 2: objective / outer possibilities</td>
</tr>
<tr>
<td>1. Values and other emotions (what for? preference)</td>
<td></td>
</tr>
<tr>
<td>2. Knowledge on contents of what &amp; why?</td>
<td></td>
</tr>
<tr>
<td>3. Knowledge on methods of how &amp; why?</td>
<td></td>
</tr>
<tr>
<td>4. Talents</td>
<td></td>
</tr>
</tbody>
</table>

The dialectical system of essential viewpoints →

→ The selected viewpoint/s →

→ Selection of the perceived objective need & perceived objective possibilities →

→ Selection of preferential needs & corresponding possibilities →

→ Definition of well, i.e. requisitely holistically grounded, not merely desired! objectives/goals: What do we want (with good reason/s)? →

→ Definition of tasks system/s: What do we have to do in order to attain objectives/goals? →

→ Definition of work procedures for every task: How must we proceed to perform? →

→ Operation: performing all the tasks according to the procedures prescribed/foreseen →

→ Results comparable to tasks, each of them contributing to attainment of objectives/goals →

→ Influence over the foregoing phases of the process where needed (returning to the beginning of the entire process or to a phase of it) →

Source: Authors’ illustration prepared and updated from (Mulej, 1979 and 2013)

Table 2 summarizes how values of the influential person become more or less general and direct the human practical behavior (Mulej et al., 2009, Mulej et al., 2013a, Ženko et al., 2013b).

Table 2
Interdependence of values, culture, ethics, and norms

<table>
<thead>
<tr>
<th>Individual with knowledge interdependent values</th>
<th>Culture as values shared by many</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑</td>
<td>↔</td>
</tr>
</tbody>
</table>

Norms as prescribed ethics about right and wrong in a social group ← Ethics as prevailing culture about right and wrong in a social group

Source: Authors’ illustration
The point of consideration of knowledge-cum-values management instead of knowledge management lies in the necessary transition from one-sided consideration of humans to the requisitely holistic one, which prevents the crucial oversights better than a one-sided one, while a real, i.e. total holism cannot be reached.

In practice, values are very crucial: they do depend on knowledge, but they also influence knowledge, all the way to the selection for which purpose a given knowledge is applied.

**Dialectical Systems Theory**

Dialectical Systems Theory (DST) matches criteria of requisite holism (Mulej et al., 2013a). The three relations in DST are: (i) The law of requisite holism, (ii) The law of entropy, and (iii) The law of hierarchy of succession and interdependence.

The three elements in DST are: (i) The ten guidelines defining the subjective starting points (values and other emotions, knowledge on contents, and knowledge on methods, as a dialectical system) aimed at making humans go for creativity and holism rather than for routine-loving and one-sided behavior; (ii) The ten guidelines on assuring the agreed policy to survive in later steps of the working process (in which several more narrowly specialized and routine-loving persons normally enter the stage); and (iii) A methodology of creative cooperation aimed at making DST viable in the daily practice as an informal systems-thinking by a shared framework programming and executing of the human creative activities (e.g., our own method called USOMID in Slovene acronym).

**Adam Smith as the crucial author of the economic theory**

Adam Smith wrote the “Theory of Moral Sentiments” (1759) first and later on his book “An Inquiry into the Nature and Causes of the Wealth of Nations” (1776). He was a professor of ethics and moral and presumed that ethics of altruism would help people to overcome their natural selfishness, which makes them forget solidarity and interdependence, if they experience that narrow individualism might help them better than solidarity.

Even today many people consider altruism less appealing. But today we can replace it, in the very competitive business world with values culture ethics and norms (VCEN) of interdependence. In practical life we can recognize it as creditworthiness and trustworthiness and credibility and reliability – for clear economic reasons (Ženko et al., 2013b).

Adam Smith’s ‘invisible hand’ does not express one-sidedness of the business partners: reliable partners keep their partners, who return again and again to do business and generate profit with relatively low cost and effort that is smaller than the effort to find new high-quality employees, suppliers, buyers and other partners, than the strikes, the illness, the poor productivity, or absenteeism, presentism, consequences of monopolies, both on the part of governments and enterprises, etc.

They behave in interdependence and with long-term views, e.g. in customer fidelity.

**Discussion**

**Reflection of the above findings in social responsibility**

Systems theory has many versions (François, 2004). Many of system theories consider only selected parts of reality from their selected viewpoints. Thus, many of them, although useful and beneficial, deviate from the basic difference of systems theory.
and cybernetics from the traditional sciences and practices: to fill in the gap in human knowledge and values resulting from oversights caused by over-specialization and lack of inter-disciplinary creative cooperation (Bertalanffy, 1951/1968, edition 1979; Wiener, 1948, edition 1985). Thus, creative cooperation leads toward the requisite holism as the solution for humankind to never repeat the world wars and big recession of 1914-1945. Now, a similar dangerous crisis is here, as the daily press reports. Solution requires requisitely holistic management of human knowledge and values.

In order to overcome the present global social and economic crisis, humankind must overcome two types of crisis: (1) oversights due to the narrowly specialized and poorly cooperating persons' non-systemic behavior and its management; (2) over-specialization inside systems theory and cybernetics causing fictitiously systemic behavior and its management.

For four decades, we have been offering a solution by Mulej’s Dialectical Systems Theory (Mulej, 1974; Mulej et al., 2013; many publications between them and latter) with many thousands of successful cases of applications. Though, our cases were more often local than global.

Now, a new solution is offered on the worldwide level: (corporate) social responsibility that supports systemic behavior (not thinking only), informally (ISO 26000 standard, by ISO, 2010); it covers all topics of human activity and exposes seven principles of systemic behavior.

ISO standard 26000 (ISO, 2010) includes the requirement of a holistic approach, which is based on interdependence. This standard includes seven content areas: (1) organization, management and governance, (2) human rights, (3) labor practices, (4) environment, (5) fair operating practices, (6) consumer issues, and (7) community involvement and development.

This requirement of holistic approach in this standard is supported by the seven principles: A. Accountability, B. Transparency, C. Ethical behavior, D. Respect for stakeholder interests, E. Respect for the rule of law, F. Respect for international norms of behavior, and G. Respect for human rights (ISO 2010: 10-14).

European Union (2011) supports social responsibility as responsibility of an individual for her/his impact over society. European Union recommends its member states and enterprises to be role models and act socially responsible. All these contents link two crucial terms from the (Dialectical) Systems Theory: interdependence, and holism. They crucially change the prevailing current VCEN practices.

Obviously, an innovation of values by knowledge-cum-values management is demanded. It should receive methodologically support.

A potential methodological support for human transition from one-sided to requisitely holistic behavior via social responsibility

With social responsibility VCEN become important for companies not only since they are required by regulations and laws, but because they recognize their competitive advantage with their more requisitely holistic business. Methodologically, we have selected and combined two methods for creative thinking and decision making: The Six Thinking Hats of De Bono and USOMID as summarized in Table 4. De Bono’s methods for ‘parallel thinking’ and method ‘Six Thinking Hats’ support lateral way of thinking and cooperative behavior (De Bono, 2005, 2006, 2015).

Six thinking hats have each a different color that represents a different way of thinking. They should be applied in phases. All participants use the same hat at the
same time in the same phase, and then all switch to another hat and a new way of thinking. First blue hat encourages thinking about organization, control of the process, discipline. Questions are what topic to discuss, what we want to achieve… Next can be white (neutral) hat encouraging objective facts, information about what is known with no interpretation. Red hat allows expressing feelings, emotions, views, intuition without explaining why, or justification. Yellow hat encourages optimistic thinking, search for benefits, advantages of proposals, search for implementation ways, constructive approach. Black hat allows negative thoughts, being cautious, expressing doubt, weak points, critique, potential problems, disadvantages, negative sides. Green hat represents energy and encourages novelty, creation, ideas, alternatives, possibilities to solve all problems. The end blue hat includes reading of results, necessary conclusions.

They can help governors and managers to run their region and organizations with requisite holism and hence successfully (see Mulej et al., 2013a, for details and references).

Table 4
Synergy of USOMID/SREDIM and Six Thinking Hats methodologies in procedure of USOMID

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>USOMID Phases</td>
<td>1. Select problem / opportunity to work on in an USOMID circle</td>
<td>All 6 hats</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
<tr>
<td></td>
<td>2. Record data about the selected topic (no ‘Why’)</td>
<td>White hat</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
<tr>
<td></td>
<td>3. Evaluate recorded data on the topic (‘Why is central’)</td>
<td>White hat</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
<tr>
<td></td>
<td>4. Determine and develop chosen solution/s to the topic</td>
<td>White hat</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
<tr>
<td></td>
<td>5. Implement chosen solution to the topic in reality</td>
<td>White hat</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
<tr>
<td></td>
<td>6. Maintain implemented solution for a requisite long term</td>
<td>White hat</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
<td>All 6 hats, red, black, yellow, green first of all</td>
</tr>
</tbody>
</table>

Source: Authors’ illustration, quoted for brief clarification (Mulej et al., 2013a)

A brief comment: there are six phases of the human work processes. For the requisite holism creative cooperation is necessary in all six phases. These two facts show the process as a table with 24 work steps. The application of the ‘six thinking hats method’ in every one of them can improve the efficiency of the process very
much, experience says. It also helps the team members apply ‘knowledge-cum-values’ rather than the too narrow knowledge management.

Concluding remarks

Values and other emotions are normal human attributes, but the economic theory, except Adam Smith who was a professor of moral and ethic, tends to oversimplify its models by averages and by leaving values and emotions aside (see also: Piketty, 2015, p. 30). The literature on management theory is hardly more realistic by limiting itself to ‘knowledge management’ rather than the concept of ‘knowledge-cum-values management’. Knowledge management is a too narrow concept; it tends to leave aside human values, impact over the natural environment, and extremely growing differences. Humankind needs consideration of responsibility, interdependence and holism in order to minimize one’s detrimental impact over society, i.e. humans and nature.

To our research question: how can one link human knowledge and values to attain the requisite holism instead of the dangerous one-sidedness we have found that we can develop into applying more knowledge-cum-values management. A realistic approach requires consideration of Mulej’s ‘Dialectical Systems Theory’ that has been applied in several thousand cases, or, maybe even better, the ‘(Corporate) Social Responsibility’ that is an informal way to the same goal: the requisitely holistic behavior, based on VCEN of interdependence, supported with the seven social responsibility principles from ISO 26000 and the methods of creative cooperation, like Mulej’s USOMID and De Bono’s ‘parallel thinking’ with ‘Six Thinking Hats’ attaining lateral thinking and cooperative behavior.

References


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New Banks’ Business – Rating Competence for the Real Sector

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Abstract

Background: The global financial crisis has revealed the urgency of changes in the business models of banks around the world. Due to rising regulatory costs and the effects of the low-interest rate phase, the revenue of banking sector is under pressure. Banks have to generate new sources of revenue. A conceivable externalization of bank internal rating data is appropriate. This available knowledge has a potential to generate new business potentials. Objectives: The goal of this paper is to compare the procurement of internal ratings by credit institutions and the supplier evaluation, particularly regarding the assessment of their financial capacity, as well as the identification of potential interfaces. Methods/Approach: The methods used in the research included an example-oriented presentation and an analysis of indicator systems aimed at assessing the financial soundness within the internal rating by credit institutions and the supplier evaluation. Results: Results show the intersections between the two evaluation systems. Conclusions: Despite the determination of evaluation results by their objective function, apparently significant trends of financial (dis)soundness can be recognized as a part of the two evaluating systems. This result provides starting points to initiate the discussion about a possible (partial) externalisation of internal ratings by credit institutions to be used for the supplier evaluation.

Keywords: business models, revenue, internal rating by banks, supplier evaluation
JEL classification: G21, G24, G28
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Introduction

The financial crisis starting in 2007/2008 rapidly spread around the world. The US government was urged to bail out several large financial institutions. Following suit, a number of European banks also failed and stock markets declined across the board (Kudrna, 2012). Thus, the financial crisis resulted in a global banking crisis that culminated in the European debt crisis. Therefore, the global banking sector was
affected in various ways. The regulating authorities put several new measures, provisions and rules. As a lesson learned, one central task should be strengthening the resilience of the financial system to future crises. In this context, a new global regulatory framework for more resilient banks and banking systems (Basel III) was implemented by legislators. The implementation at European level will be carried out through two legal acts, together called the CRD IV package. Basel III concerning higher capital requirements for banks. In addition to the quantity and quality improvement of own funds, banks must introduce a supplementary non-risk based capital ratio to restrict leverage in the banking system, higher risk weights for certain risk positions and harmonized liquidity requirements (Hartmann-Wendels, 2013). The regulatory offensive of supervisors and legislators will continue to push the regulatory costs high for a long time (Wöhler, 2015). Thus, entire banking business sectors are losing their appeal, especially in investment banking (Maisch, 2014).

In the aftermath of the financial crisis, the economy experienced historically low levels of interest rates because of monetary policy. This is based on extremely central bank intervention, with which they are trying to boost economic growth worldwide. Relating to this case, there is no end in sight: the ongoing low-interest phase will obviously continue to provide customers, banks and governments with major challenges.

The global banking sector has made various progress over the past years towards stabilizing after the financial crisis. Banks have launched numerous initiatives to improve capital efficiency, revenues, and costs (McKinsey & Company, 2016). However, also furthermore banks will face major challenges during these times. Particularly, the challenges for a sound earning situation may continue to increase. Hence, the business model of many banks will change presumptively. In addition to the fundamental demand for banking services, new alternative sources of revenue will have to be taken (The Economist, 2015).

Starting from these considerations, it seems to be beneficial for banks to detect the existing potential in their business activity to gain new revenues. Banks are typically assigned the economic task of transforming terms and credit risks. This task has made internal ratings in the credit business a core function of banks (Bieg et al., 2011). It seems conceivable, under certain conditions, that this knowledge could be used to take new alternative sources of revenue. Therefore, in a fundamental approach this paper discusses the question whether internal ratings by credit institutions can add value to real sector companies’ evaluating their suppliers. Emphasis is put on the assessment of financial capacity also by identification of potential interfaces.

**Literature review**

**Internal Ratings by Banks**

With the introduction of the Basel framework regarding equity recommendations for banks (Basel II; now replaced by Basel III), they were required to systematically assess their credit risks for the first time. According to the rules of the CRD IV package, the systematic evaluation of credit risks can be based on two different approaches: a credit risk standardised approach (SA) based on external ratings or an internal-ratings-based approach (IRBA). Banks that use the IRB approach determine the default risk at the level of individual credit and borrowers, and make their lending decisions based on this (Meeh-Bunse et al., 2012). Thus, rating systems are mandatory by using the IRB-approach. The regulatory minimum requirements require i.a. an annual actualization of the rating. If new material information is available
concerning the borrower, the rating is to be updated ad-hoc (Meeh-Bunse et al., 2012). The basis of each credit rating is a reliable database. This is fed essentially by the annual financial data of the borrowers. Borrowers have to provide this data annually (respectively during the period) to the banks. So it is for banks possible to gain a comprehensive overview of the financial strength of their borrowers by internal rating.

**Supplier Evaluation**

Due to the increasingly close integration of suppliers in the companies’ production processes (Kraljic, 1983; Ellram, 1990; Ellram et al., 2014), it is natural to assign a central role to the identification, evaluation and selection of the “right” potential or already established suppliers (De Boer et al., 2001). Various scientific publications have reported that there are benefits to a systematic approach to supplier selection (such as Weber et al., 1991; Vonderembse et al., 1999). Suppliers are thus increasingly subject to a review of their holistic performance as suppliers (Hirakubo et al., 1998). The relevance of evaluating financial performance is more and more emphasised in this context (Min, 1994; Simpson et al., 2002). Arnolds et al. (2012) state that solvent companies are better able to guarantee a timely and continuous supply of products of an assured quality, contingent on the necessary investments, product improvements and developments. In addition, financially sound suppliers with high profits are more likely to reduce their price than marginal sellers. Using the automotive supply companies “Peguform” and “Delphi” as examples, Schneck (2006) describes the potential danger of financially weak suppliers filing for bankruptcy. This would also threaten internal fulfilment of demand.

These findings have led to situations in which (potential) suppliers are increasingly being required to prove to the assessing company that they are financially sound. Traditionally, this has only been done in the context of internal ratings by banks or rating agencies.

**Intersections between Supplier Evaluations and Internal Ratings by Banks**

The assessment of financial soundness as a feature of the internal ratings by banks and the supplier performance are, among other things, generated on the basis of annual financial data. This qualitative analysis should make it possible to develop, based on previous business performance, forecasts or trend predictions for the future, or uncover relevant opportunities and potential risks. This quantitative information is complemented by qualitative criteria. The analysis of the qualitative evaluation criteria involves, among others things, assessing management quality, evaluating competitiveness, succession planning, etc. It seems almost impossible to objectively compare qualitative data. Therefore, in the authors’ view, the focus of the evaluations is on the analysis of qualitative criteria. Depending on the direction of the evaluations, the financial statements are viewed from different perspectives in order to gain an impression of the liquidity, market success, cost structure and other factors. The resulting reporting makes use of company performance indicators.

The authors begin from the fact that despite the determination of the evaluation results by their target function, it is possible to detect significant trends of financial (un)soundness, both in the context of supplier evaluations and the context of internal ratings of credit institutes. From this, the authors develop the hypothesis that the internal ratings by banks can make statements that are relevant for supplier
evaluation. The evaluating systems for the internal ratings systems by banks and the 
supplier evaluation of financial soundness should therefore be compared.

Methodology
To verify the hypothesis presented, the authors draw on example-oriented 
descriptions and the analysis of selected indicator systems to evaluate financial 
performance in the context of the internal ratings by banks and the supplier 
evaluation. This formally descriptive and comparative perspective takes to a 
profound insight into the complexity of the object of investigation. It allows 
recognizing the individuality of each example sharply. With this approach, i.a. the 
profiled illustrate situations and problems as well as detecting patterns are brought 
into interrelated

For this purpose, the authors renounced a comprehensive quantitative 
evaluation. However, we make use of two representative examples for both 
evaluation systems. The underlying examples of this paper were selected on the 
basis of an appropriate literature review. It became clear that comprehensive 
supplier evaluation systems operational in companies are hardly published. In this 
context, we default to a sound example on the basis of our literature review. For the 
purpose of comparison with an internal rating system applied by banks, we refer to 
the internal rating system of the German Association of Savings Banks (Sparkassen 
Verband), as one of the market leaders in Germany. Both presented rating systems 
concern a compilation of established covenants. These covenants can be largely 
derived from the company’s annual financial data. For reasons of clarity and 
comprehensibility we make use of four main comparison groups in order to assign 
the covenants.

Results
A comparison of the criteria and performance indicator systems for assessing the 
financial performance of a company between the internal rating systems by banks 
and the supplier evaluation hints at three issues in particular (Table 1).

First, it can be stated that analysing annual financial statements, notwithstanding 
the criticism of their ex-post analysis, plays an important role for both methods. The 
annual financial statement analysis allows an objective assessment of a company’s 
finances on a regular basis, since the information used mainly originates from the 
company’s (audited) financial statements. Evaluation is usually automated. Thus, it 
should ordinarily be possible to reconstruct the results at any time. So the data from 
the annual financial statements seems to be appropriate to compare the 
procurement of internal ratings by credit institutions and the procurement of the 
supplier evaluation. This rational is in particular regarding the assessment of the 
suppliers’ financial capacity, and, as well as the identification of potential interfaces.

Second, it can be shown that both methods of financial statement analysis 
depicted have a basic congruence. Both methods make use of tried and tested 
indicator systems that involve an analysis of the income, financing, liquidity, and 
statement of financial position ratios. The calculation of the respective ratios 
apparently largely occurs in an overlapping manner. Their results are evidently 
correlated.

Third, when comparing the evaluation procedures, it is important to always bear 
in mind that they are determined by their respective target functions. Banks’ internal 
rating procedures serve to systematically evaluate default risks to determine
regulatory capital requirements and calculate internal risk costs. The determination of financial performance as a touchstone for evaluating supplier performance should provide information on the (potential) benefits and risks of a long-term customer-supplier relationship. The available knowledge could on the benefit side help to generate new business potentials. The diverging target functions of the evaluation process are likely reflected in the actual selection, weighting and scope of the indicators used. To make more specific statements in this regard, there is a need for further empirical research. These results confirm the initially formulated hypothesis.

Table 1
Comparison of the key indicator systems in the context of the internal ratings using the example of the German Association of Savings Banks (Sparkassen Verband) and a supplier evaluation

<table>
<thead>
<tr>
<th>Key performance indicators</th>
<th>Internal Ratings by Banks</th>
<th>Supplier Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on capital</td>
<td>Net income</td>
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<tr>
<td>Return on sales</td>
<td>Return on sales</td>
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<tr>
<td>Operating profitability</td>
<td>Return on equity</td>
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<tr>
<td>Cash flow rate</td>
<td>Return on assets</td>
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<tr>
<td>Gross profit rate</td>
<td>Operating profit (EBIT)</td>
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<td>Personnel expense ratio</td>
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<td>Depreciation rate</td>
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<tr>
<td>Rental expense ratio</td>
<td>Rental expense ratio</td>
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<tr>
<td>Interest expense ratio</td>
<td>Interest expense ratio</td>
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<tr>
<td>Turnover per employee</td>
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<td>Per-capita income</td>
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<thead>
<tr>
<th>Financing and liquidity ratios</th>
<th>Internal Ratings by Banks</th>
<th>Supplier Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset coverage</td>
<td>Cash flow</td>
<td></td>
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<tr>
<td>Short-term liquidity</td>
<td>Days payable outstanding</td>
<td></td>
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<tr>
<td>Dyn. debt ratio</td>
<td>Dyn. operating profit</td>
<td></td>
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<tr>
<td>Days sales outstanding</td>
<td>3rd degree liquidity</td>
<td></td>
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<tr>
<td>Days payable outstanding in days</td>
<td>Capital commitment</td>
<td></td>
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<tr>
<td>Storage time in days</td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Balance sheet key figures</th>
<th>Internal Ratings by Banks</th>
<th>Supplier Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity ratio</td>
<td>Equity ratio</td>
<td></td>
</tr>
<tr>
<td>Short term debt</td>
<td>Equity to fixed assets ratio</td>
<td></td>
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<tr>
<td>Capitalisation ratio</td>
<td>Stock index number</td>
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<td></td>
<td>Storage time</td>
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</table>

<table>
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<tr>
<th>Other key figures</th>
<th>Internal Ratings by Banks</th>
<th>Supplier Evaluation</th>
</tr>
</thead>
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<tr>
<td>Total capital turnover</td>
<td></td>
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<tr>
<td>Investment rate</td>
<td></td>
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<tr>
<td>Depreciation on fixed assets</td>
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<td>Self-financing ratio</td>
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Source: based on Disselkamp et. al. (2004), Gleißner et al. (2014)

Discussion
The deduced existence of intersections between the described methods for evaluating companies’ financial performance prompts the question of whether a (partial) externalisation of the information on internal ratings developed by banks could be valuable for evaluating companies when rating suppliers. As outlined above, comprehensive supplier evaluation systems operational in companies are little revealed. This aspect limits the study. Future empirical research is deemed necessary on application of comprehensive supplier evaluation system. Following this, another alignment should ensue to test our hypothesis. Furthermore, the study is
limited by the tested key indicator systems. Thus, the underlying tested indicator systems should be subject of further empirical research. It should be analysed whether the tested indicator systems should be modified, expanded or concentrated. Some sources even take into question sensibility of financial reporting data at all under a digitalized environment (Deloitte, 2014).

Moreover, it is open to discussion whether a (partial) externalisation could provide added value for the companies being assessed, the suppliers. First, it is important to consider that the relevance and fundamental congruence of the evaluation processes presented here were merely based on the analysis of the financial statements. Qualitative criteria may have to be left out of consideration, because of the absence of established guidelines that make them measurable. A discussion of a possible externalisation of internal ratings by banks can therefore only be suggested for the sub-area of quantitative criteria. In consequence, additional questions are ignored in the context of this article.

However, it is not just the company’s point of view that the advantage of the externalization of bank-internal rating data is appropriate. The credit institutions themselves can also benefit. With bank-internal ratings, a corresponding knowledge is available, which can be used to generate new business and hence profit potentials. Differing to rating agencies, banks have to make credit ratings as part of the credit allocation process (risk measurement using the IRB-approach). The idea of externalising these bank-internal rating data needs to be analysed and discussed politically. This would require a rating network in which the necessary data is bundled and reprocessed. For this purpose, the credit institutions could pass on their internal rating data to an association entrusted with such task. If a corporate costumer now needs the necessary credit information on a supplier, he pays a fee to the credit rating association or the corresponding credit institution that provided the information. It is important in this context that the rating data of different banks are standardized in the rating association. A uniform database and the resulting credit rating are necessary. With this idea, credit institutions could generate new business segments and a common data pool of the bank-internal ratings would reduce the dependency of the oligopolistic structured rating market (Meeh-Bunse et al., 2014).

Via a possible externalisation of processed and condensed information from the analysis of financial statements by banks, one could, in the view of the authors, undoubtedly make statements about the basic financial soundness of the rated companies. With respect to the evaluating company, this would mean that it would not need to have a corresponding capacity to evaluate a supplier’s financial performance within the company. This would particularly benefit SMEs, since they can hardly have adequate capacity available on a regular basis and are hardly in a position to create it. This resource-saving effect is likely to be directly measurable in monetary terms. At the same time, it is important to consider that the suppliers could also benefit from an externalisation. One supposable form of shaping could be a certification function that makes transparent previously proven solidity and allows for more advanced forecasting on this basis. In the context of the supplier-customer relationship, this “certified” credit rating could also, for example, strengthen the negotiating position with suppliers and corporate customers. A diversification of credit ratings into demand-oriented ratings on basis of individual corporate customers demands is also conceivable. In contrast to established service providers offering information about the financial health of companies (suppliers), the decisive
difference is the reliability of this information as they are less supported by industry regulation.

**Conclusion**

This paper identified the intersections between the analysed evaluating systems by showing the two indicator-based systems for evaluating financial performance in the context of supplier evaluation and bank ratings. Despite the determination of the results by their target function, significant trends of financial (un)soundness can seemingly be identified. The results found here support the hypothesis that the internal ratings by banks can make statements relevant for supplier evaluation.

Previous research treated the evaluation systems independently. Here, the attempt was made to relate both systems to one another and to generate practical benefit. Considering the importance of information on the (potential) benefits and risks of a long-term customer-supplier relationship, the determination of financial performance for evaluating supplier performance increases. The existing knowledge relating to their customers financial performance available within banks may be a sustainable new alternative sources of revenue for them. By using the banks’ so far internal knowhow about financial performance, the assessing companies could reduce costs in their own evaluation while the same time increasing quality and applicability. The profit situation of both banks and assessing companies could be affected positive.

A possible (partial) outsourcing of internal ratings by banks in the authors’ view create benefit for the evaluating and the evaluated companies as well as for the banks. Hence, the economic system would experience a stabilizing impact taking a holistically effect.

**References**


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Corporate social responsibility and stakeholders: Review of the last decade (2006-2015)

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Abstract

Background: Globalization, strong development of information-communication technologies and the emergence of new burning challenges for the global communities enabled the concept of corporate social responsibility to be perceived as a business model that allows for successful differentiation of companies, as well creating sustainable competitive advantage. Objective: The goal of the paper is to offer a short overview of the role of internal and external stakeholders within the concept of corporate social responsibility and point out the importance of quality relationships between the company and its stakeholders with the aim of improving the standard of living of all community members. Methods/approach: The paper is based on a systematic analysis of previously published relevant international scientific papers in the field of corporate social responsibility, stakeholder theory and information-communication technologies. Results: This paper demonstrates that the concept of corporate social responsibility has gone, in its several decades of existence, from the “unnecessary dependency” phase to the critical business model phase. Conclusions: As there is a natural connection between the concept of corporate social responsibility and the stakeholders, it can be concluded that the quality of the relationship between the company and its stakeholders represents a key factor that affects the success of the company in its notion of differentiating itself from competitors and creating sustainable competitive advantage.

Keywords: corporate social responsibility, stakeholders, information-communication technologies, differentiation

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Introduction

The modern world presents many different and burning challenges to the entire population of the world, as well as profit and non-profit organizations every day. The neglect of set challenges can lead to societal, economic, ecological and cultural catastrophes and change the global picture of society as we know it. In everyday
life of undeveloped, but also developed economies, demands of community members, non-governmental organizations and government and regulative bodies for individual and organizational corporate social responsibility in the context of finding solutions to present challenges, but also to the heavy inequality of distribution of goods which developed as a consequence of the exclusive effects of market forces, are increasingly present (Bird et al., 2007). The increase of stakeholder concern for societal and environmental challenges has caused the emergence of the concept of corporate social responsibility in the 1950s as well as its strong development within scientific and business circles from 1960 onwards. As strong development continues even to this day, the complexity of the concept itself increases with equal dynamic (Brammer et al., 2012). Carroll and Shabana (2010) point out that the concept of corporate social responsibility represents an encompassing framework of different concepts that study the relationship of companies and the community in which the company operates, regardless of whether the community is local, national or global. Because the concept is highly complex, there is no unanimously accepted definition of the concept of corporate social responsibility to this day, so it is interpreted differently within the global economic network, and often by different groups of stakeholders (Dahlsrud, 2010). Even though the concept is highly complex, it also undoubtedly possesses a clear strategic determinant and represents an inseparable part of the business model of modern global corporations throughout the world today (Nielsen, Thomson, 2009).

By adequate governance of the concept of corporate social responsibility, the management can achieve better financial results and at the same time improve the community in which it operates by increasing the standard of living of the company's internal and external stakeholders (Du et al., 2011). In the late 1970s, Carroll (1979), one of the pioneers and leading global theorists of corporate social responsibility, presented the concept of corporate social responsibility that is based on: (i) economic responsibility; (ii) legal responsibility; (iii) ethical responsibility and (iii) philanthropic responsibility. By implementing the concept of corporate social responsibility, management can ensure that business operations adhere to legal regulations and economic standards, all with the goal of building higher quality relationships with stakeholders (Piacentini et al., 2000). As it is in the nature of the concept of corporate social responsibility to conduct business within legal regulations, it can be concluded that conducting and communicating the concept of corporate social responsibility is mostly of voluntary character (Wettstein, 2009). All presented definitions of corporate social responsibility are based on the idea that emphasizes the fact that management of the company should take into account all internal and external stakeholder expectations while developing the corporate social responsibility strategy and the strategy of the company (Saedi et al., 2015).

In the context of the connection between the concept of corporate social responsibility and the company stakeholders, it can be concluded that the concept of corporate social responsibility developed from stakeholder theory (Pirsch et al., 2007). Even though Freeman developed the foundations of the theory, Ansoff was the first to use the term stakeholder theory in 1965 (Roberts, 1992). Stakeholder theory rests on the idea that sustainability and success of a business depend on the success of the organization's management in achieving economic and societal goals through fulfilling the needs of key groups of internal and external company stakeholders (Pirsch et al., 2007). As per the stakeholder theory, Freeman (1984) described the company stakeholders as groups or individuals who are under the influence of business activities or who can influence the business operations of a
company and fulfilment strategic goals. He pointed out that the shareholders, employees, consumers, suppliers, financial institutions, non-government groups and government institutions were the most important stakeholders of an organization (Freeman, 1984). Ullmann (1985) highlights three key factors that affect the relationship between a company and a certain group of stakeholders: (i) the power of the stakeholders, (ii) strategic orientation of management towards the concept of corporate social responsibility and (iii) former and present financial results of the company. The importance of certain groups of internal and external stakeholders for the business operations of the company changes frequently and depends on the phases of the business operations, as well as characteristics of the market and the community (Jawahar, McLaughlin, 2001).

The concept of corporate social responsibility, in times when social values change rapidly, can present the means of bringing together organizational values and values of the stakeholders. The prerequisite for the success of such a process of convergence is including the interest of the stakeholders in the socially responsible strategy that presents a key segment of the business strategy of an ever-greater number of companies (Saeed, Arshad, 2012). Within the concept of corporate social responsibility, stakeholders are portrayed as groups of persons towards whom the company's business and socially responsible activities are oriented. Today, it is almost impossible to discuss the concept of corporate social responsibility without taking note of the stakeholders of the company (Sun et al., 2010). A quality and strong relationship with stakeholders increases competitiveness because it directly improves the reputation of the company through perception of the stakeholders. Key stakeholders determine the conditions in which the company does business by creating opportunities and threats for survival and growth. For this reason, while developing strategy the management must encompass the needs, interests and motives of key stakeholders as per the concept of corporate social responsibility (Rosinka-Bukowska, Penc-Pietrzak, 2015). The quality of the corporate social responsibility strategy, and as a consequence the generation of financial and non-financial benefits from conducting and communicating socially responsible activities, depends directly on the success of filtering ideas and guidelines geared towards the company by the key groups of stakeholders in the communication process (Frostenson et al. 2011). Based on the aforementioned, it is concluded that there is a link between the idea of socially responsible business operations and the stakeholders of every company (Godfrey et al., 2009).

**Literature review**

**Corporate social responsibility**

Today, more so than ever before, companies implement socially responsible activities in order to ensure the survival of the global society as we know it today, all the while ensuring the sustainability and prosperity of their own business operations (Skarmeas, Leonidou, 2013). Even though the concept of corporate social responsibility originated in the developed Western democracies, today the concept itself is considered a global movement that encompasses and unifies different aspects of society, from legislative and non-governmental to the cultural and business aspects (Sriramesh et al., 2007). The rapid spread of the concept of corporate social responsibility from Western countries to countries in transition and other countries throughout the world stimulated the creation of a new dimension of corporate social responsibility, the increase in complexity, as well as further
popularization of the concept itself (Brammer et al, 2012). It can be concluded that the concept of corporate social responsibility in the past seventy years encompassed the key problems of the global community and created perhaps the most important link between society and the business world. Besides spreading the concept on a global level and the emergence of new dimensions of corporate social responsibility, new burning problems and challenges of the global communities are additional reasons for the increasing complexity of the concept of corporate social responsibility (Moura-Leite, Padgett, 2011). In accordance with the continual increasing of complexity and ever-increasing pressure by various groups of internal and external stakeholders, achieving and sustaining responsibility towards the community is becoming an increasingly difficult process for the company's management (Carroll, Shabana, 2010).

Positioning of the company on the market, as a socially responsible organization, demands detailed knowledge of the concept of corporate social responsibility and adequate models of digital communication by the management, but also by the rest of the internal stakeholders, who are a key, reliable and transparent communication channel towards external stakeholders (Polonsky, Jevons, 2006). The success and efficacy of conducting socially responsible activities also depend on adapting the strategy of corporate communication to the rapid development of information-communication technologies as well as to the development of social networks and the Internet (Dutot et al., 2016). Digital transformation in communicating social responsibility started in the middle of the 1990s (Isenmann, 2006), and enabled the stakeholders with computer skills to easily find timely and prompt information about corporate social responsibility, but also the overall business operations of the company (Cho et al., 2009).

Apart from the simpler discovery of information related to the company's corporate social responsibility, strong development of information-communication technologies and the emergence of social networks allowed for a continuing and two-way exchange of information between individual and profit and non-profit organizations throughout the world (Bicen, Cavus, 2011). As the nature of the Internet is unpredictable and allows for a speedy transfer of information within the global community, the consequences of such two-way communication are impossible to predict or control, therefore management and internal stakeholders must be very careful in expressing personal attitudes on websites and social networks. It can be concluded that digital transformation, and consequently the emergence of websites and social networks, significantly changed the power structure in communicating corporate social responsibility between profit and non-profit organizations and their stakeholders (Fieseler et al, 2010). Successful communication of socially responsible activities towards stakeholders enables the creation of a more positive reputation of the company. Companies with a more positive reputation achieve better results than their competition that offers products and services of similar quality and price. Positive reputation, which presents valuable immaterial assets of a company, is almost impossible to completely copy from competitors, because it is a result of a whole array of different activities, the key activities being socially responsible activities (Boyd et al., 2010).

In order for companies on domestic or global markets to successfully establish a positive reputation, it is necessary to ensure that the entire supply chain of the company operates in accordance with social and environmental standards so the stakeholders, by communicating with the company, could successfully differentiate the company from its competition (Boehe, Barin Cruz, 2010). The result of the
Differentiation of companies based on corporate social responsibility is created by building positive perception, trust and awareness in stakeholders and that process of differentiation can take several years (Barin Cruz, Boehe, 2008). For that reason, it is very difficult for competitor companies in the industry to effectively imitate the process of differentiation of a successful socially responsible company (Johansen, Ellerup Nielsen, 2012). Differentiation based on corporate social responsibility is also appropriate for smaller companies, because it does not require investing of significant financial and non-financial resources (Boulouta, Pitelis, 2014). The benefits of differentiation, based on socially responsible activities, are created directly because of the readiness of consumers to pay more for products and services that are placed on the market by socially responsible companies (Bhattacharya et al., 2008). Regardless of whether the differentiation of a company based on corporate social responsibility is achieved on organizational or lower production and service levels, the company will be able to obtain a competitive advantage and ensure stability and growth of its business operations by being a market leader (Boehe, Barin Cruz, Ogasavara, 2010).

Lee (2008) assumes that the development of the concept of corporate social responsibility, from its emergence in the 1950s until today, created two main changes within the concept itself: (i) the impact of corporate social responsibility is less often analysed on a macroeconomic level, while the analyses of the impact of socially responsible activities on the company’s processes and its business operations are increasing in frequency and (ii) the concept of corporate social responsibility shifted from a distinctly ethical and philanthropic to a more business and results-oriented approach.

Even though there are discrepancies in defining desirable levels of corporate social responsibility in business operations between the industries on the global market, corporate social responsibility is considered an imperative on the developed global market today, regardless of whether business operations of powerful corporations or small family businesses are observed. Both century-old corporations and small companies in the making are currently doing their best to satisfy the wants and needs of all key groups of stakeholders, not just shareholders, in order to maximize the triple bottom line of sustainable business (Carvalho et al., 2010).

**Stakeholders and their role in business**

As the interest of consumers, government bodies, non-government organizations and other groups of stakeholders for potential company contributions to the development of the community has been increasing for decades, so is the concept of corporate social responsibility gaining significance within managerial circles throughout the global economic network by the day (Skarmeas, Leonidou, 2013). Aside from the increase in the popularity of the concept in managerial circles, more and more reputable scientific institutions are including classes in their programs, which observe and research the issues of corporate social responsibility in business. Educating young people of different cultures in scientific institutions throughout the world gives additional momentum in increasing the need for socially responsible behavior of companies as well as continual care for the interests of all groups of stakeholders, not just owners (Smith, 2007). Actively tracking the interests of stakeholders and satisfying the needs of key internal and external stakeholders enables greater sustainability of business operations, greater competitive advantage and an increase in loyalty of employees and consumers (Pirsch et al., 2007).
It can be concluded that corporate social responsibility is a concept that most thoroughly describes the connection between company and society, and within which stakeholders represent a key and unavoidable determinant (Castello Branco et al., 2014). Therefore, corporate social responsibility is described as a stakeholder-focused concept that transcends the borders of an organization, and is based on an ethical understanding of organizational responsibilities towards the influence of business activities on the society and environment (Maon et al., 2009). The concept itself consists of different dimensions of corporate social responsibility, which encompass activities geared towards different types of stakeholders (McWilliams et al., 2006). The stakeholders of a company form their perception of the company depending on their individual attitudes of corporate social responsibility and their degree of awareness of socially responsible activities conducted as part of the business processes (Pomering, Dolnicar, 2009). Freeman and coauthors (2008) divide stakeholders into primary and secondary. Primary stakeholders are the ones whose actions are of key importance to the business operations of the company, while the secondary are the stakeholders who have the possibility of influencing the perception and attitudes of primary stakeholders. Besides the aforementioned, primary stakeholders have the power and means that enable them to influence the management of the company, while secondary stakeholders do not possess the ability to approach the management as directly.

The management of an ever-increasing number of global companies is oriented on continual conducting and communicating of socially responsible activities to the local, national and global communities (Blomback, Wigren, 2009). In order for the management to obtain benefits through the differentiation achieved by a greater level of corporate social responsibility, socially responsible activities have to be adequately communicated to internal and external stakeholders through various communication channels (Bittner, Leimeister, 2011). Corporate social responsibility reports, websites, social networks and advertising all represent key communication channels of today's corporate social responsibility (Birth et al., 2008). Modern global environment and rapid development of information-communication technologies allow for less and less use of exclusive traditional channels for communicating corporate social responsibility, and demand that the management create communication strategies that encompass a combination of digital and traditional communication (Morsing, Schultz, 2006). The possibility of two-way and direct communication with internal and external stakeholders, as well as significantly lower costs than communicating by using traditional channels, urged the management to include websites and social media into the communication strategy of corporate social responsibility. Aside from profit organizations, communicating corporate social responsibility using social media and websites is also appropriate for non-governmental organizations, consumers and various other groups of stakeholders who, by using such a communication model, can share their own thoughts and ideas with other stakeholders within a very short timeframe (Kaplan, Haenlein, 2010). Communication using social media enabled passive stakeholders to become powerful creators and transferors of information, who can now affect the reputation of the company, which in turn allows them to co-create the policy of corporate social responsibility and indirectly affect the company’s business strategy (Lee et al., 2013). The rise of social media enabled an exchange of information between an individual and organizations in real time, and the popularity of using social media is rapidly increasing in all parts of the world every day. Aside from popularizing existing social media platforms, new specialized social networks that create an array of new
possibilities for profit and non-profit organizations and stakeholders are emerging daily (Bicen, Cavus, 2011).

Besides the financial inability of certain groups of stakeholders in underdeveloped countries to reward socially responsible businesses, the increase of skepticism in certain stakeholders presents an increasingly big problem for management (Carvalho et al., 2010). In order for management to successfully prevent the appearance of skepticism in stakeholders and achieve sustainable competitive advantage through differentiation based on socially responsible activities, it is necessary to know the characteristics of key stakeholders as well as design an adequate communication strategy towards them. Sometimes a decade-long process of building a positive reputation can be destroyed in a matter of days, especially in situations where management neglects the interests of key stakeholders and thus motivates them to disclose negative attitudes towards other stakeholders in a digital global network (Vanhamme, Grobben, 2009).

**Methodology**
This paper functions as a brief overview of the concept of corporate social responsibility, as well as the role of the stakeholders within the concept itself, for the period between 2006 and 2015. Special attention was paid to the importance of corporate social activities that enable differentiation from competitors and creating sustainable competitive advantage. Stakeholders are viewed as key and inseparable determinants of the concept of corporate social responsibility, with a separate review of the connection between socially responsible activities and internal and external stakeholders. The paper is based on the systematic analysis of previously published relevant international scientific papers from the fields of corporate social responsibility, stakeholder theories and information-communication technologies. In the theoretical part of the paper, methods of analysis and compilation have been used in order to present the importance of the concept of corporate social responsibility within the global business and social community, as well as the influence of corporate social responsibility on the development of quality relationships with primary and secondary stakeholders. The method of deduction has been used in order to reach conclusions about the importance of the concept of corporate social responsibility for the business result of the company, and in order to ascertain the importance of stakeholders within the concept itself.

**Results**

**External stakeholders**
Socially responsible and sustainable business operations create a series of benefits for the community and the environment, but also for the company’s business operations (Carvalho et al., 2010). The company, which is perceived within the community as socially responsible, has the potential to create positive reputation, more possibilities in retaining quality employees, continuing protection against risk from bad managerial governance and the ability to use new types of differentiation from the competition. Conducting, as well as adequate and transparent communicating of socially responsible activities, positively affects the satisfaction and trust of consumers, which allows them to identify with the values nurtured by the company (Martinez, del Bosque, 2013). Partial or complete adherence to the company’s values and a high level of loyalty affect the willingness of the consumer to pay a higher price for the company’s products and services, and therefore
enable the generation of direct financial benefits for the company (Pirsch et al., 2007).

Peloza (2006) conducted a research according to which he points out that
corporate social responsibility in business has an increasingly positive effect on the
company's reputation with its stakeholders; and that such a positive reputation
ensures stability and sustainability of business operations by the day, and sometimes
even generates certain financial benefits. Of similar opinions are Lin and coauthors
(2009), who present results through which they point out that the differentiation
based on corporate social responsibility may not always increase profitability in the
short term, but that it will positively affect protection from risks of bad managerial
decisions, and thereby ensure existing profitability or even increase it in the long
term. Therefore, an ever-increasing number of companies in the world are
implementing socially responsible activities in order to obtain certain benefits and
improve their reputation with external stakeholders. Besides, the vehemence of
media and non-government organizations for uncovering socially irresponsible
business operations has significantly increased in recent years, turning the degree of
corporate social responsibility more and more into a means of positive or negative
differentiation from the competition in the industry. As media coverage of socially
irresponsible business operations increases, so does the number of external
stakeholders who are skeptical towards conducting socially corporate activities
(Skarmeas, Leonidou, 2013). Modern technology, development of the Internet and
easily accessible global media space allowed the external stakeholders to not have
to rely only on the media and non-government organizations when expressing
attitudes about corporate social responsibility of companies, but by using websites
and social media they can send short informative posts which can set off an
avalanche of events that can shake the company to its core, as well as society in
general (Lyon, Montgomery, 2012). Dissatisfaction of key external stakeholders in one
of the markets in which the company operates can rapidly spread onto other
markets, and thus endanger the business operations in markets in which the
company was perceived as successful and socially responsible (Bhattacharya et a.
(2008).

**Internal stakeholders**

Even though the concept of corporate social responsibility is primarily oriented
towards external stakeholders, the organization's management must not neglect the
effect of socially responsible activities on the internal stakeholders and their role in
the concept. The efficacy of conducting socially responsible activities equally
depends on external and internal stakeholders (Waddock, Googins, 2011). Palmer
(2012) points out that the key task of the management, in the context of
implementing the concept of corporate social responsibility and generating
benefits, is to achieve a balance in the complex network of relationships towards
stakeholders. That is not a simple task, seeing as the management is faced with the
oftentimes incompatible interests of internal and external stakeholders, which
sometimes makes it very hard to choose activities that will satisfy all key stakeholders
(Pedersen, 2006). Aside from the positive effect on profitability and economic
growth, it has been proven that the concept of corporate social responsibility
positively affects the satisfaction, motivation and loyalty of employees, while
allowing the management to extract the best qualities from every employee, which
directly contributes to the creation of positive business trends (Torugsa et al., 2012).
Ali and coauthors (2010) come to a similar conclusion, stating that a higher level of
corporate social responsibility positively affects the loyalty of employees which significantly improves the efficacy of business processes. A greater level of motivation, loyalty and satisfaction caused by socially responsible business operations allows the employees and other internal stakeholders to identify with organizational values (Kim et al., 2010).

It can be concluded that the effects of socially responsible activities are aimed at not only the external stakeholders, but internal stakeholders of the company who act as a trustworthy communication channel towards external groups of stakeholders as well (Collier, Esteban, 2007). The concept of corporate social responsibility can be seen as an efficient tool for human resource management by using trust, satisfaction and employee motivation. It is simpler for the management to achieve sustainable competitive advantage when they are in the position to retain highly educated and motivated employees, and the concept of corporate social responsibility represents the very business model that positively contributes to a lower fluctuation of employees (Lee et al., 2013). As an increasing number of profit and non-profit organizations decides to implement socially responsible activities, situations in which partnerships are formed between entities from the profit and non-profit sectors are more and more frequent. Such partnerships, formed in order to conduct socially responsible activities between companies and non-government organizations, but other groups of stakeholders as well, enable transfer of knowledge and skills that directly improves the employees and the management (Seitanidi, Crane, 2009).

To successfully implement the concept of corporate social responsibility within an organization, it is necessary for all internal stakeholders to proactively take part in the process, both on individual and collective levels, in order for such success to improve the relationships with external stakeholders and society as well as enable the generation of financial and non-financial benefits for the company (Basu, Palazzo, 2008). Although investing in socially responsible activities most often requires initial investment of financial resources, the company has the possibility, by proper communication with its stakeholders, to achieve financial returns on investment and thus increase the value of proprietary interests in the long term (Smith, 2007). It can therefore be pointed out that the concept of corporate social responsibility has reached the phase of a critical business model in the 21st century (Palmer, 2012).

**Conclusion**

**Summary of research**

Implementation, conducting and communicating of the concept of corporate social responsibility is becoming a topic that is more and more important for the management of modern global companies. The number of internal and external stakeholders who are influenced by the level of corporate social responsibility of the company when making decisions about using their products or services is constantly increasing. For that reason, many companies use differentiation based on corporate social responsibility to obtain a sustainable competitive advantage and generate certain benefits. For the process of differentiation to be successful, the management must identify the needs and interests of key stakeholders and adapt the choice and communication of corporate social responsibility activities towards the stakeholders. It can be concluded that socially responsible business operations positively affect the company’s reputation, employee motivation, consumer loyalty, protection from bad managerial decisions and long-term profitability.
Research gaps and future research recommendations
As corporate social responsibility has been developing within the scientific world since the middle of the last century, it has become, although multi-dimensional and complex, a very elaborate concept. Seeing as there is a natural connection between the stakeholders of a company and the concept of corporate social responsibility, as well as the fact that the concept of corporate social responsibility itself developed from the stakeholder theory, the role of internal and external stakeholders within the concept has also been meticulously researched. On the other hand, it is noticeable that the analysis of the effect of corporate social responsibility on export activity and relationships with stakeholders in foreign markets is not as elaborate as it is on the domestic market. In an increasingly globalized market, in which the importance of international trade increases by the day, it would be very interesting to discover in which way the degree of corporate social responsibility affects the elimination of entry barriers in export markets, as well as export processes in general.

Research limitations
This paper is based exclusively on secondary data and available international scientific literature. Quality of the research would be much greater if the research had been conducted by using a questionnaire or interview with persons in companies who are familiar with overall business operations and the aspect of corporate social responsibilities in business. By using the primary research approach it would be possible to generate higher quality results and a more complete image for the reader.

References


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