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Ethical positions in Hungary, China, Turkey and Kyrgyzstan in the light of idealism and relativism

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Abstract:
This paper is devoted to the study of ethical positions of the respondents from Hungary, China, Turkey and Kyrgyzstan. In the context of globalization, when the process of global economic, cultural, social integration occurs, the effectiveness of interaction between countries and peoples, especially in trade and economic relations, depends on the understanding of the concept of business ethics. Therefore, the understanding of national aspects of business ethics plays a significant role. The idea of business ethics may vary depending on the national and cultural characteristics, traditions, mentality and stereotypes of the country with which the interaction takes place. Therefore, it is necessary to study the ethical position. To do this, we conducted a survey, using the Foresight questionnaire, among 905 respondents from Hungary, China, Turkey and Kyrgyzstan, who are students of the Department of Business, and had work experience in private and public sector. The results of the study confirm the hypothesis that ethical position differs depending of nation, gender, and work experience.

Keywords
Business ethics, idealism, relativism, Hungary, China, Turkey and Kyrgyzstan

Introduction

Recent years have seen significant changes in public and private services (Grigorescu, Lincaru, Pîrciog, & Chitescu, 2019). Economic development involves the proper allocation of resources (Subic, Vasiljevic, & Andrei, 2010). Human capital plays an important role in economic output and growth (Nica, 2018). Success of a company depends on its effectiveness, which plays a major role in competition and strategy. (Prdić, Kuzman, & Damjanović, 2019) However, companies entering the global economy deal not only with differences in culture, politics, management style but also face the challenge of understanding the ethical mind-set of their partners. Thanks to the cultural history of human society, a person adheres to a set of universal principles and takes a certain collective view of the past, which gives him a sense of belonging to society (Jora, Apăvăloaei, & Iacob, 2018). Ethics doesn't have universally definition. In Cambridge Dictionary ethic is a system of accepted beliefs that control behavior, especially such a system based on morals". Researchers define ethic as "a set of principles describing a behavior code that explains what is good and right or bad and wrong" (Henderson, 1982), how people ought to act based on moral principles and ideals such as justice, fairness and trust (Lacey, 1996; Wiley, 1995) "concerned with clarifying what constitutes human welfare and the kind of conduct necessary to promote it" (Powers & Vogel, 1980)

Furthermore, business ethics may vary depending on the national and cultural

characteristics, traditions, mentality and stereotypes. Strategies and procedures that may be considered appropriate, legitimate, or even laudable in one country may be condemned as morally unacceptable elsewhere (Forsyth & O'Boyle, 2011). There are still ethical problems in the field of legislation, jurisdiction, political life, the functioning of the police, and state administration, after the socialistic period in Czech Republic. The reasons of those problems are insufficient law and jurisdiction, low support of ethics in-law, and shortage of interest from political leaders and government in ethics (Poor, Abdulkerim, Bariscil, & Kollár, 2018). In some cultures employees think less of maximizing their personal outcomes at the expense of others and the company as a whole. They dally during work breaks, call in sick so they can enjoy some time off, take credit for work they did not do, and misuse the trust such as taking company supplies for using at home, but in other cultures such improper actions are roundly condemned (Forsyth & O'Boyle, 2011) (Al-Kazemi & Zajac, 1999).

In this study we conducted a survey, to determine ethical positions in Hungary, China, Turkey and Kyrgyzstan. Foresight questionnaire was used among 905 respondents who are students of Department of Business, and had work experience in private and public sector. We have predicted that the reason of difference in ethical position is the difference in nationality and gender.

1. Theoretical framework

According to Al-Khatib, Al-Habib, Bogari, & Salamah (2016) moral philosophies are defined in two categories as deontological and teleological. Both deontological and teleological valuations include ethical decision-making process. Furthermore, Al-Khatib et al. (2016) assume that deontological/teleological paradigm was similar to Forsyth's (1980) two-dimensional personal moral philosophy concept – idealism and relativism.

According to Forsyth and O'Boyle (2011) "theory of Ethics Position assumes that moral actions and assessments are the external expression of a person's integrated conceptual system of personal ethics, or ethics position. These positions, which are the results of a lifetime experience in confronting and resolving moral issues, differ along two general dimensions: relativism and idealism".

Forsyth (1980) draws four ethical positions according to idealism and relativism dimension (Table 1). Situationists (high idealism - high relativism), who favour securing the best possible consequence for all concerned even if doing so will violate traditional rules that define what is right and what is wrong; Absolutists (high idealism – low relativism), who believe people should act in ways that are reliable with moral rules, for doing so will in most cases yield the best outcomes for all concerned; Subjectivists (low idealism – high relativism), who based their ethical choices on personal considerations, such as personalized values, moral emotions; Exceptionists (low idealism – low relativism), who endorse moral rules as guides for action, but admit that following rules will not necessarily generate the best consequences for all concerned.

Table 1: Taxonomy of Ethical Positions

	High relativism	**Low relativism**
High idealism	Situationists: Reject moral rules; advocates individualistic analysis of each act in each situation; relativistic.	Absolutists: Assume that the best possible outcome can always be achieved by following universal moral rules. What here?
Low idealism	Subjectivists: Appraisal based on personal values and perspective rather than universal moral principles; relativistic.	Exceptionists: Moral absolutes guide judgments but pragmatically open to exceptions to these standards; utilitarian

Source: Forsyth, 1980

Franke & Nadler (2008) believe that contemporary comparisons of different countries allow to understand the impact of culture on ethical attitudes. According to Hunt and Vitell (1986) ethical decision making based on culture, since culture influences on how a person perceives, understands and solves ethical issues. Hofstede (1984) suggested six dimensions of natural culture: Power distance, which means the expanse of the inequalities between different individuals; Uncertainty avoidance, shows preference to structural situations in unstructured situations; Individualism-collectivism when people behave as individuals or taking part in a group. Masculinity/Femininity is degree of attention which a society pays more, for achievement or nurture; Long-Term Orientation, when people focus on achieving quick results or on long-term aims; Indulgence, when individuals try to control desires or prefer to live according to their desires.

1.1 .Gender

Does gender play a role in ethical positions? According to (Singhapakdi, Vitell, & Franke, 1999) women have more ethical intentions than men. Moreover, women have the opportunity to improve their position in economic activity thanks to the latest achievements in field of artificial intelligence (Kral, Janoskova, Podhorska, Pera, & Neguriță, 2019). Franke et.al., (1997) found that "there are significant gender differences in ethical perceptions of business practices, which decline as a function of work experience and are moderated by characteristics of the practices themselves". Ekin & Hande Tezölmez, (1999) suggested that female managers have a stronger connection to business ethics than their male colleagues. The sex of the individuals involved in a behaviour moderates the gender differences in ethical perceptions.

2. Research methodology

To investigate respondents' ethical attitudes we have used the Ethical Position Questionnaire (EPQ), developed by D.R. Forsythe. It contains 20 statements and requires individuals to indicate their acceptance of these statements - which vary in terms of relativism and idealism. The relativism scale includes assertions such as "Different types of morality cannot be compared in terms of 'rightness'" and "What is ethic - varies according to the situation". The idealism scale, on the other hand, measures an individual's perspective on positive and negative consequences with such assertions as "Individuals should ensure that their actions are free of any intent to harm others - even to the slightest degree" and "If an action could harm an innocent third party, it should not be taken" (Forsyth, 1980).

In the current questionnaire each statement was rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). To show the Idealism and Relativism scales we counted the averages of items 1-10 (Idealism) and items 11-20 (Relativism). Higher scores result higher levels of idealism or relativism.

Our research was conducted in Hungary, China, Turkey and Kyrgyzstan. Our sample comprises 904 from these countries. In our previous studies country variable (living place) was also included. To avoid distortion and to aspire to homogeneity we have analysed data among nationality variable and we have closed off respondents whose nationality and living place differed, for example, Hungarian minority who live in Slovakia or in Serbia. The sample, for the most part, was collected among business students, as well as employees from both private and public sector. Figure 1 illustrates distribution of respondents in term of nationalities.

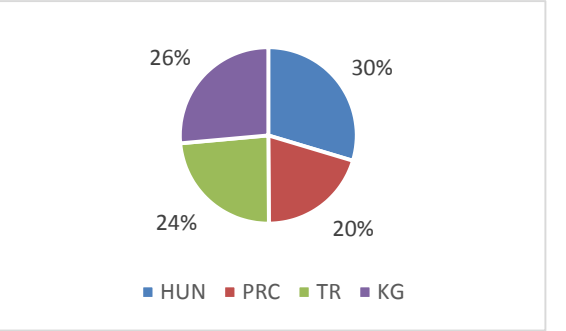

Figure 1: Distribution of respondents
Source: Authors' research

3. Results

The European space is the concentrated expression of the historical transformations which marked the development of European societies.

Hungary: Ownership has changed to some extent in Hungary along with the economic and market structure after the regime change in 1989, which created a good opportunity for entirely developed market economy that is in use in the country today. These changes increased the importance of values which led to an environment in which businesses focus on customer orientation as a vital factor. On the other hand, proficiency in foreign languages became more critical on the way for success as globalization spreads. The important majority of the population in the country follow the Judaeo-Christian cultural traditions; however, based on the research done by European Values Study (EVS) in 2000, the rate of practicing a religion is only moderate which is just 43% of total population. (Poor, et. al., 2016).

China: China can be compared with CEE region for their physical size, population and topographic location (from the isolation point of view). In fact, there are not so many "real" Chinese values considering these factors. On the other hand, Chinese people tend to be less risky (avoiding uncertainty), which can also be observed from a Chinese proverb - "The tallest tree gets cut first" – which means, the ones who are removed first are the ones who stands out. Furthermore, interestingly experiments by communism could not make a significant impact on the Chinese culture, which is highly influenced

by its historical feudal system that reflects high power-distance (Poor, J. et. al., 2016).

Turkey: All kinds of relations, whether social, economic or even political are formulated on fear in Turkey (Akgeyik, 2009). According to the research held by Akgeyik, although business ethics within Turkish people is at the very satisfactory level, nowadays they lag behind both technically and practically. That is the reason why currently a negative attitude appears in the Turkish society towards businesses and businessmen (Arslan & Berkman, 2009). Later on, they continue that these conditions show that the position of State Institutions in the country is highly under the negative impact, driven from the inadequacy of civil organizations, civil society organizations, bureaucracy and bureaucrats. Turkey has an increasing number of university graduates every year (Yavuzaslan, Bariscil, & Farkas, 2016). Therefore, there are not enough positions in the public sector, and it reveals the fact that many university graduates should start considering starting a career in business life. In turn, it conditions to start teaching the concept of business ethics since higher education.

Kyrgyzstan: Figure 2 shows the relationship between the ethical position and the nationality of respondents. According to the results, we can assume that the nation tends to be more idealistic ($p<0.01$) than relativistic ($p<0.01$). It means that the respondents' belief in moral absolutes, thus, all ethical judgments are based on ethical principles and right actions lead to expected results. Individuals with strong idealistic principles avoid engaging in activities that contradict to their beliefs. We have measured the higher idealism value in case of Turkish respondents. According to Figure 2, we can notice that Hungarian and Turkish respondents are very similar. In case of these nations, we have measured higher idealism values. The Kyrgyz are less idealistic. In case of relativism scale we can notice those analysed nations are less relativist. We have measured the lowest value in case of Hungarian and Turkish respondents and rate of relativism is very similar in the case of Kyrgyz respondents. According to results, respondents do not reject universal ethical principles; rather, they accept them in their ethical decision-making process. We have measured the highest relativism in case of Chinese respondents.

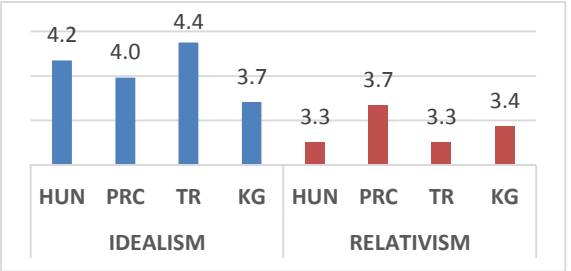

Figure 2: Idealism and Relativism by nationality
Source: Authors' research

Figures 3 and 4 demonstrate that women show more idealistic attribute than men, but ethical position value is nearly equal in case of the gender. We can see the highest differences in the case of Hungarian respondents. It can also be said regarding relativism dimension. In our sample, there is a small difference between the genders. Despite bare relative differences independent sample t-test resulted in significant difference between gender in case of idealism and relativism too ($p<0.01$).

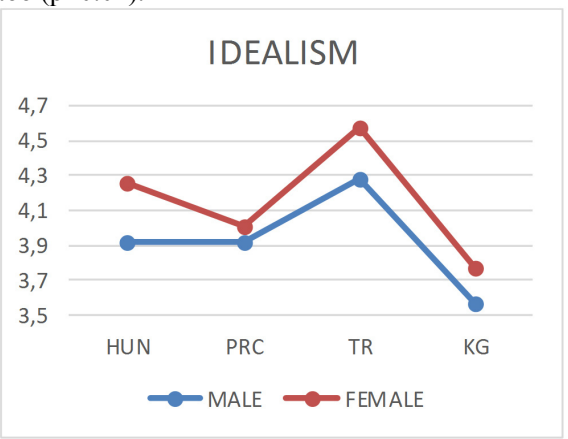

Figure 3: Idealism by gender
Source: Authors' research

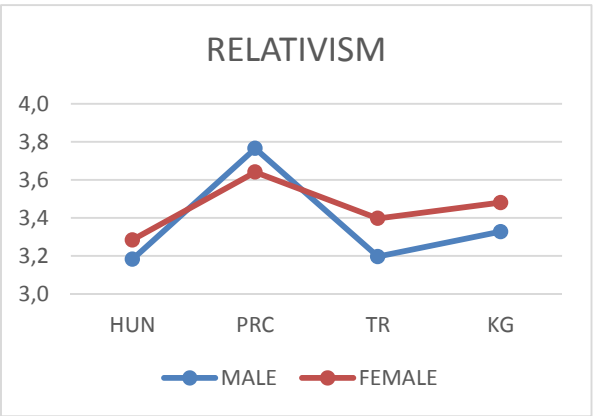

Figure 4: Relativism by gender
Source: Authors' research

Variables as public and private sectors were also examined in this research. Figure 5 shows the relationship between the ethical positions and sectors. Despite bare relative differences independent sample t-test resulted in significant difference between sectors in the case of idealism and relativism scales too ($p<0.01$). According to results, we can establish that respondents from public and private sectors are more idealistic ($p<0.01$) than relativistic ($p<0.01$). In the case of relativism scale, we can establish that the private sector is more relativistic than the public sector.

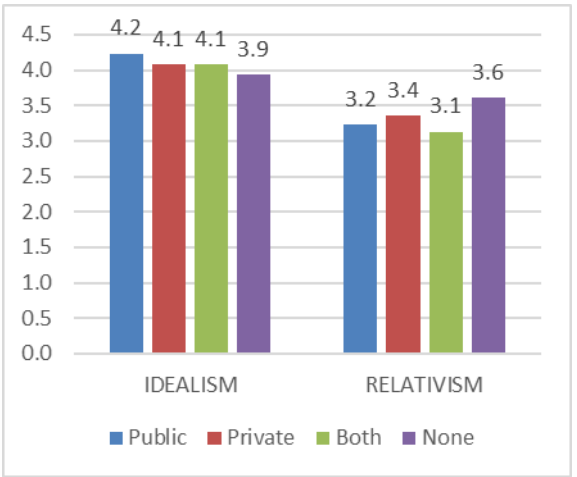

Figure 5: Idealism and Relativism by sector
Source: Authors' research

Conclusion

Current research has revealed interesting, simultaneously estimated details about ethical position in four different countries that, overall, reflect a possibility that results would be more or less similar in other countries that are not the objective of this study. However, it has also shown that estimated hypothesis are realistic and there is a significant difference among different nations in regard with the rate of idealism and relativity. It can be called significant difference because, although the levels of the variables are not so high, tiny differences in these variables can make considerable impact on the productivity in international companies established in different countries, or companies that host multi-cultural human resources, if these cultural differences are not considered in communication with employees or in the organization culture or an international enterprise established in another country.

The other aspect of this study is about its contribution in creating an opportunity to estimate possible countries that will better fit for business establishment based on the information collected from this or similar researches based on the information about what extent these cultures are similar or different in. It can be told from Human Resource point of view as well. Thus, considering that all businesses try to maximize the productivity and profit, minimizing cultural and communicational gap causing different obstacles within the company, this research and similar studies on this discipline will illuminate HR policies within a company.

Results of this study reveal that all four examined nations are more idealistic than relativistic. It means that respondents' beliefs in moral absolutes are stronger, since all ethical judgments are based on ethical principles and the right actions lead to expected results. In spite of the fact that Hungarian and Turkish respondents are very similar, idealism value of Turkish respondents are higher, while Kyrgyz respondents are less idealistic, which means that respondents do not reject universal ethical principles, rather they accept them in their ethical decision-making process. However, Chinese respondents showed the highest relativism. When we approach the issue in terms of gender, women are more likely to be idealistic than men in comparison to the indicated countries, but ethical position value is nearly equal in case of gender.

Collected data has partly confirmed the primary hypothesis, since there are national, gender, cultural and historical differences to a certain extent and it reflects itself in the difference of ethical position attributes in each of the four target countries. This study has revealed that there is a need for deeper research in regard with the analysis of the reasons of such a variety, the circumstances in which ethical position formulates a country, and cultural perspective of leading ethical opinions in a certain country. To sum up, all the findings and ideas stressed above authors believe that this study may help understand moral standards in Central and Eastern Europe better; also, it may help researchers of this field as well as entrepreneurs to figure out and interpret the moral aspects and opinions in the target countries of this research.

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The length of the distribution channel as a factor of its efficiency

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Abstract
Distribution network is a system of activities that provide transfer of products between producers and final users. It is also known as distribution channel, marketing channel, distribution chain, distribution pipeline, market chain and trade chain. This network has two or more partners, so it has to be coordinated in the direction of order fulfilment and satisfied demand.
As a partnership business network, distribution channels are very important, due to their role in responding to customers' requests. Distribution channels could provide competitive advantage for all partners along the network, through shorter delivery lead time and higher product availability. Although the main purpose of distribution channels is providing continuous flows of products to customers, they should be designed to fill customer's demand with minimum total cost. Determining the right number of facilities and proper locations for distribution network is an essential issue for companies involved in the channel.
The issue of distribution channel's length has become more interesting due to the parallel existence of two different trends. On one hand, there is tendency for reducing number of partners, facilities or stages of distribution channels, with the purpose of avoiding extra expenses, but on the other hand there is a necessity to involve more partners in distribution channel, because that is a way for providing greater market share.
Configuration of distribution channels depends on many factors. These factors have internal or external character. Therefore, the fact that the distribution of the same products in different countries can be performed completely differently is not surprising at all. In this regard, the aim of this papers is to classify the factors that affect the length of the distribution channel. In addition, the paper will also indicate advantages as well disadvantages of both long and short distribution channels. The goal of the analysis of the factors and the way of designing distribution channels, in terms of its length, is to make an adequate decision for increasing efficiency of the distribution network.

Keywords
Distribution, channel's length, network, flows, efficiency

Introduction

Distribution includes a set of operations for transmitting products from manufacturers to final users (Fayaz & Azizinia, 2016). Similarly, Segetlija, Mesarić & Dujak (2011) explains distribution as a system of all activities for transferring products between manufacturers and customers. Distribution system therefore assumes coordination of preparation, adequate type and volume of products, at the right time and space, with the purpose to ensure fulfilment of orders and satisfied demand (Segetlija et al., 2011). Distribution operations or activities are, actually, performed inside distribution channel. A distribution channel is linearly ordered by operations in the purpose to achievement physically flow from one to another intermediaries down to the final user (Oklander, 2005; Larina, 2005).

Designing a distribution channel implies some decisions and choices (Szeląg-Sikora & Rorat,

2016), concerning the type of channel (direct, indirect), the number of partners involved (one or several), length (long, short), width (wide or narrow), the type of intermediaries (wholesalers, retailers, agents, buyers, individual, etc.). The above mentioned choices influence the distribution system efficiency, so decision about distribution channel structure seems very important (Galkin, 2015).

More precisely, efficiency of distribution system determines the level of its ability to achieve defined goals, higher market share or profitability, or to dominate over competitors (Szeląg-Sikora & Rorat, 2016). Although the most often used measures for measuring a distribution channel's performance have financial character (revenue, net profit, turnover or logistics costs), nonfinancial measures also become very significant in the conditions of global competition, such as level of customer service or improved customer value. Efficiency of a channel could be measured by ability of each company in channel to minimize costs which are associated with performing necessary channel functions (American Marketing Association, n.d.). It depends not only on internal resources or inputs of each company involved, but also on external resources. The structure of the distribution channel affects the possibility of exploiting both internal and external resources. Therefore, it is in the interest of all partners to design an adequate distribution channel structure.

Channel theory has two orientations: economic and behavioural. Economic orientation has a focus on channel efficiency, with analysing design and structure of the channel, while behavioural orientation is concerned with relationship, cooperation and conflicts between the partners in channels (Da Silva, 2008). In this regard, the involvement of intermediaries between manufacturers and customers can be justified by economic motives, by reducing the transport costs of producers, by economies of scale and with a focus of producers on key competences, but it can also be justified by behavioural motives, or by need for establishing trust-based relationships with minimizing conflicts between channel's partners.

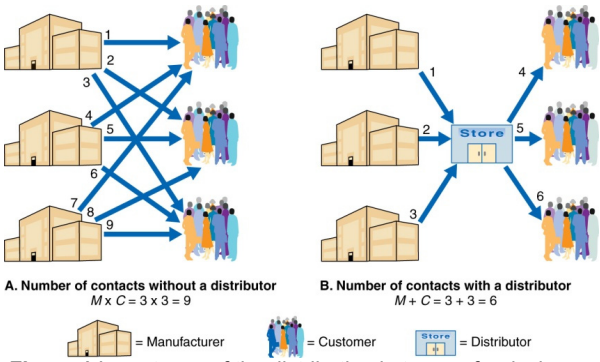

Figure 1 Importance of the distribution in terms of reducing the number of contacts
Source: Chapman, n.d.

Figure 1 shows an increase in the efficiency of the channel by involving an intermediary. However, the number of intermediaries involved in the distribution process between manufacturers and customers can affect the efficiency of the entire channel function in a negative context as well, since the increase in the number of intermediaries affects the increase of the distribution costs. In addition, the emergence of conflicts, which is more certain in case of longer or indirect than in case of shorter or direct distribution channel, can also negatively affect the efficiency of the entire distribution system. In this sense, in this paper the focus is on the analysis of distribution channels in terms of number of intermediaries, highlighting the advantages and disadvantages of long or short channels. In addition, the analysis of different factors (internal and external) will indicate the drivers of distribution channel's length.

Direct or indirect distribution channels' efficiency

The most common types of distribution network are direct and indirect, with one or more levels of intermediaries (distributor, wholesaler, and retailer). According to this classification, Dent (2011) points to the following structures of distribution: direct - without intermediaries between producer and customers, one-tier distribution with a set of intermediaries between producer and customers, two-tier distribution with two sets of intermediaries (for the purpose of increasing level of services for a wider market area), and multiple-tiered distribution with more than two set of intermediaries. Having in mind the number of intermediaries in the distribution channel or its length, Rushton, Croucher & Baker, (2014) divide distribution channels into „short" and „long". According to those authors, length of a distribution channel has direct impact on the

efficiency of the distribution system through distribution costs and quality of service of each partner of the channel.

Long distribution channels have a multi-tier distribution, and each tier could contain several warehouses and distribution centres, such as warehouses of producers, distribution centres, regional centres, local warehouse etc. Thus, long distribution channels have a lot of loops and connections between them. This is the reason why problems which are usual for distribution channels could be much more serious in long distribution channels (Djafar, Amer & Lee, 2013). On the other hand, short distribution channel assumes the direct distribution of products to the consumer or a small number of intermediaries, as well as links that need to be managed. In this regard, in comparison with the long distribution channels, the distribution system in this case is much simpler. Success of short distribution channel depends from consumer's behaviour (Fedorko, Bacik & Gavurova, 2018, p. 1243). The lack of control of the channel and liquidity problems are recognized as key problems and challenges of longer distribution channels. On the other hand, trust-based relationship (Sheffi & Rice, 2005, p. 45), high level of coordination and exchange of information among partners are characteristics of short distribution channels. It follows that it is much easier to notice problems and manage shorter distribution channels, as well as to detect potential errors and risky situations, on one side, but also hard to manage risky situations due to the greater degree of dependence partners and the inability to respond to unpredictable and changing market demands due to the lack of alternatives (Blome & Henke, 2009, p. 132), on the other side.

Distribution channels with a large number of intermediaries have a problem with a high level of complexity. This type of distribution networks could have problems concerning coordination and collaboration between partners (Segetlija et al., 2011). According to Hyton (2005), a great number of intermediaries could have a reflection to level of coordination.

Concerning the above mentioned, the authors agree with Hyton (2005) that intermediaries in distribution channels represent a main source of problems. In this sense, long distribution channels are faced with the following problems (Djafar et al., 2013): variability, bottleneck, bullwhip effect, delivery time and distribution costs, and conflicts between intermediaries.

Due to the large number of organizations, activities and facilities, long distribution channels become favourable ground for *variability*. Sources of variability can exist both on the supply and demand side. Variability on the demand side is a result of incorrect demand forecasting, seasonal character of demand, uncertainty circumstances caused by the lack of information or changes in dynamic market, or customer behaviour (Selim & Ozkarahan, 2008). Variability of demand directly affects the inventory level, and wrong estimation of demand in terms of excess inventory or stock outs will lead to an increase in the cost of keeping inventories or the cost of lost sales. Variability on the supply side is a result of insufficient production capacities, unreliable warehouse facilities and transportation systems, and inadequate planning and control due to lack of information. When the source of variability is identified, there are following options for absorbing its negative impact: higher inventory level (it will enable avoiding of stock outs, but with increasing keeping inventory costs), development of partnership relations and trust, offering different prices for various delivery times, setting production schedule with customers' requirements. The last two options may be used for make-to-order products.

Bottlenecks in long distribution channels present barriers for continuous product flow and points of weak performance. Bottlenecks are points whose capacities are lower than demand. Those could be seaports, airports, and customs as places of loading and uploading process and as places of intermodal transport. Research in Indonesia from 2005 showed that costs of some companies are higher by 14% as a result of logistics bottlenecks and especially seaports (Peidro, Mula, Poler & Lario, 2009). In order to minimize the effects of bottlenecks, distribution channels take the following actions: define priority orders, determine lot size according to available capacity, trade-off between size handling and transport lot.

The bullwhip effect is a result of lack of coordination among partners, because of poor information sharing, inadequate market data, insufficient forecast techniques or other uncertainties (Djafar et al., 2013). Forecasting demand according to demand of previous partner, instead according to demand from point of sale is the major cause of bullwhip effect. Consequences of bullwhip effect are more serious in long distribution channels, due to the great number of intermediaries, so that implies greater deviation in demand between customers and the producers.

The delivery time is one of the most important indicators of distribution channel efficiency. This indicator directly depends on the number and structure of distribution channels. In terms of delivery time, common aim of all partners in the distribution channel is to minimize it. Beside delivery time, for evaluation of distribution channels success, different *costs* arising from the *distribution process* should be analysed, for example: warehouse costs, transportation costs, inventory costs, equipment costs etc. (Andrejić & Kilibarda, 2015). Long distribution channels have more challenges to face considering that those channels have more storage points and product movements. With an increase in the number of intermediaries, distribution costs increase, too, which eventually leads to increasing the price that the final customer pays (Sharifi, Masoudi & Javadin, 2013). According to Hesse and Rodrigue (2004) each additional transit day could increase final cost of product approximately by 0.8%.

Also, one of the challenges which are imposed by long channels is *conflicts*. Conflicts could be a result of a low level of coordination between intermediaries. Incompatible objectives of intermediaries may have negative consequences on coordination and efficiency of the distribution system.

In their study about designing distribution channel for consumer goods, Grant and Banomyong (2010) found a solution for the problem in the case of long distribution channels. Those authors concluded that factors as human resources, suitable distribution infrastructure, implementation of new technologies and e-commerce have a great influence on efficiency growth and reduction of distribution cost. In modern conditions, especially role of information technologies in distribution channels is irreplaceable. Long distribution channels find possibility for eliminating or minimizing consequences of inadequate coordination in implementation of information technology. Beside establishing collaboration and ensuring coordination between partners, importance of information technology grows in the following conditions (Segetlija et al., 2011):

- increased market sensitivity,
- increased number of channel types,
- increased market size,
- wider use of e-commerce,
- internationalization and access to global market.

Drivers of distribution channel's length

The decision about length of distribution channel is conditioned by numerous factors, both from the internal and external environment. A large number of authors dealt with this issue. However, they usually analysed only one or few factors that could have impact on the length of the channel. Isolating only one or few factors can be a major limitation when deciding about the length of the channel. Some authors analysed only the influence of buying habits on the length of the channel (Bucklin, 1962; Rangan et al., 1992; Frazier and Lassar, 1996), while others observed the impact of the product type on the channel length (Rangan, Menezes & Maier, 1992; Frazier & Lassar, 1996; Black, Lockett, Ennew, Winklhofer & McKechnie, 2002; Liu & Cui, 2014). Aspinwall (1962) and Miracle (1965) monitored the impact of particular product characteristics on the length of the distribution channel. Bucklin (1966) analysed market decentralization, lot size, assortment, and waiting time as a factors of distribution channel's length. Lilien (1979) was testing impact of product and market factors on the length of distribution channel, on a sample of 125 industrial products.

Designing the optimal length of the distribution channel is conditioned by customer habits, product characteristics, market factors, and factors of the focal company (Da Silva, 2008). The Table 1 shows an overview of the mentioned factors and how they affect the length of the channel.

Table 1 Factors of distribution channels' length

Factors	***Distribution channel***	
	Short if:	**Long if:**
Customer habits		
Frequency of purchase	Low	High
Purchasing effort	High	Low
Rapidly of consumption	Low	High
Significance of purchase	High	Low
Waiting time	High	Low
Product characteristics		
Replacement rate	Low	High
Gross margin	High	Low
Adjustment	High	Low
Searching time	High	Low
Unit value	High	Low
Product complexity	High	Low
Product life-cycle stage	Introduction	Maturity
Volatility of demand	High	Low
Brand positioning of quality	High	Low
Perishability	Low	High
Market factors		
Target focus on mass market	Low	High
Rate of technological change	High	Low

Intensity of competition	Low	High
Geographic concentration of market	High	Low
Company factors		
Range of products	Wide	Narrow
Order size	Large	Small
Market share	Low	High
Desire of control	High	Low
Retailer investments	Low	High
Number of support programs	Low	High
Promotion budget	Low	High
Size of the company	Large	Small

Source: Da Silva, 2008.

Beside analysed factors of distribution system length, based on some empirical research conducted in certain countries or regions, it is obvious that context also has impact on it. For instance, the Japanese distribution system is a great example of long and convoluted channel, with a lot of wholesalers (Figure 2).[1] Papers and studies which analysed Japanese distribution system tried to figure out the reasons for its complexity. One of the reasons of long distribution channels in Japan is small stores (Flath & Nariu, 1991).

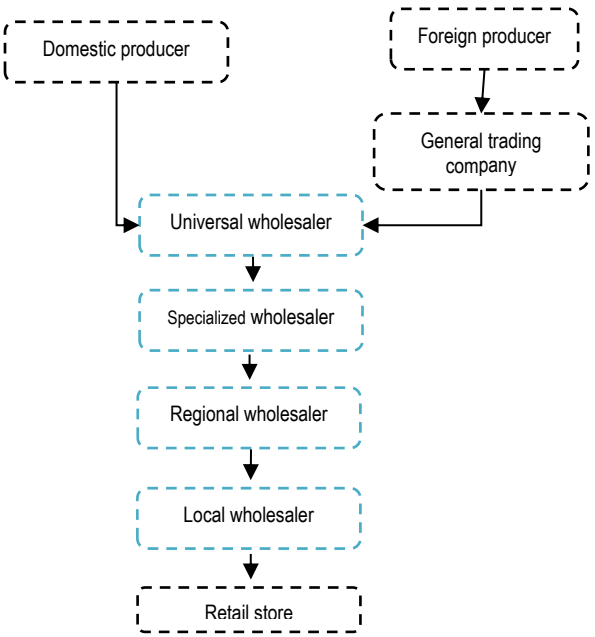

Figure 2 Distribution channels in Japan
Source: Revised according to Lovreta, Petković & Končar, 2013, p. 106.

Earlier research showed a great percentage of wholesalers in distribution channels in relation to other intermediaries in Japan. So, percentage of sales from one to other wholesalers in Japan is 41.9%, in United States 24.8% and 16.2% for Germany (Flath & Nariu, 1991). Ubiquity of retail stores is also the reason of great number of wholesalers. According to Bucklin (1966), ubiquity of retailer stores in Japan and a lot of wholesale steps have one common point - economies on household storage. Both have interest to ensure inventories in close proximity to customers and frequently inventory replenishment. Flath (1990) recognized higher costs of storage in retail stores in comparison to costs of storage in wholesale centres and short geographic distance between point of production and point of consumption, as reasons for ubiquity of retail stores in Japan.

A survey conducted in February and March 2010 involving 486 customers of cranes from the EMEA (Europe, Middle East and Africa) and APAC (Asia and Pacific) cranes in the context of testing the importance of direct and indirect distribution channels for achieving annual profitability, buyer satisfaction and buyer loyalty, has shown a greater importance of indirect channels in terms of achieving greater profitability. However, by analysing customers' satisfaction and loyalty, it has been found that greater satisfaction and loyalty in this type of product can be achieved by using direct channels. The key reason is the establishment of solid collaborative relationships through a direct channel that are the basis for achieving a greater degree of satisfaction and then consumer loyalty (Rambocas, Meneses, Monteiro, & Brit, 2015).

Number of intermediaries could be changed during the life cycle of the product. For example, at the beginning of business in the United States telephone service provider AirTouch Cellular used agents and wholesalers to sell telephones and service. Involving agents and wholesalers in distribution channels was justified by the necessity of installing the phone properly. So, installing the phone was a good part of added value of intermediaries. The emergence of mobile phones has reduced the importance of agents and wholesalers, especially in the domain of installing the phone, which was their key competence (Frazier, 1999).

Due to the fact that both models of distribution channel have pros and cons, usually there is a need for adopting a hybrid approach, or combining direct and indirect channels, as well as exploiting the benefits of both approaches.

[1]However, not all distribution channels in Japan are long, with a great number of wholesalers. For example, products as motor vehicles and electric appliances have a relatively few intermediaries, and also wholesalers.

By involving an intermediary in the distribution channel, cost of inventory holding will increase, but at the same time that will reduce the physical distance and lead time to the customers. As ways for reducing transportation and logistics cost long distribution channels use: various alternatives of vehicles (less than truck load/LTL, full truck load/FTL, train, sea vehicles etc.) or warehouses (as distribution centre or transit-terminal consolidation). By using various facilities, long distribution channels could provide more options for warehousing and transport in small or large quantity, depending on the size and number of orders, in order to avoid possibility for lost demand.

Choosing direct channels is justified by cost savings and establishing of direct contacts with the market. "Expensive" intermediaries are eliminated through the company's direct channels. In addition, producers expect to achieve better relationships with customers and a greater degree of loyalty and trust, through direct channels. Apple is a great example exploiting the benefits of direct channels, since this company has a many-branched retail network. Also, Tesla has shown that it can successfully market cars from their own Tesla showrooms.

The choice of long channels allows to producers focus on key competencies, provide better market coverage and lower physical distance from customers. More and more combinations of direct and indirect distribution channels are present in modern conditions. In this way, producers want to take advantages of both one and the other way of placing products on the market. For example, Nike sells its products through several tens of thousands of retailers around the world. Beside indirect channels, Nike has direct channels: Nike.com and more than 1000 flagship and outlet stores. In 2017 through direct channels Nike realized 28% of total sales (Statechi, n.d.).

Methodology and results of the research

In order to get a picture about the domination of certain type of distribution channels in the Republic of Serbia, a pre-research was conducted. In the focus of this research are companies that operate in the Republic of Serbia, from the food industry. The research framework represents the systematisation of factors of distribution channels' length presented in Table 1. The objective of the research is to identify factors that have dominant role in making decision on distribution channels' length. Therefore, the research hypothesis is formulated in the following way: There is statistically significant difference between the factors indicated as drivers of distribution channels' length.

The evaluation of factors impact on decision about the distribution channels' length was done by top managers of the observed companies. The impact of each factors was evaluated based on the Likert scale (five point scale, where 1 means that the factor does not have any impact, while 5 means that the factor has great impact on decision about the distribution channels' length). Bearing in mind the fact that the sample is rather small (24 enterprises), the authors consider the results of analysis as informative and as an opportunity for identification of some new factors that should be included into evaluation and analysis. Data were collected by questionnaire, comprising of some general questions (type of industry, company's size, capital origin and so on) and questions concerning 27 factors of distribution channels' length. However, since reliability analysis, based on Cronbah's Alpha test, has shown that some variables (factors) should be excluded from further analysis, the actual number of the observed factors is 20 (Cronbah's alpha based on standardized items is 0.825). The data have been analysed by using usual statistical methods (descriptive statistics, ANOVA, factor analysis). In order to create an image about the estimated impact of observed factors on distribution channels length, they are observed at the group level (customer habits, product characteristics, market factors, company factors), and detailed analysis is planned after this pre-research. The results of descriptive analysis are presented in Table 2. Data indicate that customers' habits (2.51) and company factors (2.29) are the most important, from managers' perspective.

Table 2 Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CU	24	1.00	3.50	2.5104	.54911
PR	24	1.17	3.50	2.0069	.70622
MA	24	1.00	3.67	2.1806	.81043
CO	24	1.00	3.17	2.2986	.53383

Source: Authors

In order to evaluate whether the difference of the grouped factors' impact on distribution channel length is statistically significant, ANOVA was used. Based on the results from Table 3, it is obvious that there is statistically significant difference of the observed factors' impact.

Therefore, it might be said that from managers' point of view some factors are more important when deciding about distribution channel's length.

Table 3 ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.218	3	1.073	2.463	.007
Within Groups	40.067	92	.436		
Total	43.285	95			

Source: Authors

Even though some factors are considered more important than the others, it might be useful to see how individual factors are connected. For this purpose, cluster analysis is used and precisely dendrogram (Figure 3), as a diagram that shows the hierarchical relationship between objects (in this case created as an output from hierarchical clustering).

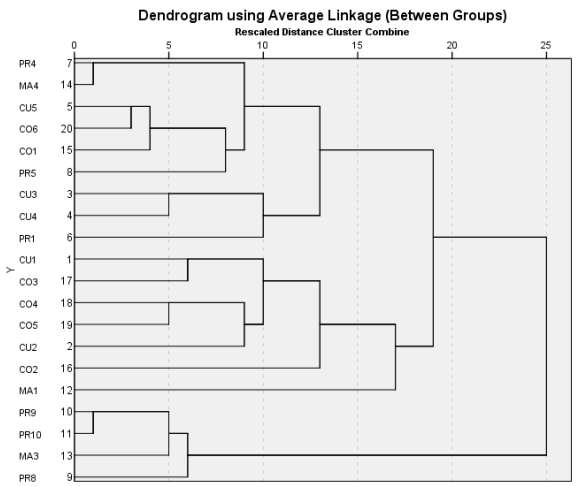

Figure 3 Dendrogram - hierarchical relationship between the factors

Source: SPSS software output (IBM SPSS 22)

According to the dendrogram, factors that are identified as the most important for determining the distribution channels length are at the same time closely connected factors. Therefore, for this level of the analysis, it may be concluded that customers' habits and company factors have decisive impact on deciding about the distribution channel's length.

Conclusion

Solving the dilemma of choosing direct or indirect distribution channels depends on defining an adequate model. It seems that the key issue in selecting one or the other distribution model is to accept trade-off between market coverage and costs concerning holding inventories. Long distribution channels will increase market coverage but also will provoke higher inventory costs.

The results of the research, partly presented in the paper, do not offer one precise solution about the type of distribution channels that should be chosen by analysed companies. However, they indicate the groups of factors that are considered as more influential on distribution channel's length in comparison to the others. Based on descriptive and ANOVA statistics it is obvious that the dominant groups of factors refer to customers' habits and company factors.

Certainly, the significant limitation of the research certainly is the sample size. Beside this one, another limitation concerns the analysis of distribution channels efficiency, since this would give an opportunity to analyse the impact of certain factors, not only on the length of distribution channels, but also on their efficiency.

Considering the number of papers and studies on the length of the distribution channel, it seems that this is a very interesting area. However, there is still no holistic approach that will define more detailed and precise recommendations when deciding on channel's length selection. In addition, the emergence of hybrid channels has the objective to overcome disadvantages of short and long distribution channels. Further research may be focused on understanding channels' design, in the sense of companies' freedom in choosing a channels' length or adapting to it and recognizing some other factors that could have an influence on distribution length, preferably by Delphi method. Since it is pointed out in the paper that establishing collaboration and ensuring coordination between partners is greatly affected by information technology, it is obvious that the importance of information technology is growing and that it should definitely be included into the list of factors determining the length of distribution channels that provides customers' satisfaction and channels' efficiency at the same time.SM

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Challenges of introducing intelligent packaging to the retail market of AP Vojvodina

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Abstract
The aim of this paper is to analyse the readiness of retailers in the AP Vojvodina market to adopt the concept of intelligent packaging. The importance and role of intelligent packaging as an integral part of the final product are highlighted in the theoretical section of the research. The most common benefits and obstacles on the market are identified. In the empirical section of the paper, the benefits and obstacles that appear when intelligent packaging is introduced are analysed on the sample of 23 trading companies on the territory of AP Vojvodina. The results showed significant variations among retailers depending on the size of the company, sales volume, number of employees and standards adopted. Based on the results obtained, a set of measures and procedures is proposed that should be implemented to encourage the implementation of intelligent packaging in the AP Vojvodina market. Suggestions for future research are provided in the paper.

Keywords
Intelligent packaging, retail, product, AP Vojvodina.

Introduction

In recent years, the global market has seen a growing trend in the introduction of new packaging technologies for consumer goods (Fast Moving Consumer Goods), mainly food and organic products (Jurjević, Bogićević, Đokić & Matkovski, 2019, Cappelli, D'Ascenzo, Ruggieri, Rossetti & Scalingi, 2019; Drăgoi et al., 2018). New packaging system technologies, such as intelligent and interactive packaging, are evolving in response to current industrial production trends and consumer demands to preserve product use value, i.e. growing needs for practical packaging, fresh and tasty food products with extended shelf life and quality control (Dainelli, Gontard, Spyropoulos, Zondervan-van den Beuken & Tobback, 2008). Changes in the retail sector, such as market internationalization and globalization, have resulted in longer supply chains and changes in consumer buying habits, which have led to shortening of shopping time and having as much information as possible to make that purchase safer (Končar, Marić & Vukmirović, 2019, Fedorko, Bacik & Gavurova, 2018; Gerpott, 2018). Such tendencies are the driving force for the development of new and improved packaging concepts, which extend the shelf life of a packaged product and enable more efficient maintaining and monitoring of its use value.

Unlike traditional packaging, which primarily has a protective and commercial function, intelligent packaging offers consumers the ability to communicate with packaged content, better protective function in the physical distribution process, greater benefits in terms of more practical use of packaging and preserving the characteristics of the packaged product itself (Vanderroost, Ragaert, Devlieghere & De Meulenaer, 2014). Intelligent packaging enables

all participants in the marketing channel, primarily the final consumer, to gather information about the production process and product history (e.g. nutritional composition, origin and quality of raw materials, place of production, storage conditions, temperature, humidity, microorganisms, etc.) as well as to track information about changes within the packaging (e.g. content contamination, freshness, etc.). There are three main technologies for realizing intelligent packaging, such as: sensors (e.g. chemical sensors for identification of CO2, H2S, NH3, etc.), indicators (e.g. TTI indicators) and radio frequency identification (RFID systems) (Realin & Marcos, 2014).

Given the above characteristics, intelligent packaging has become widely used in retail. Some studies indicate a significant market share of intelligent packaging. For instance, the share of packaging with chemical sensors is 7% in the total packaging produced, the share of self-venting packaging is 6%, the share of packaging equipped with TTI indicators is 2%, while the share of RFID systems is already around 16% (Shafiq, 2019; Bledsoe & Rasco, 2018; Dainelli et al., 2008). As a result of the use of innovative technological solutions, the key benefit of intelligent packaging is reflected in the ability to reconstruct the entire supply chain, from product manufacturing (place of production, composition of raw materials), packaging methods and conditions, distribution and storage, to its presentation and final consumption, and the process of disposal and/or reverse logistics (Marić, 2019).

Despite the obvious advantages, the implementation of the intelligent packaging concept and innovative/digital technologies is not yet fully accepted in all markets (Shafiq, 2019; Ruggieri, Savastano, Scalingi, Bala & D'Ascenzo, 2018). This is especially true for trading companies in developing countries, which, often due to expensive technology, decide not to change their placement policy (Končar, Grubor, Marić, Vukmirović & Đokić, 2018; Andrei & Darvasi, 2012). On the national market and the market of AP Vojvodina, there are few retailers who have fully embraced the concept. Therefore, *the subject of this paper* is the analysis of the possibilities of applying intelligent packaging in the retail market of AP Vojvodina. *The aim of the paper* is to identify the benefits and obstacles that emerge from its introduction. An empirical study was conducted on a sample of 23 companies in the consumer goods retail segment on the expected benefits and obstacles to introducing intelligent systems. *The practical significance of the paper* is reflected in the possibility of applying the obtained results in practice. Based on the research results, retail management can identify clear obstacles that limit the introduction of intelligent packaging, and optimize its implementation by undertaking a set of specific measures and procedures to minimize such obstacles.

1. Theoretical background

The prevailing view in the literature is that intelligent packaging is a specific type of packaging that, unlike conventional forms, is equipped with sensors and devices used to detect, read, monitor, record and transmit certain quality information of a packaged product (Kocetkovs, Muizniece-Brasava & Veipa, 2019). Accordingly, intelligent packaging is equipped with a variety of hardware components, the most common being NFC technology, RFID systems, TTI indicators and bio-sensors (Prasad & Kochhar, 2014). In retail, NCF - a short-range data technology, is most commonly used on meat and meat products packaging. NCF technology connects packaging to mobile phones and provides all the information that is needed by the final consumer, such as information on allergens, product freshness, storage conditions, etc. If the product contains some potentially harmful ingredients or allergens, the mobile phone will alert the consumer to their presence. In addition to NFC interaction, this type of packaging also contains a hidden UHF antenna and chip to prevent the unauthorized opening, taking and use of packaged product (Ortego et al., 2012). RFID systems, on the other hand, are affixed to product packaging and are used to transmit product information over radio frequencies. (Radio Frequency Identification). The RFID sticker is glued to the package or packaging (product, transport packaging, pallets, containers, etc.). This enables the movement of the product to be monitored throughout all production and distribution operations. In addition to retail, they are widely used throughout the physical distribution system (Rakić Sokolović, Ostojić, Lazarević & Stanovski, 2008).

NCF and RFID technologies enable timely exchange of information between all supply chain participants, thus enhancing the efficient consumer response (ECR). The goal of these technologies is, in fact, information connectivity that will enable the most accurate and efficient

transfer of data across the supply chain (Lovreta, Končar, Petković, Bogetić & Stojković, 2019).

On the other hand, TTI indicators, chemical and bio-sensors are used for communication between the packaging itself and the packaged contents. These sensors embedded in the packaging provide information on the presence of gases, humidity, storage temperature, product storage conditions, freshness, contamination, presence of allergens, etc. The information can be sent to smart devices or be visible to final consumers at the point of product display, such as colour changing of the packaging or colour changing of the special sensors indicated on the packaging (Rachmelia, & Imawan, 2018).

As the biggest problem with intelligent packaging, the studies (Realini & Marcos, 2014; Vanderroost et al., 2014; Dainelli et al., 2008) emphasize the economic justification and the fact that production of such packaging often requires high costs and investment. The implementation of modern technology that makes packaging intelligent and/or smart increases the cost of packaging itself, so packaging innovations should have a useful end result that would offset the additional cost of using modern technology. This is especially emphasized in transition countries where low consumer purchasing power can be a serious limiting factor, especially in the retail sector.

In addition to price, recent research defines satisfaction with traditional packaging, high costs and long installation time, unqualified employees, problems of standardization and certification, unclear performance of intelligent packaging, lack of modern devices and technologies, commercial unsustainability, etc. as limiting factors (Fang, Zhao, Warner & Johnson, 2017; Ghaani, Cozzolino, Castelli & Farris, 2016; Vanderroost et al., 2014).

Although it is assumed that the global intelligent and interactive packaging market will grow at a rate of 3% annually and account for about 25% of the total global packaging market with a value of over US $ 6.4 billion (Dobrucka, 2013), the concept of introducing intelligent packaging into supply chains and the retail sector is in the initial phase of implementation on the national and AP Vojvodina markets. Despite the obvious benefits, there are major obstacles and limitations to its full exploitation. In this context, there is a need to analyse and define the benefits, on the one hand, and the limitations or obstacles to introducing intelligent packaging into the retail sector of AP Vojvodina, on the other hand. It is important to identify indicators that determine limitations for retailers and propose a set of measures and/or procedures to minimize these limitations.

2. Methodology

2.1. Aim and hypotheses

The aim of the research is to identify the benefits and obstacles to the implementation of intelligent packaging in the retail market of AP Vojvodina. The main task is to determine whether different benefits and limitations of retailers depend on the size of a trading company, sales volume, number of employees and standards adopted. The aim and task of the research thus set out were operationalized through two basic research hypotheses:

H_1 – Obstacles to the introduction of intelligent packaging in trading companies in the market of AP Vojvodina vary depending on the size of a trading company, sales volume, number of employees and adopted standards.

H_2 – Benefits of introducing intelligent packaging in trading companies in the market of AP Vojvodina vary depending on the size of a trading company, sales volume, number of employees and standards adopted.

2.2. Research sample

The research included 23 trading companies in the retail segment of consumer goods, which operate in the market of AP Vojvodina. Retailers are grouped by size, sales volume, number of employees and standards adopted. In terms of size, retailers are equally grouped. Small trading companies represented the biggest portion of the sample – 30.4%, followed by middle-sized trading companies – 26.1% and micro trading companies – 26.1%, while the least represented were large retail chains –17.4%.

In terms of business standards adopted, trading companies are divided into two groups. A greater number of retailers in the sample, i.e. 73.9%, implemented the ISO9000 standard. The second group of respondents implemented the standards such as ISO9000 + HACCP + BRC standard, a total of 26.1% of the sample.

The sample can also be broken down by sales (operating income) in 2018, as well as by the number of employees.

The following table (Table 1) shows the distribution of trading companies in the sample by sales volume and number of employees.

Table 1 Research sample size

Sales volume in 2018	No.	%	Number of employees	No.	%
up to 100,000€	6	26.1	up to 10	5	21.8
up to 500,000€	5	21.8	10 - 50	7	30.4
up to 1,000,000€	8	32.5	50 - 250	6	26.1
over 1,000,000 €	4	17.4	over 250	5	21.8

Source: The Authors

2.3. Variables and data analysis

The statistical analysis program SPSS 20 was used to process the data. In order to get familiarized with the sample, descriptive statistics was used - frequencies for independent variables of nominal and ordinal levels of measurement and descriptive indicators for dependent variables. One-way analysis of variables (ANOVA) and T test for independent samples were used to test the hypotheses. Trading company's size, sales volume, the number of employees and the standards adopted are independent variables, while dependent variables are benefits and obstacles to the introduction of intelligent packaging in the retail market of AP Vojvodina, obtained as the average of the respondents' answers to the questionnaires.

2.4. Research procedure

The research was realized as part of the research project "Possibilities of applying intelligent packaging as a segment of green marketing logistics in the function of sustainable development in the market of AP Vojvodina" in the period July-September 2019. Based on the report of the Serbian Business Registers Agency (SBRA), a sample of 23 trade companies with headquarters in AP Vojvodina was selected. Trading companies are equally divided into sub-groups (strata) according to their size, income, number of employees and standards. The questionnaire was electronically distributed to managers (middle and top level). The questionnaire consisted of two sets of statements regarding the use of intelligent packaging, as follows: 10 statements for benefits and 11 statements for obstacles. Respondents expressed their agreement with the proposed statements on the five-point Likert-type scale (from 1 - completely disagree, to 5 – completely agree).

3. Results

In order to analyse the respondents' answers to the proposed statements about the benefits of introducing intelligent packaging, the following table summarizes (Table 2) the average ratings.

Table 2 Descriptive indicators of expected benefits from intelligent packaging in the retail market of AP Vojvodina

No.	Indicators	Min	Max	Mean	SD
1	Income growth	2.00	4.00	3.21	.79
2	Export growth	2.00	5.00	3.73	.81
3	More efficient supply chain	3.00	5.00	4.13	.62
4	Lower inventory costs	1.00	5.00	2.78	1.27
5	Delivery timeliness	1.00	5.00	3.17	1.19
6	Speeding up of physical and manipulative operations	2.00	5.00	3.91	.73
7	More efficient reverse logistics	3.00	5.00	3.95	.47
8	Easier product tracking	1.00	5.00	3.39	1.15
9	Lifetime extension	1.00	5.00	3.60	.94
10	More attractive packaging	2.00	5.00	3.52	.79

Source: The Authors

Based on these indicators, it can be concluded that retailers mostly agree with the statement that the use of intelligent packaging will increase the efficiency of the supply chain, i.e. facilitate the synchronization of production, transport and distribution plans (M=4.13). The respondents are most unanimous regarding this statement, rating it from 3 to 5. On the other hand, they least agree that the introduction of intelligent packaging will affect the reduction in inventory costs (M=2.78). Respondents rated this statement from 1 to 5, and the recorded standard deviation was highest for this question (SD=1.27). Significant benefits for retailers from the introduction of intelligent packaging include a more efficient reverse logistics process (M=3.95), i.e. reducing the rate of product being returned from a retail store due to its expiration date and/or defect, as well as speeding up physical and manipulative operations (M=3.91). Many retailers also expect significant export growth to markets that have already integrated intelligent packaging into their business systems, such as markets in EU, China, etc. (M=3.73). After the benefits are analysed, Table 3 shows the average values for the obstacles.

Table 3 Descriptive indicators of obstacles to the introduction of intelligent packaging in the retail market of AP Vojvodina

No.	Indicators	Min	Max	Mean	SD
1	Existing packaging	3.00	5.00	3.91	.66
2	Price	3.00	4.00	3.73	.44
3	Initial costs	2.00	3.00	2.73	.44
4	Different criteria of usefulness	2.00	4.00	3.30	.87
5	Long introduction period	4.00	5.00	4.56	.50
6	Standardization	3.00	5.00	4.47	.89
7	Consumer purchasing power	3.00	4.00	3.56	.50
8	Employees' lack of training	3.00	4.00	3.69	.47
9	Lack of technology	4.00	5.00	4.47	.51
10	Practical application	2.00	4.00	2.82	.83
11	Unsustainability	3.00	5.00	3.91	.66

Source: The Authors

In the group of indicators describing limitations, retailers largely agree with the statement that it takes a long time to fully implement intelligent packaging and that this period is often not in line with the seasonal character of the production and distribution of products, especially for easily perishable foodstuffs, fruits and vegetables (M=4.56). Respondents provided only ratings 4 (agree) and 5 (completely agree) for this statement. Identical average ratings are provided for standardization and the lack of modern technology (M=4.47). In accordance with the indicated answers, respondents from trading companies believe that standardization processes and procedures for obtaining different approvals from competent institutions in the market of AP Vojvodina can have a restrictive influence on the implementation of intelligent packaging. For respondents, the lack of modern technology and modern IT equipment and platforms is considered a limitation. Respondents least agree with the statement that the introduction of intelligent packaging will cause high initial implementation costs and significantly reduce profitability (M=2.73). The ratings for this statement were 2 (disagree) and 3 (undecided). For retailers, the real practical benefit, i.e. the practical application of intelligent packaging, is a significant indicator, which they do not consider to be a limiting factor (M=2.82).

In order to test the hypotheses, one-way analysis of variance (ANOVA) and T test for independent samples were applied.

First, it was examined whether there was a statistically significant difference in obstacles for the implementation of intelligent packaging in the retail market of AP Vojvodina, and whether these limitations differ depending on the trading company's size, sales volume, number of employees and standards adopted.

Applied analysis showed that there is a statistically significant difference between obstacles that appear in trading companies in the market of AP Vojvodina, depending on the size of the company ($F(3.23)=61.542$, $p<0.001$). Table 4 shows the result of the Scheffe's Post hoc test. Based on the test used, it is found that all four groups differ in the assessment of obstacles to the introduction of intelligent packaging. Independent retailers or micro trading companies provide the highest rating for limitations. The lowest significance to limitations is given by small companies, as limitations grow with the growth of a company.

Table 4 Differences in obstacles in relation to trading companies of different sizes

Trading company size	1	2	3	4
Small	3.3636			
Medium-sized		3.7273		
Large			3.9091	
Micro				4.0000*

Source: The Authors

Independent retailers cite lack of technology, satisfaction with existing packaging, and price as the biggest problem. On the other hand, the biggest problem of large retail chains is the long period required to introduce intelligent packaging systems and unskilled employees.

One-way analysis of variance was applied in order to compare the differences between trading companies with different sales volume in 2018. F test is statistically significant and is 17.115, while the significance is less than 0.001. Respondents with revenue of up to € 1,000,000 in 2018 provided the lowest average ratings of limitations, while retailers with a sales volume of up to € 100,000 provided the highest ratings. Table 5 shows the result of the Scheffe's Post hoc test.

Table 5 Differences in obstacles in relation to different sales volume of trading companies

Sales volume in 2018	1	2	3	4
up to 1,000,000 €	3.3636			
over 1,000,000 €		3.8231		
up to 500,000 €			4.2200	
up to 100,000 €				4.3700*

Source: The Authors

The most pressing problem for retailers with a small annual turnover (up to € 100,000) is the implementation of expensive technology, price

and high initial costs of introducing intelligent packaging.

In terms of the number of employees, retailers are also divided into four strata. Using one-way analysis of variance, the difference between these strata was examined. The obtained results show that the difference is statistically significant. F test is 14.15, $p<0.001$. According to the Scheffe's Post hoc test, it can be concluded that there is a difference between all four groups. The highest rating for limitations is provided by trading companies with up to 10 employees, while the lowest ratings are provided by those with up to 250 employees. Table 6 shows the differences obtained by the Scheffe's Post hoc test.

Table 6 Differences in obstacles between trading companies with different numbers of employees

Sales volume in 2018	1	2	3	4
up to 250	3.3636			
over 250		3.8340		
up to 50			4.1200	
up to 10				4.2100*

Source: The Authors

The results show that the obstacles are higher and more pronounced in trading companies with fewer employees (less than 10 and from 10 to 50 employees). Besides the already mentioned problems related to the lack of modern technology and satisfaction with existing packaging, these companies emphasize the problem of unsustainability, i.e. the questionable commercial profitability of intelligent systems. On the other hand, companies with more than 250 employees cite the lack of skilled labour as the biggest problem.

Finally, trading companies are grouped into strata by adopted standards. The first group consists of retailers with the adopted ISO9000 standard, while the second group consists of those who have ISO9000 + HACCP + BRC standard. To analyse the differences between the two groups, a T test for independent samples was used. The obtained results indicate that the T test is statistically significant, i.e. there are statistically significant differences between the groups. Higher score and higher ratings for obstacles are reported by respondents in trading companies with ISO9000 standard implemented. Table 7 provides detailed results of the applied analysis.

Table 7 Differences in obstacles in trading companies with different standards

Standards	No	Mean	SD	T	Sig.
ISO9000	17	3.88	.67	27.67	.000
ISO9000+HACCP+BRC	6	3.36	.16		

Source: The Authors

Trade companies with the adopted ISO9000 standard identify a very long process of standardization and obtaining various permits, certificates and approvals from competent state and provincial institutions and associations as the biggest problem for the implementation of intelligent packaging in the market of AP Vojvodina.

Given the applied analysis and the results obtained, the first research hypothesis $\mathbf{H_1}$ is accepted. It can be concluded that the obstacles for the introduction of intelligent packaging in trading companies in the market of AP Vojvodina are statistically significantly different depending on the trading company's size, sales volume, number of employees and standards adopted. In other words, different retailers face different obstacles, limitations and barriers to the implementation of intelligent packaging on the market of the AP Vojvodina.

After analysing differences in opinions on obstacles, it was examined whether there were differences between retailers in terms of the benefits they would expect from smart packaging. As in the previous cases, a series of one-way analyses of variance and a T test for independent samples were conducted. All the analyses showed that there was no statistically significant difference in the expected benefits between groups by trading company's size, sales volume, number of employees and standards adopted. There are no differences on the total score as well as in individual items. Table 8 shows the results of the analyses.

Table 8 Differences in trading companies in terms of the benefits from implementing intelligent packaging

One-way analysis of variance	F test	Sig.
Size of trading companies	1.958	.155
Sales in 2018	1.061	.365
Number of employees	1.254	.324
T test for independent samples	**T test**	**Sig.**
Standards adopted	1.117	.277

Source: The Authors

Based on the analysis, it can be concluded that the second research hypothesis $\mathbf{H_2}$ is rejected and that retailers in the AP Vojvodina market, regardless of differences in size, income, number of employees and standards, have the same level of expectations and benefits from the introduction of intelligent packaging systems.

4. Discussion

The conducted research has shown that the biggest obstacles to the introduction of intelligent packaging systems in the retail market of AP Vojvodina are a long implementation period, standardization, lack of modern technology and satisfaction with conventional forms of packaging. In this way, the results of previous studies (Fang et al., 2017; Ghaani et al., 2016; Vanderroost et al., 2014; Dainelli et al., 2008) have been partially confirmed, where, in addition to the above indicators, price was identified as one of the primary obstacles. The reason for this discrepancy is the fact that the studies also included final consumers who identified the final retail price as the biggest obstacle to purchasing products in intelligent packaging.

A significant contribution of the conducted research is reflected in the fact that different obstacles were defined for different subgroups of retailers in the market of AP Vojvodina. It can be noticed that independent retailers, i.e. trading companies with the lowest operating income, a small number of employees, and no other standard adopted except ISO9000, provide higher average ratings for all statements on obstacles. The chart below summarizes the comparative view of average ratings for statistically significant obstacles between independent retailers and large retail chains in the AP Vojvodina market.

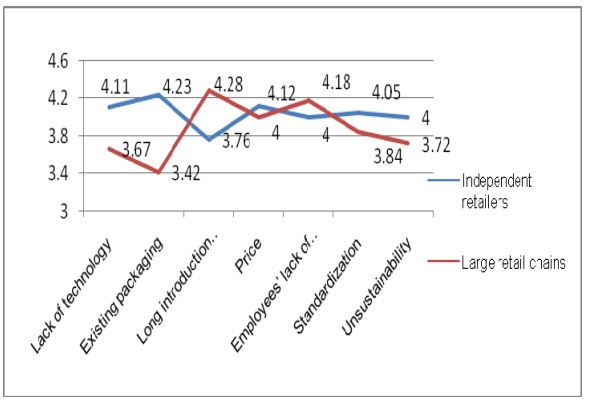

Figure 1 Average ratings of obstacles to the introduction of intelligent packaging in the market of AP Vojvodina
Source: The Authors.

In order to reduce the average ratings for all these obstacles, it is necessary that the competent state and provincial institutions undertake a whole set of measures and activities.

On the one hand, measures should target incentives for the introduction of intelligent packaging among all participants in the supply chain, and especially among independent retailers who experience the greatest problems. The measures should be directed towards tax breaks for economic entities introducing intelligent technologies, as well as taking appropriate measures in the form of co-financing the replacement of conventional packaging with intelligent systems. Furthermore, competent institutions should encourage all parties in the supply chain to participate jointly in EU funds financing the introduction of smart and intelligent packaging. In addition, professional associations would have to organize various training and retraining programs for employees in order to be able to work with modern technologies (Foerster-Pastor & Golowko,2018).

Trade policy makers, on the other hand, should fully align and harmonize national legislation and regulations on packaging and packaging material with the EU Directives and Regulations governing this field. Among others, these are: EU Directive on Packaging and Packaging Waste (94/62/EC); EU Directive relating to the labelling, presentation and advertising of foodstuffs (2000/13/EC); Regulation 1935/2004/EC for the safe use of active and intelligent Regulation 450/2009/EC of specific requirements for the marketing of active and intelligent materials and articles intended to come into contact with food packaging; etc. (Restuccia et al., 2010). At the same time, the Institute for Standardization of Serbia should harmonize Serbian SRPS ISO standards with international ISO standards, such as ISO 17366:2013 Supply chain applications of RFID - Product packaging; ISO 17367:2013 Supply chain applications of RFID - Product tagging, etc.

Conclusion

The research results, the analyses carried out and the hypotheses tested have shown that the retail market of AP Vojvodina shows a high degree of readiness to adopt intelligent packaging systems on the one hand, while having significant obstacles to its full implementation, on the other hand. All retailers tested, regardless of their size, revenue, number of employees and standards, are

equally aware of the benefits and advantages that such packaging would enable. However, the differences between them impose different obstacles to the full implementation of intelligent concepts in their business systems.

Independent retailers are facing the biggest problems. Removing their obstacles is not easy. It requires the simultaneous coordination of a set of measures and activities of all relevant institutions, professional associations and organizations. The problems faced by large retail chains are not so pronounced and it is assumed that they will be minimized with the removal of obstacles in independent retailers. What is common for all retailers is taking extensive steps regarding trade policy, where it is necessary to adopt a set of appropriate national standards and regulations, which must be fully aligned with EU legislative policy.

The shortcoming of the conducted research is reflected in the territorial limitation of the testing process solely to the sample of retailers who perform their principal activity and are headquartered in the territory of AP Vojvodina. The reasons for choosing this type of research sample are the authors' familiarity with the structure of the retail sector in the AP Vojvodina market, knowledge of the issue of placements on the national market and availability of necessary data through the Serbian Business Registers Agency (SBRA).

In the context of *suggestions and recommendations for future research*, it is necessary to extend the sample to retailers headquartered in other regions of the national market and to compare it with similar results in the Western Balkans region, as well as to perform comparison between EU and non-EU countries. Final consumers' views should be included in the analysis and their views should be compared with retailers' views. Such research would further complement the scientific **contribution** in solving the problems of introducing intelligent packaging on the national market of the Republic of Serbia.

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The development of working capital management and its impact on profitability and shareholder value: evidence from Germany

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Abstract
This study investigates empirically the development of working capital management and its impact on profitability and shareholder value in Germany. We analyse panel data of 115 firms listed on the German Prime Standard, covering the period from 2011 to 2017. The results provide evidence that efficient working capital management, indicated by a shorter cash conversion cycle, deteriorated over time, but that a shorter cash conversion has a positive impact on profitability and shareholder value. The findings highlight the need that managers should give greater priority to working capital optimization, even in a low-interest environment. The paper contributes to the literature by advancing this research area in Germany, and it is the first study investigating shareholder relationship with working capital management and all its determinants.

Keywords
Working capital; working capital management; cash conversion cycle; profitability; return on capital employed; shareholder value; market value added; Germany; panel data.

Introduction

Working capital management, i.e. the management of current assets and current liabilities, is an aspect of managerial accounting and an important component in a firm's financial success. It can be considered a holistic approach to improving a company's liquidity, profitability, and value (Gitman & Zutter, 2015). Working capital management had regained in importance during the financial crisis as a source of internal financing when there was limited or no access to external capital (Gleich, Horváth & Michel, 2011). Consulting firms offer their services in the improvement and optimization of working capital management and regularly publish working capital studies on the current trends in specific regions. Despite the relevance of working capital management, some studies conclude that it has recently been of minor importance due to the low-interest environment, which provides cheaper financing for companies (Deloitte, 2017; REL Consultancy, 2017). However, also in times of cheap money, working capital management provides enormous cash potentials (Deloitte, 2017) as the working capital components accounts receivable and inventory account for a substantial portion of a company's assets. In the case of the

firms considered in this paper, the components constitute approximately 23% of their total assets; further, the calculation of a cash potential revealed that roughly €326 billion could be released from their balance sheets in 2017 (for the calculation of a cash potential see Seeger et al., 2011). These calculations underline the importance of prioritizing working capital management.

In addition to the regularly published industry studies of consulting firms, numerous scientific studies statistically analyse the positive influence of working capital management on profitability in various countries and contexts (Singh, Kumar & Colombage, 2017). This study intends to unite the two types of investigation, working capital studies, and statistical research on working capital management and brings them up to date in the context of Germany. The purpose of this research is twofold. First, we empirically examine the development of working capital management, and second, we investigate the impact of working capital management on profitability and shareholder value. Both analyses are based on 115 firms listed on the German Prime Standard for the period from 2011 to 2017 (you can also see an example of analysing an array of data in the source: Westbrook, Pera, Neguriță, Grecu & Grecu, 2019). The first research question is answered by analysing the variable cash conversion cycle (CCC), a measure for working capital management efficiency, over time (Van der Wielen, Van Alphen, Bergen & Lindow, 2006). We invest the impact of working capital management with panel data models, in specific with fixed effects (FE) and random effects (RE). The associated dependent variables profitability and shareholder value are estimated with return on capital employed (ROCE) and market value added (MVA), respectively.

This study contributes to research threefold. First, it provides recent evidence on the development of working capital in business firms in Germany. Second, there exist only a few studies investigating the impact of working capital management on profitability in Germany, which are out of date and published in German language only (Meyer & Lüdtke, 2006; Wöhrmann, Knauer & Gefken, 2012). Third, this paper contributes to the literature by assessing the relationship of shareholder value with working capital management and all its determinants. So far, the effect of overall working capital management on shareholder value has been confirmed by only few authors, but not for Germany (Kieschnick, Laplante & Moussawi, 2013; Wang, 2002).

The remainder of this paper is outlined as follows: Section 2 provides a brief theoretical background on working capital and its components. Section 3 presents a literature review and derives the respective hypotheses. Section 4 discusses the research design, which is subdivided in the description of data, the definition of variables and the explanation of the research methods. The empirical results are outlined and discussed in Section 5. The study concludes with a summary of the findings and the resulting implications.

1. Theoretical background on working capital

In addition to the investment (see for examples: Subic, Vasiljevic, Andrei, 2010), working capital management is an important area in financial management and relates to the overall management of current assets and current liabilities. Although traditionally working capital refers solely to current assets, this study relates to the more common definition of (net) working capital as the difference between current assets and current liabilities. Hence, it reflects the portion of current assets financed by long-term debt and equity (Schall & Haley, 1986).

The primary goal of working capital management is to release capital tied up in daily operations to increase liquidity. The released cash can be utilized for internal financing, and the avoided external funding reduces the capital cost (Gleich et al., 2011). Moreover, improvements in working capital do not only increase liquidity but, above all, efficiency in operational processes. The resulting lower costs tend to increase financial profits (Van der Wielen et al., 2006).

In contrast to the main and intellectual capital (see for example Bratianu, 2018), the drivers of working capital management are accounts receivable management, inventory management, and accounts payable management. The underlying idea is to reduce accounts receivable by collecting cash more quickly (e.g. through renegotiating payment terms and granting discounts for early payment, implementation of the principles of sharing economy (see for example Popescu, 2018). Further, accelerating the turnover of inventory, for example by ordering stocks just-in-time through lean manufacturing, lowers stocks. Lastly, firms should maintain higher values of accounts payable as a result of

delaying payments to suppliers, thus making use of supplier credit (Van der Wielen et al., 2006).

A popular and comprehensive measure of working capital management efficiency used in practice, combining the drivers of working capital, is the cash conversion cycle (CCC) (aspects of cycle theory see for example Isaic, Smirna & Paun, 2019; Gitman, 1974; Deloof, 2003). The CCC focuses, with its three components days sales outstanding (DSO), days inventory outstanding (DIO) and days payables outstanding (DPO), on the length of time in days it takes a firm to convert the cash invested in its operations into cash flows through purchasing, production, and sales. As shown in figure 1, the CCC is calculated by deducting the payment period (DPO) from the operating cycle (the sum of DSO and DIO), which is the period from the beginning of the production process to the collection of cash and the sale of the finished product. The aim is to reduce the length of the CCC to a reasonable minimum. The shorter the CCC, the lower the capital requirements (Gitman & Zutter, 2015). Nevertheless, a positive gap in the CCC is normal for many industries to ensure the smooth running of their business, for example by pre-financing production (Charifzadeh & Taschner, 2017).

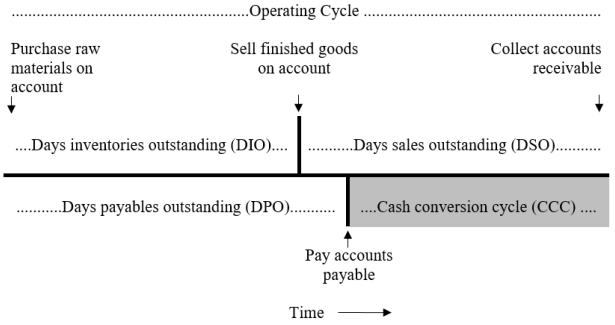

Figure 1 The cash conversion cycle
Source: adapted from Gitman & Zutter, 2015

Practice shows that there exists a trade-off in working capital management between a firm's profitability and risk and hence makes working capital management a task of optimization (Gitman & Zutter, 2015). For instance, high-pressure collection techniques might deter potential customers and lead to lost sales. Keeping inventory too low risks stock-outs, not being able to respond to sales peaks or special customer needs, and a bad reputation among customers (see foe example Pauna, 2019). Further, a firm cannot delay payments indefinitely, because it would risk good relationships with suppliers, creditworthiness (restricted access to bank credits) and legal consequences (Van der Wielen et al., 2006). The critical question is, therefore, how and to what extent companies must manage their working capital in order to keep it as low as possible but as high as necessary (Gleich et al., 2011; Charifzadeh & Taschner, 2017).

The sufficient level of working capital largely depends on a company's industry and client base (Van der Wielen et al., 2006). Some industries, such as pharmaceuticals and industrial production, have inherently high levels of capital requirements and large cash gaps, whereas other sectors such as the telecommunication industry even achieve to manage a negative CCC (PricewaterhouseCoopers, 2017).

From a broader perspective, working capital management also plays an integral part in the overall corporate strategy to create shareholder value. Rappaport (1986), who initiated the shareholder revolution in the 1990s with the goal to integrate value orientation as a principle of modern governance, emphasizes already in his standard 1986 work the particular role of working capital in determining shareholder value. He incorporates working capital investment as a key value driver into his shareholder value network, which has a direct impact on operating cash flow and thus on value creation (Rappaport, 1998). In particular, changes in working capital are added (increase in working capital) or subtracted (decrease in working capital) from the forecast operating cash flows and discounted to a present value (Rappaport, 1999). The discounted cash flow (DCF) approach recommended by Rappaport has become popular in corporate valuation and is the most common technique alongside other approaches such as the multiples method or market valuation (Brotherson, Eades, Harris & Higgins, 2014; Koller, Goedhart & Wessels, 2015). The direct link between working capital and the DCF approach is a core reason why companies put a lot of effort into working capital optimization.

2. Literature review and hypothesis development

2.1. The development of working capital management

Regarding the levels of working capital in companies over time, there exists a number of non-academic studies by accounting and consulting firms. These companies have

discovered working capital management as a promising line of business and are offering their working capital reduction services as an opportunity to create shareholder value and liquidity. The following review summarizes the most relevant findings of their recently published studies.

A study by PricewaterhouseCoopers (PwC) showed a slight decrease of CCC in 2017 (-0.4 days), but a deterioration from 2013 to 2017 by 1.3 days (PricewaterhouseCoopers, 2018). They found a worsening of DSO and DIO over this period, which was mostly offset by a vast improvement in DPO, i.e., accounts payable management. They commented on this development as problematic and unsustainable in the long term, since the cash burden is passed down the value chain, which increases the risk (including financial risk (see for example Valaskova, Kliestik & Kovacova, 2018)) for all parties. The study further states that investment was sacrificed to maintain cash flows, which, in the long run, will pose a threat to their growth. No link is made to profitability or value of a firm.

The "Europe Working Capital Survey 2017" conducted by REL Consultancy (2017) found a similar development in working capital management and its components for the 1,000 largest non-financial companies in Europe from 2008 to 2016. The study further explained that the increased payment periods are probably a consequence of the recently implemented late payment directive in the European Union in 2017. It defines that suppliers need to be paid within 60 days latest and it intends to prevent late payments, harming particularly small and medium-sized enterprises (SMEs) in countries like Spain and Italy. According to the study, countries with shorter payment terms reacted and started to extend their payments to 60 days, consequently hurting credit periods.

Also, PwC's working capital study on the countries Germany, Austria, and Switzerland from 2007 to 2017 is in line with global and European development (PricewaterhouseCoopers, 2017).

Deloitte's working capital study 2017 on the 213 biggest German non-financial firms from 2010 to 2015 showed opposite results to the previously presented studies, with a slight improvement in the CCC by one day. The firms' DSO and DIO improved, whereas DPO worsened (Deloitte, 2017).

In summary, working capital management performance slightly deteriorated over the last years from an international perspective, whereas studies covering Germany, the country of interest, showed an opposing trend. This research updates the development of working capital in Germany by testing whether the positive development can be confirmed for the underlying data sample:

H1: Working capital management in Germany improved during the period from 2011 to 2017.

2.2. The impact of working capital management on profits of domestic and international corporations

A large body of empirical research addresses the impact of working capital management on profitability. Most of these studies focus on specific countries, conduct multi-sector analysis and exclude financial firms in their investigation due to the specific nature of their activities. The research field initially emerged in the United States and became popular in Asia. Also in Europe researchers increasingly assess the topic (Singh & Kumar, 2014).

The pioneer works of Jose, Lancaster, and Stevens (1996), Shin and Soenen (1998) and Wang (2002) introduced the CCC as a measure for working capital management. Jose et al. (1996) conducted multiple regression analysis for 2,718 U.S. firms from 1974 to 1993. They found that the independent variable working capital management, defined as a shorter CCC, relates positively with the dependent variable profitability, measured with return on assets (ROA) and return on equity (ROE). The same relationship was found by Wang (2002) for 1,555 Japanese and Taiwan firms between 1985 and 1996. Shin and Soenen (1998) covered a similar sample as Jose et al. (1996) and likewise found a negative association between the length of the CCC and two operating margin ratios.

Subsequent studies consistently assessed working capital management with the CCC, although with slightly differing definitions. Researchers additionally started to analyse the CCC components DSO, DIO, and DPO individually. The literature shows a consistent approach in the methodology, namely conducting correlation analysis and different types of regressions for panel data. Most frequently pooled ordinary least squares (OLS) or fixed effects (FE) regression is applied (e.g., Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Pais & Gama, 2015). FE models reduce the issue of correlated error terms, a violation of the regression assumption, which is often present in

panel data (Greene, 2003). Additionally, the inclusion of control variables in the regression equation is standard, yet these variables are not of great interest (Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Lazaridis & Tryfonidis, 2006).

One of the most influential studies is the work of Deloof (2003). Deloof's motivation to conduct the study was the large amounts of cash firms invested in working capital, whereupon the author concluded that working capital management must have a significant impact on firms' profitability. For a sample of 1,009 firms in Belgium from 1992 to 1996, the study found a negative and significant relationship of the CCC and all its components (DSO, DIO, and DPO) with gross operating income (GOI). Another paper showed identical results by assessing the same relationship with GOI but in the context of the Athen Stock Exchange (Lazaridis & Tryfonidis, 2006). García-Teruel and Martínez-Solano (2007) introduced the investigation on SMEs with the argument that for them the management of short-term assets and liabilities is especially relevant. They analysed 8,872 companies in Spain, covering the years 1996 to 2002, and gave evidence for a negative and significant relationship of DSO and DIO with ROA; they also found a negative relationship with DPO, however, the negative impact was not significant. Pais and Gama (2015) and Lyngstadaas and Berg (2016) are one of the authors who likewise focused on SMEs in Portugal and Norway respectively. Other authors, like Eljelly (2004), Taghizadeh, Ghanavati, Akbari and Ebrati (2012), and Singhania and Mehta (2017) focused on emerging markets. Yet another author, namely Enqvist, Graham and Nikkinen (2014) studied the role of business cycles in the link between working capital and corporate performance by implementing recession and boom dummy variables.

Only a few studies found a positive relationship between working capital management and profitability, which object theory. Sharma and Kumar (2011) found a positive correlation for 263 Indian firms listed on the Bombay Stock Exchange, but the authors drew conclusions from statistically insignificant results.

The role of accounts payable in working capital management is controversial and little discussed. In empirical findings, DPO is often negatively correlated (Enqvist et al., 2014; Lazaridis & Tryfonidis, 2006). This effect is inconsistent with the theoretical view that a shorter CCC, which can be achieved through the extension of payments to suppliers, leads to higher profitability. An often repeated argument by Deloof (2003) is that less profitable firms wait longer to pay their bills, or that companies redeem substantial discounts for early payments. However, no other study tried to give further explanations (e.g. Enqvist et al., 2014; Lazaridis & Tryfonidis, 2006; Raheman & Nasr, 2007). Since the negative effect was also sometimes found to be insignificant, this relation remains unclear (García-Teruel & Martínez-Solano, 2007; Meyer & Lüdtke, 2006).

In Germany, there are only two studies on the impact of working capital management on profitability published in German language. First, Meyer and Lüdtke (2006) considered the relationship between working capital management and ROCE for 7,420 selected German firms covering the single year 2003. The only significant result was that a higher inventory turnover positively influences a firm's profitability. As the authors were not able to prove the findings of previous research, they suggested extending the work with a longer period. Six years later, Wöhrmann et al. (2012) continued the research and considered working capital management of 4,963 German firms in light of the financial crisis (2007-2009). Their research motivation was the need for internal financing in times of crisis and the question of whether too aggressive working capital management, e.g., too aggressive receivable management, might harm customer relations. The conducted regression analysis, with ROCE as the dependent variable, revealed a positive impact of working capital management on profitability. In specific, they found a negative and statistically significant relationship for the ROCE with DIO, a positive and statistically significant relationship with DPO, and a positive but not statistically significant association with DSO.

Overall, empirical research, nationally as well as internationally, shows fairly consistent results and provides evidence of an inverse relationship between efficient working capital management, measured with the CCC and profitability ratios. This paper intends to add to the research of Wöhrmann et al. (2012) for the subsequent years 2011 to 2017 after the financial crisis. This leads to the following hypothesis:

H2.1: Efficient working capital management has a positive impact on the profitability of German firms.

2.3. The impact of working capital management on shareholder value

In addition to Rappaport's (1999) reasoning that in a discounted cash flow approach changes in working capital reflect on the cash flow calculation, working capital management contributes to shareholder value creation mainly through the capital charge. The capital charge is the product of a firm's capital employed and its cost of capital (Young & O'Byrne, 2001). Since working capital is part of the capital employed, a firm can operate with a lower capital charge by economizing in working capital. A lower capital charge, in turn, results in an increase in value.

Many of the previously mentioned papers concluded that working capital management also increases shareholder value, even though they only considered traditional profitability measures (e.g., Deloof, 2003; Meyer & Lüdtke, 2006; Shin & Soenen, 1998) and do not test the relationship to value. Profitability measures are inappropriate to determine the creation of shareholder value as accounting profit terms do not account for the entire cost of capital and are subject to accounting principles (Rappaport, 1999; Charifzadeh & Taschner, 2017).

There exist only a few published papers that handle the shareholder value relationship using a different measurement approach. Kieschnick et al. (2013) adopted an integrated cash flow approach to working capital management by following the base-line valuation model of Faulkender and Wang (2006). Their results show that, on average, U.S. corporations value an additional dollar invested in net operating working capital less than a dollar held in cash.

Wang (2002) takes a simpler approach by assessing the impact of working capital management on corporate value with the metric Tobin's Q, the market value of equity and book value of debt over the book value of total assets. No such study exists for the German market. The following hypothesis generalizes the positive relationship between shareholder wealth and working capital management found by Kieschnick et al. (2013):

H2.2: Efficient working capital management has a positive impact on shareholder value.

3. Research design

3.1. Data

The data sample for testing the hypothesis consists of all listed firms on the Prime Standard, a segment of the Frankfurt Stock Exchange, at the end of the year 2017. Its composition was retrieved from the German newspaper "Börsen-Zeitung". Due to its high transparency, its great influence on the German economy, and its diversity (mix of classic, technological and top-selling companies from various industries), the Prime Standard can be regarded as a representative sample for the German economy.

All calendar year data from 2011 to 2017 were retrieved from the FactSet Research System. For the conducted analysis, the firms were classified according to the nine supersectors in the German stock index (DAX): Consumer Goods, FIRE (Finance, Insurance, and Real estate), Basic Materials, Industrials, Consumer Services, Pharma & Healthcare, Information Technology, Tele-Communication, and Utilities (Deutsche Börse AG, 2017). Consistent with previous research, the FIRE sector was excluded from the data sample as well as firms with incomplete data. The sample consists of 116 firms or 812 firm-year observations for the analysis with ROCE and 784 firm-year observations for MVA. To prevent biased results in the analysis, one outlier firm was eliminated from the data. Hence, the final sample represents a balanced panel with n=115 firms, T=7 years, and N=805 observations for the analysis with ROCE, and an unbalanced panel with n=115 firms, T=3-7 years, and N=777 observations for the analysis with MVA.

3.2. Variables

When analysing the relationship between working capital management and profitability, most studies assessed profitability with GOI or ROA (Knauer & Wöhrmann, 2013). An alternative return ratio, which is quite popular in practice, is the return on capital employed (ROCE). ROCE considers only capital, equity, and debt, for which their providers, shareholders, and creditors, require a return. We, therefore, consider ROCE as more appropriate for measuring profitability in our study, because it assesses financing and operating performance showing how efficiently a company is utilizing its capital to generate profits to shareholders and creditors (Whiting, 1986). ROCE is calculated as earnings before interest and taxes (EBIT) over capital employed (CE).

The latter figure is calculated as the average of the current and the last period, to overcome the different time dimensions of the income statement and balance sheet figures.

Figure 2 depicts that working capital has both a direct and indirect effect on ROCE. Efficient working capital management directly reduces the CE of a company by reducing the capital tied up in operations. The indirect effect is that efficient working capital management improves operational processes and consequently reduces operating costs, which should have a positive effect on EBIT. Conceptually, both effects should lead to an increase in ROCE (Simons, 2000).

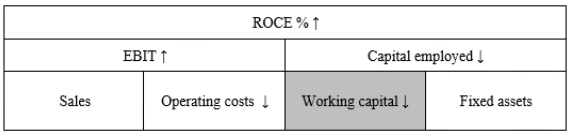

Figure 2 The effect of working capital on return on capital employed
Source: adapted from Gleich et al., 2011

ROCE is not a measure of shareholder value creation, though. We operationalize shareholder value creation by using the metric market value added (MVA). MVA represents the additional value that management creates beyond the capital employed (CE), provided by both shareholders and bondholders (Stern & Shiely, 2001). Consequently, it is a suitable extension to the profitability ratio ROCE. If a company's market value exceeds CE, reflected by a positive MVA, this indicates value creation. The firm's management aim should be to create as much MVA as possible. The metric MVA is conceptually linked to the free cash flow model of valuation and can be calculated as the sum of all future economic value added (EVA) discounted at the cost of capital (MVA ex-ante) (Hoke, 2002). Yet, as this study solely relies on data available to external analysts, MVA is calculated according to another common approach, which is the difference between the market value and CE (MVA ex-post) (Young & O'Byrne, 2001). Theoretically, efficient working capital management increases MVA by reducing CE and accordingly the deduction base from the market value.

The explanatory variables for ROCE and MVA are the working capital measures DSO, DIO, DPO, and CCC. The variables' advantage is that they provide relative, not absolute, information, thereby making cross-company comparison possible (Knauer & Wöhrmann, 2013). The ratios' computation follows previous studies in this field (Jose et al. 1996; Shin & Soenen, 1998; Deloof, 2003) but requires averages for the balance sheet figures to account for volatile balance sheet positions (Charifzadeh & Taschner, 2017).

Several control variables were considered in the regression, to test the relative and causal relationship between working capital management and the dependent variables ROCE and MVA (Mooi & Sarstedt, 2011). The choice of the control variables was inspired by previous studies (e.g., Deloof, 2003; Sharma & Kumar, 2011). The size of the firm (SIZE) is calculated as the natural logarithm of sales because the log transformation minimizes both heteroscedasticity and the influence of outliers in the regression model (Jose et al., 1996). Growth in sales (SGROWTH) is measured as (Salest - Salest-1 / Salest-1); firm leverage (LEV) is obtained by taking total debt over total assets; industry differences are controlled through dummy variables (IND) ranking the nine DAXsupersectors from 9= highest capital intensity to 1= lowest capital intensity to be able to draw useful conclusions in the analysis (ranking based on PricewaterhouseCoopers, 2017).

3.3. Methodology

3.3.1 The development of working capital management

The hypothesis that working capital management in Germany improved over the period from 2011 to 2017 was tested by calculating the averages of the CCC for each year. Efficient working capital management improved if the CCC declined in the investigated period, comparing the years 2011 and 2017. Additionally, the percentage change of the CCC for all seven years was calculated and averaged to see whether the overall change was negative, giving evidence for an improvement in working capital management. This two-step approach ensures the exclusion of possible one-time effects in 2011 or 2017.

To gain further insights, the development was broken down into the CCC's components and the individual industries.

3.3.2 The impact of working capital management

The second hypothesis, which considers the impact of working capital management on profitability and shareholder value, was tested by

conducting panel data regression following Deloof (2003). For the regressions with ROCE, the Hausman test indicates the fixed effects model (FE) while for the regressions with MVA, random effects (RE) is preferred (Hausman, 1978).

It is important to measure each working capital component separately with the control variables to determine their individual effects (Knauer and Wöhrmann, 2013). Hence, to investigate the relationship with ROCE we consider four regressions with fixed effect estimates and for MVA four regressions with random effect estimates. We investigate in series the effect of the independent variables CCC, DSO, DIO, and DPO on ROCE and MVA respectively, always with the same control variables: size, growth, leverage, and industry. To account for possible heteroscedasticity and autocorrelation, we apply Newey-West (NW) robust standard errors (Newey and West, 1987).

To account for possible heteroscedasticity and autocorrelation, we apply Newey-West (NW) robust standard errors (Newey & West, 1987).

4. Empirical analysis and discussion

Table 1 shows the descriptive statistics for the adjusted data sample, containing 115 German firms over the period from 2011 to 2017.

Table 1 Descriptive statistics

	Mean	Minimum	Maximum	Standard deviation
ROCE (in %)	9.69	-41.33	50.00	9.21
MVA (in million €)	416	-161,661	195,032	16,192
CCC (in days)	68	-79	320	63
DSO (in days)	57	1	192	26
DIO (in days)	67	0	269	53
DPO (in days)	56	5	257	33
SIZE	8	2	12	1.80
SGROWTH (in %)	7.99	-67.15	260.76	20.75
LEV (in %)	20.91	0.00	99.96	15.15
IND	7	1	9	2.19

Source: The Authors

ROCE for the sample is on average 9.69%. The mean for MVA is €416 million, and the variable has a high standard deviation because it is an absolute measure, therefore showing higher variation than ratios. The average CCC is 68 days. Firms collect their sales from costumers after an average of 57 days, it takes them on average 67 days to sell their inventory, and they wait on average 56 days to pay their bills. The mean value for the variable SIZE indicates that most of the investigated firms generate high turnovers, which reflects the composition of the Prime Standard. The firms' mean sales growth is 7.99%, and on average 20.91% of all assets are financed with financial debt. The values for IND indicate the dummy variable's range.

4.1. The development of working capital management

Figure 3 shows the line graphs for the CCC and its components and reveals a relatively flat line for the CCC from 2011 to 2017. The length of the CCC changed only slightly with an increase by one day from 67 to 68 days. Averaging the yearly changes in the CCC results in an average increase of 0.28%. The results give evidence to reject hypothesis 1, with the conclusion that working capital management deteriorated from 2011 to 2017. Considering the CCC components individually, inventory constitutes the largest proportion of the CCC followed by accounts receivable and accounts payable. Over the time period, DSO and DIO increased by three days and one day, respectively. DPO lengthened by five days.

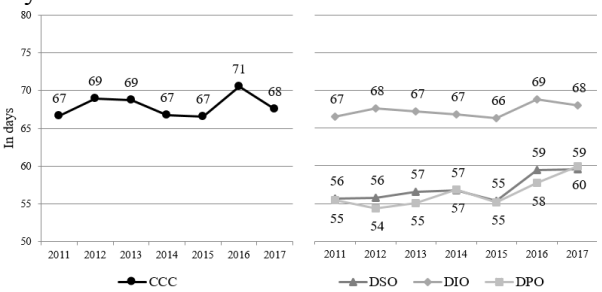

Figure 3 The cash conversion cycle and its components; development 2011 – 2017
Source: The Authors

These findings are not in line with Deloitte's working capital study on Germany, which found a decrease in the CCC by one day from 2010 to 2015 (Deloitte, 2017). Our findings confirm the results of the more international studies, which revealed a small deterioration in working capital management. We also see an unsustainable development of a substantial increase in DPO that partially offsets the increase in DSO and DIO.

Further analysis of the individual industries included in the sample reveals that all industries, except telecommunication, consumer services,

and utilities, show an increase in the CCC. Telecommunication and consumer services outperform the others, with an average CCC of minus five days and ten days, respectively (figure 4). The reason for this achievement is that being service industries, both exhibit rather low inventory levels, with telecommunications showing very low figures for DIO. Additionally, telecommunications achieved a considerable increase in the length of DPO compared to other industries. The sector consumer services performs well because it manages the most extended payment periods, and it is the second-best performer in receivable and inventory management.

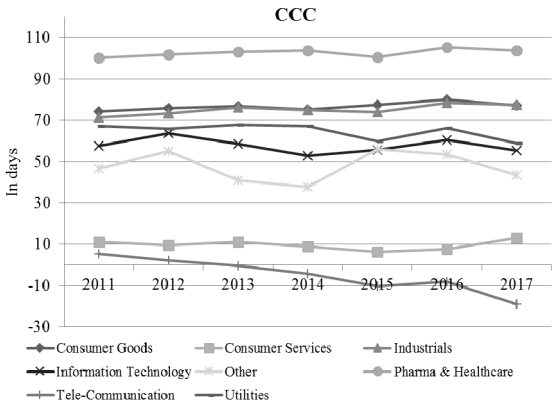

Figure 4 The cash conversion cycle across industries 2011 – 2017
Source: The Authors

When comparing the best performers of the CCC with the best performing industries in DSO, DIO, and DPO, it becomes clear that inventory management determines whether a company achieves to manage a short CCC, which is consistent with the findings of Lind, Pirttilä, Viskari, Schupp & Kärri (2012) who showed this for the automotive industry. The dominant role of DIO makes sense, as inventory constitutes the largest proportion of the CCC (figure 4). Especially poorly, caused by slow inventory turnover, performs the pharma & healthcare and the consumer goods industry.

4.2. The impact of working capital management

Table 2 shows the results for the FE estimation of ROCE using Newey-West (NW) robust standard errors. As the FE model eliminates anything that is time-invariant, the dummy variable IND drops in the ROCE regression models (Wooldridge, 2016).

Table 2 Regression output for ROCE; estimates and NW standard errors

Model	(1)	(2)	(3)	(4)
CCC	-0.0708 *** (0.02)			
DSO		-0.0758 ** (0.02)		
DIO			-0.0735 *** (0.02)	
DPO				0.0018 (0.02)
SIZE	2.27 ** (0.83)	2.24 ** (0.84)	2.20 * (0.86)	2.40 ** (0.91)
SGROWTH	0.0140 (0.01)	0.0121 (0.01)	0.0189 ' (0.01)	0.0248 ' (0.01)
LEV	-0.0967 *** (0.03)	-0.1151 *** (0.03)	-0.1124*** (0.03)	-0.1106 *** (0.03)
IND	-	-	-	-
R Square	0.1086	0.0829	0.0873	0.0597
F-statistic	20.89 ***	15.51 ***	16.40 ***	10.89 ***

*Note: Significance level at ***0.1%,**1% ,*5%, '10%*

Source: The Authors

All Models (1) through (4) regress ROCE as the dependent variable against CCC and its components. The estimates for CCC, DSO, and DIO respectively are negative and highly significant. Consistent with Deloof (2003), these results imply that a shorter CCC, achieved with the faster collection of accounts receivable and higher inventory turnover, positively contributes to a firm's profitability. The coefficient for accounts payable management, measured with DPO, is positive but not significant.

Comparing the coefficients of the significant working capital components shows that these key figures have approximately the same impact on profitability. Across firms and over time, an additional day increase in CCC, DSO, or DIO would yield in a reduction of ROCE of roughly 0.07 percentage points.

The control variables indicate that profitability tends to increase with the size and the sales growth of a firm, yet the latter effect is not statistically significant. A firm's leverage is significantly negatively related to ROCE, implying that a higher debt ratio results in lower profitability. To conclude, the results of regression models (1) to (4) offer strong evidence that efficient working capital management, indicated by a shorter CCC, improves

profitability, which consequently leads to the acceptance of hypothesis 2.1.

These relationships are consistent with most previous studies (e.g. Deloof, 2003; García-Teruel & Martínez-Solano, 2007; Lyngstadaas and Berg, 2016), except for the results for DPO. Most studies found a negative relation for DPO, contradicting theory postulating a higher DPO leading to lower working capital requirements, thus to higher profitability.

Table 3 shows the results for the random effect (RE) estimation of MVA using similar to previous estimation, Newey-West (NW) standard errors.

Table 3 Regression output for MVA; estimates and NW standard errors

Model	(I)	(II)	(III)	(IV)
CCC	-26.80 * (11)			
DSO		-15.17 (33)		
DIO			-5.77 (10)	
DPO				51.69 ** (19)
SIZE	-689.26 (970.04)	-602.676 (-0.61)	-575.25 (849)	-694.02 (879)
SGROWTH	-2.29 (28)	3.48 (26)	4.17 (26)	8.57 (26)
LEV	-181.64 *** (44)	-177.51 *** (42)	-179.48 (44)	-168.69 *** (41)
IND	667 ** (202)	436.65 * (205)	412.15 * (209)	458.52 * (211)
Intercept	6963.71	6778.17	6292.67	3358
R Square	0.0362	0.0239	0.023	0.0196
Chisq:	28.83 ***	11.868 **	17.34 ***	15.396 ***

*Note: Significance level at ***0.1%,**1% ,*5%, '10%*

Source: The Authors

Similar to the regression with ROCE, model (I) shows a negative estimate for CCC, meaning that a shorter financing gap has a positive impact on shareholder value, measured by MVA. In contrast to the ROCE model, where the negative relations of accounts receivable and inventory are highly significant and negative, the effects become insignificant in model (II) and model (III). Contrary, the positive impact of DPO in Model (IV) becomes highly significant in the regression with MVA. Thus, we find evidence that making use of trade credit by deferring payments to suppliers increases shareholder value. Interpreting the regression results with MVA as a whole, DPO has the highest effect on shareholder value, implying that an additional day in DPO would increase MVA on average by €51.69 million. The interplay of the working capital components, measured by the CCC, has the second largest impact and reduces MVA by €26.80 million per one additional day in the CCC.

The control variables SIZE and SGROWTH in the light of MVA exhibit very low significance levels. Also, the variable IND is not statistically significant. For the control variable firm leverage (LEV) we find a significant negative relationship in the MVA models, like in the ROCE models.

In conclusion, the results of regression models (I) and (IV) suggest that improved working capital management has a positive impact on shareholder value, hence leading to the acceptance of hypothesis 2.2. This view is in line with Kieschnick et al. (2013) who proved this relationship with an alternative integrated cash flow approach. It is also in line with theory as shareholder value is measured by the difference between the market value and CE (MVA ex-post).

It is worth further discussing the ambiguous role of accounts payable in working capital management because our findings indicate a positive, yet not significant, relationship with profitability in contrast to the majority of papers (e.g. Deloof, 2003; Enqvist et al., 2014; García-Teruel & Martínez-Solano, 2007; Padachi, 2006; Pais & Gama, 2015; Raheman & Nasr, 2007). Moodley Ward & Muller (2016) dedicated a whole research paper to this topic criticizing the negative relationship of payables found in many studies as a contradiction to theory. They proposed to consider a holistic metric such as long-term return to investors instead of profitability. Applying a portfolio analysis, they found a positive association between payable days and shareholder return for companies in sectors with significant investments in payables (matching the majority of industries included in this research), hence supporting working capital management theory.

Our findings suggest a highly significant positive impact of DPO on the shareholder value measure MVA and thus support the criticism of Moodley et al. (2016). The positive, though not significant, relationship with ROCE might underlie the same explanation, because the ratio is often considered as a value-based metric (Holler, 2009), therefore resembling shareholder value more than traditional return measures. ROCE

considered in a value-based context would also explain the positive relationship for payables found by Wöhrmann et al. (2012) who likewise calculated with ROCE.

Conclusion

This study examines the relationship between working capital management and profitability as well as shareholder value. We conducted panel data analysis for a sample of 115 firms and 805 firm-year observations in Germany covering the period from 2011 to 2017. We find that working capital management slightly deteriorated in Germany in the analysed period. In specific, the CCC increased by one day or an average of 0.28%. This increase is caused by an unsustainable development of a substantial increase in DSO and DIO, which is partially offset by longer payment periods. By analysing the performance of individual industries, we find supporting evidence, that inventory management is the key factor that determines whether companies achieve a short cash conversion.

Our regression analysis reveals that a shorter CCC increases ROCE. These findings are highly significant. Likewise, the analysis of the determinants of CCC shows that a shorter DSO and DIO have a positive and significant impact on profitability. The positive relationship of days payables and ROCE is not significant, though.

Prior empirical studies have focused primarily on the effect of working capital management on firm profitability (e.g., Deloof, 2003; Meyer & Lüdtke, 2006; Shin & Soenen, 1998) but failed to investigate the relationship with value. Our results for the relationship of working capital management and shareholder value indicate that a shorter CCC increases shareholder value, with longer payment terms having the highest and most significant effect.

The positive relationships of payables management in our regression analysis provide new evidence, as most previous studies found a negative relationship between payables management and profitability, which contradicts theory.

Considering the currently deteriorating trend in working capital management, the results highlight the necessity that managers should give greater priority to working capital optimization. Otherwise, they miss the opportunity that a shorter cash conversion, achieved through a combination of inventory, receivables and payables management, rises both profitability and shareholder value. For increased profitability, managers should focus on receivables and inventory management, which can be addressed with tighter credit policies or tools of lean manufacturing. In contrast, for the creation of shareholder value, extending payments periods to suppliers is crucial.

Our results correspond with previous literature, except that the effect of extending accounts payables is positive. This positive relationship is in line with theory and can be attributed to the value orientation of both dependent variables. We conclude that extending payment terms is particularly important in the long-term creation of shareholder value, whereas prompt payments increase profits in the short-run.

This study is one of the few to analyse the relationship of working capital management and shareholder value and advances the research topic on the impact of working capital management in the German market.SM

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Data quality in customer relationship management (CRM) – literature review

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Abstract
The aim of this paper is to examine challenges that organizations face when they start to deal with quality of customer data more seriously in order to manage their customer relationships better. Research extracted from the literature review has identified some problems with the quality of customer data as well as suggestions for their solutions. The author found that challenges regarding the quality of data used in customer relationship management are reflected in: decentralized data storage, inconsistencies in input and storage, inadequate integration of different data sources, different data defects, and their tendency in quality deterioration over time. In addition, problems have been identified in the high costs of maintaining data quality, as well as new challenges in the form of big data and open data. Possible improvement solutions have been suggested through a number of tools and frameworks by different authors

Keywords
Data quality, customer relationship management, DQ.

Introduction

A key source of the company's competitive advantage lies in its ability to dynamically respond to changes (Adamik et al., 2018). As a result of changes in the digital environment, companies are increasingly facing large amount of data stored in diverse and often inconsistent databases. The main necessity for the quality of data used to manage customer relationships is the need for accurate information that will serve to manage campaigns and determine customer value (Zahay, Peltier & Krishen, 2011). A 2015 Experian report identified that nearly 80% of organizations lack sophisticated access to data quality. Gartner's report predicted that "by 2017, 33% of Fortune 100 organizations will experience an information crisis, due to their inability to evaluate, manage and trust their information". This is followed by evidence suggesting that many organizations are unaware of their data quality problems and either ignore them or don't prioritize them (O 'Brien, 2015).

The subject of this paper is the set of challenges that organizations face when they become more serious about data quality (DQ) in the context of customer relationship management (CRM). The research question addressed in the paper is: What are the problems organizations face when dealing with the quality of their customer data and how can they be solved? The author has tried to present an overview of the most common problems in the field of data quality that organizations face, with an outline of possible solutions.

After explaining the concepts of CRM and DQ and their interrelation in Chapters 1 and 2, the author will refer to data quality issues in CRM and their potential solutions in response to the Research Question in Chapter 3. Subsequently, concluding considerations will be presented.

1. Customer relationship management (CRM)

CRM is a strategic approach to systematically target, monitor, communicate and transform relevant customer data into information that underlies strategic decision making and action (Missi, Alshawi & Fitzgerald, 2005). The goal of CRM is to improve operational efficiency,

achieve an acceptable level of customer connectivity (Reid & Catterall, 2014), manage customer relationships within the company and increase their satisfaction (Tu & Yang, 2013), and as a consequence of all this - increase revenue (Negahban, Kim & Kim, 2016). CRM enables organizations to identify and attract new customers, as well as increase retention of profitable customers through developing, strengthening and managing relationships with them, considering sustainable company growth (Sharma, Goyal & Mittal, 2010). In today's competitive business environment, key problems relate to the quality of organizational data and their integration and it is necessary to capture customer information in real time (Missi et al., 2005). Unfortunately, the reality is that CRM classification models are outdated, unbalanced, and noisy (Natchiar & Baulkani, 2014), and customer-stored data is often located in separate departments and not linked throughout the company's CRM (Missi et al. 2005). The problem with data quality only occurs when an organization wants to correct anomalies in one data source or when it wants to integrate data coming from different sources into one new data source. Due to the tendency of organizations to avoid or ignore the importance of data quality and their integration process, we often witness the failure of CRM projects (Missi et al., 2005). Companies misunderstand that it is necessary to have large amounts of customer data, and in fact it is much more important to have quality data (Zahay et al., 2011).

In order for CRM to be successful, it is necessary to integrate three key components: business processes, the human factor and technology (Negahban et al., 2016). Business processes need to be streamlined (because sometimes complex processes cause data complexity) (Foss, Henderson, Murray & Stone, 2002), employees need to be motivated by senior management and organizational culture to pay more attention to the quality of the data collected (Reid & Catterall, 2014), (Peltier, Zahay & Lehmann, 2013) and all this should be supported by the use of technology that will optimize customer interaction. As a large percentage of customer interactions will occur rather on the Internet than with employees, technology must adapt to a changing and unpredictable market (Chen & Popovich, 2003), but even the most sophisticated IT or business systems will not succeed if they rely on data of insufficient quality and if they are not structured for the purpose for which they are applied (Sharma et al., 2010). In some organizations, CRM is a simple technology solution that enhances customer targeting efforts through the use of a separate database and sales automation tools, while other organizations see it as a tool specifically designed for 1-on-1 customer communication, which is the responsibility of sales, call centers and marketing departments (Chen & Popovich, 2003).

Missi et al. (2005) cite the basic types of data that organizations collect about customers: demographics (gender, age, marital status, education level, home ownership, etc.) that are very stable and not very expensive, but the problem is that we can hardly get them on an individual basis with a high level of accuracy; behavioral data (types of purchases, payments, customer service activities, etc.) that are the easiest to predict, but are the most difficult and expensive to obtain from external sources; psychographic data (opinions, lifestyle, personal values, etc.) that can lead to improvement and be used to determine a customer's life stage, but the weakness is that they indicate behavior that may be highly, partially, or marginally related to the right behavior (Missi et al., 2005). In addition to these types of data, Zahay et al. (2011) also emphasizes the contact information of the users, which forms the basis for marketing efforts, as well as personalization i.e. the ability to tailor marketing communications to the individual customer. Personalized communication strategies can be developed by using demographic information with psychographic profiles to achieve interactive communication with users (Zahay et al., 2011), in order to create, elaborate and reinforce meaning in customers' relationship with the company (Ferreira et al., 2019).

It can be concluded that the quality of customer data is very important and that information about customers should be carefully collected, as it is one of the main, if not the main factor that will affect the performance of CRM systems. Having the right information at the right time is essential to a successful CRM strategy (Sharma et al., 2010).

2. Data quality (DQ)

Peltier et al. (2013) provided a definition of quality data: "Customer data are of high quality when the information collected across multiple transactions, touchpoints, and channels accurately reflects the behavior and sentiments of customers,

both collectively and individually" (Peltier et al., 2013). The high quality of well integrated customer data is the foundation of successful CRM projects. If the data quality problem is not resolved on time, low data quality can affect operating costs, customer satisfaction, effective decision making, and CRM workers' confidence. The trouble is that even when problems are noticed at an early stage, they are still difficult to address. That is why it is important to create a comprehensive data quality management strategy at the beginning of CRM implementation (Reid & Catterall, 2014) and to understand data quality management (DQM) as a continuous process (Even, Shankaranarayanan & Berger, 2010). Customer information is usually heterogeneous data collected from different sources, mostly informal, unlimited and in different formats (numeric and categorical) (Tu & Yang, 2013). They can contain a large amount of redundant and irrelevant information that affects the performance of CRM (Natchiar & Baulkani, 2014). The most common sources of "dirty" data are: legacy systems that contain poorly documented and outdated data, the distribution of data across databases in different departments with a lack of data coding standards, typing errors, poor data entry, missing data, etc. (Reid & Catterall, 2014).

Data quality is both a technical and organizational problem, it also requires understanding the types of information required and understanding how this information is used to make sound marketing decisions (Peltier et al., 2013). Most authors have tried to improve the quality of data using mathematical and programming solutions (Sharma et al., 2010). Technological developments have allowed new data mining (DM) approaches to analyze customer data to be applied to find the best CRM strategies (Natchiar & Baulkani, 2014). DM represents a large group of algorithms and methods that are used to analyse large data volumes (Dusmanescu et al., 2016) in order to extract comprehensible, hidden and useful information from data, to find unexpected connections between them (even predictive information that experts may miss because they are beyond their expectations) and to predict trends and behavior based on them. The process consists of observing specific examples in order to define general conceptual definitions (Vukelić, Stanojević & Anđelić, 2015). For DM tools to assist in CRM, appropriate data quality is crucial (Sharma et al., 2010), but it is not possible to establish generally acceptable procedures for DM classification, as it is difficult to find a single methodology that will address all DM problems that CRM data yields: heterogeneity, dimensionality, serious anomalies on data, unbalanced classification, data encryption, etc. (Tu & Yang, 2013). DM tools can provide answers to business questions that are time consuming and complicated to solve; it is only necessary to research which tools would be appropriate in which situation and apply them accordingly to improve data quality (Sharma et al., 2010).

The failure of the CRM system has been attributed to the inability to facilitate and improve the organization-level transfer of customer information (Peltier et al., 2013). The company needs to know the state of its data to know what needs to be improved and what benefits it will bring, and because of the difficulty of managing large amounts of data, companies will sometimes leave these problems to firms specializing in this (Foss et al., 2002). Higher quality targeting typically increases the value of a data set, but can involve a lot of costs. The elements that the data describe can change over time, such as changing a customer's address, their profession, marital status, etc., which means that their quality may deteriorate over time. Maintaining data at a high level of quality involves significant costs associated with efforts to detect and correct defects, set up management, redesign processes and invest in quality monitoring tools (Even et al., 2010). Eppler & Helfert (2004) split the costs into those caused by low data quality (verification, re-entry, compensation, low reputation, wrong decisions, sunk costs) and those to improve data quality accuracy (training, monitoring, development and usage standards, analysis, reporting, plan repair and implementation) (O 'Brien, 2015).

3. Data quality management – problems and solutions

By analyzing the extracted literature, an answer to the Research Question was formed, which presented the problems of different quality dimensions in CRM and potential solutions to some of the mentioned problems.

3.1. Solutions:

- Sharma et al. (2010) suggest that there should be a ranking of allowable and

expected data quality in CRM systems, which depends on the specific data element. Some data must be perfect, such as unique keys, internal security information, and anything audited. However, some other data may be estimates or even missing, making it easier to maintain bases and reduce their costs. Even et al. (2010a) have proposed a model that allows different levels of quality to be set for different records, so that optimal quality varies depending on the records.

- Reid & Catterall (2014) proposed simplification of the database architecture in order to make data quality support easier and more cost effective.
- Foss et al. (2002) state that it is sometimes better to focus on process simplification than on case integration.
- Practitioners of CRM classification require a standardized framework with simplified DM processes that could produce satisfactory results for CRM data in general, with all the DM challenges mentioned previously (Tu & Yang, 2013).
- Ahmed et al. (2016) have shown that using Java programming and SQL can define appropriate constraints and get 100% accurate data. Data from different users can be standardized for more accurate information and its processing. Using SQL servers will help address key data quality tasks, such as profiling, cleaning and refining, as well as auditing. This will create approaches that will reduce system integration costs, develop benefits, and mitigate data risks.
- The ability to update data throughout the system would be preferable in order to avoid problems when the country code is changed or when data is integrated from different sources. Consistency issues should be addressed at an early stage of integration by defining data standards and data rules within the organization (Jaya et al., 2007).
- Given the common legacy of poor data quality from a previous system being ported to a new system, the solution may be to invest in a data cleaner that will reform the data before being transferred to a new database so that it stores pure data only (Reid & Catterall, 2014).
- Using the right tools has a direct impact on the performance of the adopted CRM (Alshawi et al., 2011). As different types of errors can exist in the same data set, we often need to implement more than one error detection tool (Abedjan et al., 2016). Missi et al., (2005) cite a variety of tools that can be used to achieve data quality and integration: tools that provide insight into one relational access to data, tools that transform non-relational into relational data; tools that develop, test, and perform transformations in databases and automatically generate code that makes it easy to manage even the most complex transformations of all types of data and applications; tools for converting data among hundreds of formats and applications; tools for consolidation, verification, standardization, real-time data profiling; a tool that records, models, and maintains metadata from various sources, stores numerous models and versions.
- Data quality can be improved by e.g. automating data collection, continuous inspection, correction and cleaning of data (Even et al., 2010a).
- Data completeness is best addressed by improving the process of data entry by including data verification processes. In the case of mobile CRM, this can be automated or, in the case of traditional CRM, should involve an expert who will verify data entry, which will help improve accuracy in the organization (Jaya et al., 2007). Even et al. (2010a) propose that older data should be ignored, and that companies should invest in the quality of the newer data. It is only necessary to determine what percentage of the data should be captured.
- To ensure that eCRM uses the latest user data, organizations can apply rules that require the use of different date formats from the same source, so the one with the most recent date will be selected and saved (Ahmed et al., 2016). The mobile CRM system is explicitly designed to work with data from a central CRM system, which provides sufficient data accuracy. Scripts can be implemented to check the length of the attribute values (restrictive rules for checking country codes and a limited number of digits /

characters in mobile number / user name). A security identification scheme can be used during the registration process to verify the validity of the user's identity and his / her phone number. Application usage can also be monitored to find out which users are actively using the application and what messages they are interested in (Hable & Aglassinger, 2013).

3.2. Problems:

- Data is often stored in separate departments and it's not linked across the entire company's CRM (Missi et al., 2005).
- Lack of agreement on a standard set of dimensions that contribute to high data quality (Jaya, Sidi, Ishak & Affendey, 2007).
- Problems of logical consistency of data entry (in many organizations there is no common language of logically compatible data that would affect CRM (Alshawi, Missi & Irani, 2011), as well as inconsistencies in how information is stored in different units, which occurs because in CRM, almost everyone in the organization is in touch with the application. This results in a greater likelihood that data quality will be poor given the large number of people who interact with the data (Reid & Catterall, 2014).
- The status of existing customer databases created in the previous period when not much thought was given to the quality of the data being collected (Alshawi et al., 2011).
- Inadequate integration of different data sources, so each product has unique identifiers in the database and storage. In order to see the relevant data of the user's order, it is necessary to access the files in the database (Ahmed, Amroush & Ben Maati, 2016).
- Data collected and stored can have defects such as: incorrect (typing errors, misspelling, etc.) and missing values (initially blank values, changing and adding new ones) (Even et al., 2010), (Even, Shankaranarayanan & Berger, 2010a), duplicate records (Reid & Catterall, 2014), noise records, and unbalanced datasets (Natchiar & Baulkani, 2014), insignificant values (e.g. an attribute that preserves the value of a bank employee in charge of a customer) (Hable & Aglassinger, 2013). Defective data, in addition to misleading organizations about their customers, can compromise the performance of DM's data quality tools if they are not filtered out, because customer information is heterogeneous and with different scales, with many irrelevant features. (Tu & Yang, 2013).
- A unique value violation, whereby the same user can be stored in the database multiple times with a different user number (Hable & Aglassinger, 2013). It brings poor pairing of individual customer records and thus the inability of the company to determine how many customers it actually has because it has stored the same customer several times in the database (Reid & Catterall, 2014). Alshawi et al. (2011) and Reid & Catterall (2014) mention problems with the unique customer identifier, where one of such problems is cited by the lack of a postal code in European countries.
- Syntax violation. For example, it should be ensured that phone numbers are of a certain format, that they have a limited number of non-numeric characters, so that records with incorrect values are not stored (Hable & Aglassinger, 2013).
- Outdated values in user profiles (Even et al., 2010a). Values that were correct may not be true anymore. For example, the user may have changed the phone number (Hable & Aglassinger, 2013).
- Data quality deteriorates over time. The elements that the information describes can change over time, such as changing a customer's address, their profession, marital status, etc. (Even et al., 2010). If Amazon has 60 million active users per year, it begs the question whether it is economically logical to maintain all records at a high level or whether it should be limited to a specific subset (Even et al., 2010a).
- High costs for maintaining a new database (Reid & Catterall, 2014). Maintaining data at a high level of quality involves significant costs associated with efforts to detect and correct defects, set up management, redesign processes and invest in quality monitoring tools (Even et

al., 2010).

- New challenges in data quality management resulting from new technologies - big data and open data (Jaya et al., 2007). Armeanu, Andrei, Lache & Panait, (2017) stated that although "it is not possible to determine a priori whether this huge amount of data should be entirely used in the decision making process", one cannot ignore complex relationships that are based on the correlations between variables and output (Armeanu, Andrei, Lache & Panait, 2017).
- For a better view, the identified problems and suggestions for their solution are presented in Table 1.

Table 1 Identified problems and solutions of customer data quality

No.	Problems	Solutions
1	Lack of agreement on a standard set of data quality dimensions	There are no suggested solutions to overcome this problem.
2	Decentralized data storage	**Missi et al., (2005)** mention possible tools to overcome this problem.
3	Inconsistency in data entry and storage	The authors **Tu & Yang (2013), Ahmed et al. (2016)** and **Jaya et al. (2007)** state that it is necessary to have a framework for standardizing data, and also that it is necessary to include the process of automatic or expert verification of data.
4	The unsatisfactory condition of existing customer databases	The solution is to simplify the database architecture and invest in a data cleanup tool that will reform the data before it is transferred to a new database **(Reid & Catterall, 2014).**
5	Inadequate integration of different data sources	**Hable & Aglassinger (2013), Ahmed et al. (2016)** and **Missi et al. (2005)** state that it is necessary to use tools that will allow adequate integration of data of different formats.
6	Data defects (incorrect and missing data, unique value violations, syntax violations, outdated values in user profiles)	Data quality can be improved e.g. automating data collection, continuous inspection, correction and cleaning of data **(Even et al., 2010a).** Defect prevention has been addressed in greater detail by **Missi et al. (2005), Even et al. (2010), Hable & Aglassinger (2013), Reid & Catterall (2014),** and **Ahmed et al. (2016)** in their works, where they outlined various tools that can be used to achieve data quality and integration.
7	Data quality is deteriorating over time	It would be desirable to be able to update data throughout the system **(Jaya et al., 2007). Even et al. (2010a)** propose that older data be ignored and that the quality of the newer ones be invested.
8	High costs for securing and maintaining data quality	Cost reduction can be achieved by addressing key quality problems **(Ahmed et al., 2016)** by different algorithms **(Even et al., 2010)**. It is necessary to reconcile maximizing economic benefits with the optimum level of data quality **(Even et al., 2010).**
9	New challenges - big data and open data	The improvement of computer systems and the expansion of databases can be used to partially overcome big data problems **(Erceg, Šereš & Zoranović, 2019).**

Source: Authors' research

CRM systems make it easy to build long-term customer relationships by creating centralized databases and enabling sales force automation. This minimizes duplication of data, retains customer knowledge, institutionalizes links between users, helps manage numerous products / services, and increases revenue while allowing firms to cross-sell. Mobile CRM enables employees and managers to access real-time data and make better decisions (Negahban et al., 2016). In addition to the aforementioned proposals for solving certain data quality problems, it is essential that employees are supported by senior management and motivated to manage the data well. Human resource management, methods and processes, software and guiding principles should be combined to ensure efficient data management and the ability to transmit them (Foss et al., 2002).

Conclusion

CRM has become one of the focal points for many industries such as banking, retail, telecommunications, insurance, etc. (Natchiar & Baulkani, 2014). As CRM relies on data in its operation, it is very important that the quality of the data is appropriate so that the organization can have coordinated CRM responses to today's business needs (Alshawi et al., 2011). Increasing numbers of structured data, better tools and big economic drivers are pushing organizations to aggregate and use data from different sources (Bidlack & Wellman, 2010). New challenges are emerging in managing data quality resulting from new technologies - big data and open data, with their ability to collect large amounts of data from different sources and store them as different types of data - structured, unstructured and semi-structured (Jaya et al., 2007).

Data defects can prevent managers and analysts from having a real picture of customers and their purchasing preferences, which can significantly affect marketing efforts that will not produce the expected results and lead to poor decisions (Even et al., 2010), and potential financial risks i.e. financial losses that affect company's prosperity (Valaskova, Kliestik & Kovacova, 2018). They can also affect a company's inability to determine how many customers it actually has (Reid & Catterall, 2014). When looking at the quality of data used in CRM, we can conclude that bigger is not always better, because increasing the number of records that are monitored, maintaining more attributes and achieving perfect quality may have technical and functional merit, but it is not profitable (Even et al., 2010).

The analysis of the extracted works pointed to certain problems regarding the quality of customer data, as well as suggestions for their solutions. We can conclude that the challenges regarding the quality of data used in CRM are reflected in: decentralized storage of data, inconsistency of their input and storage, inadequate integration of different data sources, different number of data defects, and their tendency to have quality that gets worse over time. In addition, problems were identified in the high costs of maintaining data quality, as well as new challenges in the form of big data and open data. Possible solutions have been suggested through a variety of tools and frameworks to improve them.

In order for organizations to take full advantage of the customer data they possess for the purpose of adequately analyzing and evaluating their desires, preferences, behaviors and thereby gaining a competitive advantage on the basis of valuable, hard-to-imitate data, it is imperative to align economic benefits with the optimum level of data quality (Even et al., 2010).SM

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Here is a list of the most common reference types:

A. PERIODICALS

Authors must be listed by their last names, followed by initials. Publication year must be written in parentheses, followed by a full stop. Title of the article must be in sentences case: only the first word and proper nouns in the title are capitalized. The periodical title must be in title case, followed by the volume number, which is also italicized:

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number*(issue number), pages.

➲ Journal article, one author, paginated by issue

Journals paginated by issue begin with page 1 in every issue, so that the issue number is indicated in parentheses after the volume. The parentheses and issue numbers are not italicized, e.g.

Tanasijević, V. (2007). A PHP project test-driven end to end. *Management Information Systems, 5* (1), 26-35.

➲ Journal article, one author, paginated by volume

Journals paginated by volume begin with page 1 in issue 1, and continue page numbering in issue 2 where issue 1 ended, e.g.

Perić, O. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management, 14*, 654-668.

➲ Journal article, two authors, paginated by issue

Strakić, F., & Mirković, D. (2006). The role of the user in the software development life cycle. *Management Information Systems, 4* (2), 60-72.

➲ Journal article, two authors, paginated by volume

Ljubojević, K., & Dimitrijević, M. (2007). Choosing your CRM strategy. *Strategic Management, 15*, 333-349.

➲ **Journal article, three to six authors, paginated by issue**

Jovanov, N., Boškov, T., & Strakić, F. (2007). Data warehouse architecture. *Management Information Systems, 5* (2), 41-49.

➲ **Journal article, three to six authors, paginated by volume**

Boškov, T., Ljubojević, K., & Tanasijević, V. (2005). A new approach to CRM. *Strategic Management, 13*, 300-310.

➲ **Journal article, more than six authors, paginated by issue**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems, 3* (1), 99-106.

➲ **Journal article, more than six authors, paginated by volume**

Strakić, F., Mirković, D., Boškov, T., Ljubojević, K., Tanasijević, V., Dimitrijević, M., et al. (2003). Metadata in data warehouse. *Strategic Management, 11*, 122-132.

➲ **Magazine article**

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review*, *130*, 20-21.

➲ **Newsletter article with author**

Dimitrijević, M. (2009, September). MySql server, writing library files. *Computing News, 57,* 10-12.

➲ **Newsletter article without author**

VBScript with active server pages. (2009, September). *Computing News,57,* 21-22.

B. BOOKS, BROCHURES, BOOK CHAPTERS, ENCYCLOPEDIA ENTRIES, AND BOOK REVIEWS

Basic format for books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

Note: "Location" always refers to the town/city, but you should also include the state/country if the town/city could be mistaken for one in another country.

➲ **Book, one author**

Ljubojević, K. (2005). *Prototyping the interface design*. Subotica: Faculty of Economics.

➲ **Book, one author, new edition**

Dimitrijević, M. (2007). *Customer relationship management* (6th ed.). Subotica: Faculty of Economics.

➲ **Book, two authors**

Ljubojević, K., Dimitrijević, M. (2007). *The enterprise knowledge portal and its architecture*. Subotica: Faculty of Economics.

➲ **Book, three to six authors**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., & Perić, O. (2006). *Importance of software testing*. Subotica: Faculty of Economics.

➲ **Book, more than six authors**

Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., Boškov, T., Strakić, F., et al. (2007). *Supply chain management*. Subotica: Faculty of Economics.

➲ **Book, no author or editor**

Web user interface (10th ed.). (2003). Subotica: Faculty of Economics.

➲ **Group, corporate, or government author**

Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia*. Belgrade: Ministry of community and social services.

➲ **Edited book**

Dimitrijević, M., & Tanasijević, V. (Eds.). (2004). *Data warehouse architecture*. Subotica: Faculty of Economics.

➲ **Chapter in an edited book**

Boškov, T., & Strakić. F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics.

➲ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45). Subotica: Faculty of Economics.

C. UNPUBLISHED WORKS

➲ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables*. Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

➲ **Paper or manuscript**

Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007. May). *First steps in visual basic for applications*. Unpublished paper, Faculty of Economics Subotica, Subotica.

➲ **Doctoral dissertation**

Strakić, F. (2000). *Managing network services: Managing DNS servers*. Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

➲ **Master's thesis**

Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams*. Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

D. ELECTRONIC MEDIA

The same guidelines apply for online articles as for printed articles. All the information that the online host makes available must be listed, including an issue number in parentheses:

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Online Periodical, volume number*(issue number if available). Retrieved from http://www.anyaddress.com/full/url/

➲ Article in an internet-only journal

Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, *8* (4). Retrieved October 7, 2004, from www.ef.uns.ac.rs/sm2003

➲ Document from an organization

Faculty of Economics. (2008, March 5). *A new approach to CRM*. Retrieved July 25, 2008, from http://www.ef.uns.ac.rs/papers/acrm.html

➲ Article from an online periodical with DOI assigned

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. doi: 10.1108/06070565717821898.

➲ Article from an online periodical without DOI assigned

Online journal articles without a DOI require a URL.

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Journal, volume number*. Retrieved from http://www.anyaddress.com/full/url/

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. Retrieved from http://www.ef.uns.ac.rs/mis/TestDriven.html.

REFERENCE QUOTATIONS IN THE TEXT

➲ Quotations

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by "p.") must be included. The quotation is introduced with an introductory phrase including the author's last name followed by publication date in parentheses.

According to Mirković (2001), "The use of data warehouses may be limited, especially if they contain confidential data" (p. 201).
Mirković (2001), found that "the use of data warehouses may be limited" (p. 201). What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

He stated, "The use of data warehouses may be limited," but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➲ **Summary or paraphrase**

According to Mirković (1991), limitations on the use of databases can be external and software-based, or temporary and even discretion-based. (p.201)

Limitations on the use of databases can be external and software-based, or temporary and even discretion-based (Mirković, 1991, p. 201).

➲ **One author**

Boškov (2005) compared the access range…

In an early study of access range (Boškov, 2005), it was found...

➲ When there are **two authors**, both names are always cited:

Another study (Mirković & Boškov, 2006) concluded that…

➲ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author's name will cited, followed by "et al.".

(Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author's name is used, followed by "et al." in the introductory phrase or in parentheses:

According to Jovanov et al. (2004), further occurences of the phenomenon tend to receive a much wider media coverage.

Further occurences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004).

In "et al.", "et" is not followed by a full stop.

➲ **Six or more authors**

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

Yossarian et al. (2004) argued that…

… not relevant (Yossarian et al., 2001).

➲ **Unknown author**

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while

titles of articles and chapters are placed in quotation marks:

> A similar survey was conducted on a number of organizations employing database managers ("Limiting database access", 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year:

> ("The Objectives of Access Delegation," 2007)

Note: In the rare cases when the word "Anonymous" is used for the author, it is treated as the author's name (Anonymous, 2008). The name Anonymous must then be used as the author in the reference list.

➲ **Organization as an Author**

If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

> According to the Statistical Office of the Republic of Serbia (1978), …

Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

> The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).

> The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

➲ When citing **more than one reference from the same author**:

> (Bezjak, 1999, 2002)

➲ When several **used works by the same author were published in the same year**, they must be cited adding a, b, c, and so on, to the publication date:

> (Griffith, 2002a, 2002b, 2004)

➲ **Two or more works in the same parentheses**

When two or more works are cited parenthetically, they must be cited in the same order as they appear in the reference list, separated by a semicolon.

> (Bezjak, 1999; Griffith, 2004)

➲ **Two or more works by the same author in the same year**

If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c…) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

> Survey results published in Theissen (2004a) show that…

➲ To **credit an author for discovering a work**, when you have not read the original:

Bergson's research (as cited in Mirković & Boškov, 2006)…

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➲ When **citing more than one author**, the authors must be listed alphabetically:

(Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➲ When there is **no publication date**:

(Hessenberg, n.d.)

➲ **Page numbers must always be given for quotations**:

(Mirković & Boškov, 2006, p.12)

Mirković & Boškov (2006, p. 12) propose the approach by which "the initial viewpoint…

➲ **Referring to a specific part of a work**:

(Theissen, 2004a, chap. 3)

(Keaton, 1997, pp. 85-94)

➲ **Personal communications, including interviews, letters, memos, e-mails, and telephone conversations**, are cited as below. (These are *not* included in the reference list.)

(K. Ljubojević, personal communication, May 5, 2008).

FOOTNOTES AND ENDNOTES

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.[1] Endnotes begin on a separate page, after the end of the text. However, Strategic Management journal **does not recommend the use of footnotes or endnotes.**

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