Impressum

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The Combined Use of Balanced Scorecard and Data Envelopment Analysis in the Banking Industry

Aleksandra Bošković, Ana Krstić
Faculty of Economics, University of Kragujevac, Serbia

Abstract

Background: Starting from the limitations of different single-method approaches to measuring the organizational efficiency, the paper is focused on covering both the financial and non-financial factors of this concept by combining two methods, namely the Balanced Scorecard (BSC) and Data Envelopment Analysis (DEA).

Objectives: The main goal of the research in the paper is to show that certain deficiencies in the independent application of each method are eliminated by combining these methods. Methods/Approach: The paper combines two methods, BSC and DEA, to measure the relative efficiency of all branches of a bank in Serbia.

Results: Results confirmed that the combined use of the named methods facilitates measurement of organizational efficiency by using both financial and non-financial indicators. Conclusions: The paper shows that it is possible to achieve synergetic effects in the evaluation of organizational efficiency in the banking sector if BSC is applied first, to define goals within four perspectives, and then four DEA models are developed to measure efficiency in each perspective.

Keywords: Balanced Scorecard, Data Envelopment Analysis, organizational efficiency, combined methods, decision support systems

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Introduction

The modern business environment is characterized by high competition and frequent changes, which greatly hamper the performance management process, measuring organizational efficiency and effectiveness increasingly challenging. Companies are being faced with the need to address all the relevant types of performance, so new measurement models are emerging.
Broadly speaking, efficiency represents the requirement to achieve the highest outputs with the lowest possible inputs. It is traditionally measured by the financial indicators. The most common criteria for assessing the efficiency are profit, return on investment and the profit ratio (Domanović & Bogićević, 2011). In addition to the return on investment (ROI), both ROE (return of equity) and ROS (the rate of return on sales) are often used as the relevant profitability indicator (Kalas & Rakita, 2017). Although financial indicators have an indispensable role in measuring the business performance, the precision and objectivity of its numerical expression do not allow for the inclusion of all relevant factors that affect efficiency. Inter alia, various organizational elements affect efficiency differently. Research shows that organizational structure, and the control systems, in particular, are important antecedents of organizational efficiency (Ostroff & Schmitt, 1993). The non-material factors can be covered by non-parametric sets of methods, models, and techniques, i.e. Data Envelopment Analysis (DEA), Balanced Scorecard (BSC), Stochastic Frontier Analysis (SFA) and other.

Starting from the complexity of contemporary organizations, each method has its limitations and it is difficult to cover all the important aspects of organizational efficiency by using a single method approach. Their deficiencies create a space for their combined use (Mingers & Brocklesby, 1997). We start from the previous research which has shown that it is useful to combine the BSC with DEA method (Wang, Li, Jan & Chang, 2013; Amado, Santos and Marques, 2012; Asosheh, Nalchigar & Jamporazmey, 2010; Garcia-Valderrama, Muleron-Mendigorri, and Revuelta-Bordoy, 2009; Macedo, Barbosa & Cavalcante, 2009; Chen, Chen & Peng, 2008; Eliat, Golany & Shhtub, 2006) because their combination creates a conceptual framework which enables the assessment of decision-making units from multiple perspectives, by encompassing both financial and non-financial data. However, there is still no single model with a clearly defined sequence of steps in the application of these two methods to encompass the multidimensionality of the efficiency concept (Bošković & Krstić, 2018, p. 83).

The subject of research in the paper is the combined use of the BSC method and the DEA method for measuring organizational efficiency. The research aims to show that the combined use of these methods eliminates some of their shortcomings in measuring organizational efficiency. The paper points out the positive and negative sides of the combined use of the methods.

Background
Before developing the combined BSC-DEA model, the key features of BSC and DEA methods, as well as the assumptions, conditions, and possibilities of their synergistic use are explained and discussed.

Balanced Scorecard
Starting from the static and retrospective character of the traditional, financial performance measures, it is necessary to consider other significant indicators of success, with a greater focus on the business dynamics and the creation of long-term value. In contemporary strategic management, performance criteria must be linked to the strategy. The process of managing the strategy is pluralistic, and the success of its implementation is not reflected in the financial effects only. It is necessary to observe the problem situation from various perspectives, taking into account all the important objectives and performance criteria.
These ideas led to the development of a BSC method, found by Robert Kaplan and David Norton in the early 1990s. This concept is based on the premise that companies can no longer achieve a viable competitive advantage by relying solely on material resources, but more effort is needed to build intangible assets and intellectual capital (Domanović, Jakšić & Mimović, 2014). Kaplan and Norton (1992) found that BSC enables the integration of different indicators derived from the strategy. It means retaining the financial indicators of past activities, but also adding the indicators of future activities. This is done explicitly by translating the strategy into tangible targets and indicators. In this way, the activities of the company are directed towards achieving the defined goals to create a unique value, following the strategy, which differs, from the competitors.

The BSC includes four perspectives that provide answers to important strategic questions. The Customers Perspective or Marketing Perspective answers the question of how customers see the company. The Internal Processes Perspective is aimed at providing an answer to the question of where (in which activities) and how to achieve excellence. The Learning and Growth Perspective should provide an answer to the question of how to continue to innovate and create value, while the Financial Perspective pays more attention to meeting shareholder needs.

All of these perspectives are presented in the Strategy Map, which describes and connects those (Kaplan & Norton, 2001 according to Domanović, 2016). The Strategy Map shows the ways for achieving strategic goals in each perspective, whereby goals from one perspective directly contribute to the next perspective. It starts with a Learning and Growth Perspective, including goals such as employee competence, strategy awareness, and technology infrastructure. The next perspective is the Internal Business Processes Perspective, in which “employees apply their competencies, develop an awareness of the strategy and use technological infrastructure” (Domanović, 2016, p.151). The Customers Perspective includes goals such as, for example, customer satisfaction, which finally contribute to the objectives from the Financial Perspective, such as profit, sales revenue, growth rates, etc.

Although each perspective focuses on different aspects of the strategy, they should not be observed separately. The strength of the BSC method is reflected in the fact that it enables the integration of different measures and the emphasis on the relationships between different dimensions and performance of the same system (Amado et al., 2012). In this regard, the DEA method can provide significant support.

Data Envelopment Analysis

DEA “deals with the evaluation of the performance of Decision-Making Units (DMU) performing a transformation process of several inputs several outputs” (Bouyssou, 1999, p. 974). DEA is based on linear programming and enables analysis of the efficiency of DMUs by considering combinations of different input and output variables. The efficiency of the observed DMUs is “the ratio of the weighted sum of outputs to a weighted sum of the inputs” (Galagedera & Watson, 2015, p. 2962). The efficiency calculated by this method is relative. Unlike the typical statistical methods, DEA compares each DMU only with the best of all DMUs. A DMU is relatively efficient if: it cannot increase any of its output without increasing one of its inputs or reducing one of its remaining outputs and if it cannot reduce any of its inputs without increasing one of its outputs or increasing one of its remaining inputs (Šporčić, Martinčić, Landekić & Lovrić, 2008; Krstić, 2014). Besides, the condition for each DMU is that the ratio of the weighted sum of outputs and the weighted sum of inputs is less than or equal to 1.

DEA model is based on the following formula (Cooper, Seiford & Zhu, 2011):
\[
max h_0(u, v) = \sum_r u_r y_r / \sum_i v_i x_{i0}
\]

In the observed DMU, the variables are \(u_r\) and the \(v_i\) while \(y_{r0}\) and \(x_{i0}\) represent the values of outputs and inputs, respectively.

The DEA method is one of the most significant in evaluating the performance of non-profit organizations, where financial criteria are not crucial. It is also useful to include the multidimensional nature of organizational efficiency in enterprises. Some of the areas in which the method is often applied are higher education (e.g. Mimović & Krstić, 2016), information technology (e.g. Seol, Lee, Kim & Park, 2008), electricity industry (Chen, Lu & Yang, 2009), healthcare (e.g. Rabar, 2010), tourism (e.g. Rabar & Blažević, 2011), banking (e.g. Casu & Molyneux, 2003; Chen et al. 2008), etc. There are many different DEA models, which vary in orientation, type of return to scale, projection to the efficiency and sensitivity of the input data. The first model was the CCR (Charnes, Cooper and Rhodes, 1978) model, which assumes a constant return to scale. It was developed relying on Farrell’s model for measuring efficiency (Farrell, 1957), and later models were developed based on it. There is also a BCC model, which is most appropriate for measuring technical efficiency, and it assumes variability of return to scale (Banker, Charnes & Cooper, 1984). On the other hand, depending on the goal, there are the input-oriented model, output-oriented model, and non-oriented models. The input-oriented model aims to minimize inputs with given outputs, while the goal of an output-oriented model is to maximize outputs with given inputs (Seol et al., 2008, p.232).

The assumptions, conditions and the synergistic use of BSC and DEA methods

This paper starts from the assumption that the shortcomings of individual use of the observed methods represent the basis for identifying the prerequisites and conditions of their combined use. Therefore, it is necessary to identify the key advantages and disadvantages of both the DEA and BSC, as well as the areas in which they can be complemented.

Firstly, BSC is not just a method for measuring performance, but it is also a strategic management tool, that allows the connection of the strategy with the objectives and performance measurement criteria. BSC is a method that is oriented towards the future and enables the assessment of future performance, not just evaluation of the results achieved in the past. Given that the DEA is based on an estimate of the efficiency achieved in the previous period, this is a key advantage that the BSC provides in their joint application. Besides, the BSC enables the observation of a problem situation from multiple interdependent perspectives and the understanding of the interactive relationship between the elements of these perspectives, while the DEA provides summarized performance indicators by using one model to transform multiple inputs into multiple outputs and therefore does not allow the complexity of a problem to be processed adequately.

Despite the numerous advantages, various authors have identified certain deficiencies of the BSC. Some of the key defects relate to the fact that the BSC does not specify a way to make a balance between the different perspectives, does not specify the way to measure performance and does not allow the identification of inefficient units (Amado et al., 2012). On the other side, DEA, as a hard system approach within the field of operational research, provides a higher level of precision and objectivity in management problems research. Although the BSC is a comprehensive method that allows a holistic approach to performance evaluation, it
is not completely free from subjectivity and does not allow for such a high level of precision in measurements, as the DEA method does. The strength of the mathematical expression of the DEA method, based on linear programming, allows a comparison of DMUs, which represents its main advantage in organizational efficiency analysis.

Therefore, the combined application of these two methods can overcome some limitations of their individual application. The BSC enables identification of the cause-and-effect relationships between inputs and outputs within different perspectives of organizational performance and is a useful framework for applying the DEA in organizational efficiency measurement. The BSC facilitates the consideration of the relevant criteria and the choice of inputs and outputs, which should be covered by the DEA. Among the first studies, in which the possibility of combining these two methods has been identified, is the one by Rouse, Putterill, and Ryan (2003). However, the literature has not identified one best, universal way to integrate BSC and DEA yet.

Initially, the models usually involved the use of one DEA model, with outputs from all four BSC perspectives (Rickards, 2003; Eliat et al. 2006; Chen & Chen, 2007; Macedo et al. 2009; Min et al. 2008). Some studies proposed to apply the BSC method first and then develop the DEA model using the indicators defined in the BSC model as inputs and outputs (e.g. Rickards, 2003). Other studies developed a DEA model first and used its results as inputs for the development of a BSC, intending to improve performance (e.g. Rouse et al. 2002). However, such a combination does not overcome an important disadvantage of the DEA method. Namely, it leads to unique performance measures, without the possibility of comparing results from different BSC perspectives and their interrelations. Therefore, recent literature suggest that the BSC should be applied as a framework that provides an insight into the contribution of different parts of the organization to the business success, after which four interactive DEA models should be developed for each BSC perspective (Valderrama et al. 2013; Amado et al., 2012; García-Valderrama et al. 2009). In each DEA model, inputs and outputs should be used, which correspond to different perspectives, keeping in mind the connection between the observed inputs and outputs. One of the first papers, in which the combined BSC-DEA model was applied in this way, is a study by the authors García-Valderrama et al. (2009), which relates to performance measurement in research and development activities, in the chemical and pharmaceutical industry in Spain.

**BSC-DEA model for measuring organizational efficiency in banking industry**

Starting from the previous research (Amado et al., 2012; García-Valderrama et al., 2009), we propose one way of combining the application of BSC and DEA methods for measuring the efficiency of organizational parts of a bank in Serbia (hereinafter: XYZ Bank), whose identity or any sensitive data will not be disclosed. Information about the bank, such as data on vision, mission, strategy, objectives and other planning decisions have been collected through unstructured interviews with the bank representatives.

The focus is on the proposal of the model for measuring the organizational efficiency of all branches of XYZ Bank, which belong to one Regional Center, in order to determine their relative efficiency and formulate recommendations for the future operation of efficient and inefficient observation units following the Bank’s strategy. There are 10 branches and they represent decision-making units (DMUs).
The initial phase in the integration of the BSC and DEA method is the formation of a strategic map where the objectives of the XYZ Bank are presented within each of the BSC perspectives (Figure 1).

The next step involves creating a Balanced Scorecard, a strategic management tool that includes strategic goals, critical success factors, and performance indicators of XYZ Bank (Figure 2). All these elements are interactive.

Figure 1
The strategic map of an XYZ Bank

The BSC for the XYZ Bank shows an overview of some of the most important strategic goals, critical success factors, and performance indicators presented through four interdependent BSC perspectives (Table 1). It serves as a framework for the development of the DEA model, which uses performance indicators as inputs and outputs. Following the recommendation of Amado et al. (2012), ratios were used as inputs and outputs. Thus, we used the BCC (Banker, Charnes, and Cooper) model, which assumes the variable return to scale. In particular, four DEA models (one for each perspective) were developed. Each model has two inputs and two outputs. The outputs of the first model were used as inputs for the next model, and so for each of the following. In this way, the interdependence between the BSC perspectives was encompassed. In doing so, the decision-making units should remain flexible, since the weight coefficients for the same factors (outputs that are used in the next model as inputs) can be changed in different models. The proposed DEA models are shown in Figure 2.
### Table 1
BSC of the XYZ Bank

<table>
<thead>
<tr>
<th>Strategic objectives</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Creating value for shareholders</td>
<td>Earnings per share (EPS)</td>
</tr>
<tr>
<td>Maximizing profitability</td>
<td>Economic value added (EVA)</td>
</tr>
<tr>
<td>Minimizing risk</td>
<td>Relative profit rate</td>
</tr>
<tr>
<td></td>
<td>Cash flow</td>
</tr>
<tr>
<td></td>
<td>Value at Risk (VaR)</td>
</tr>
<tr>
<td><strong>Marketing / Customer Perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Attract new clients</td>
<td>Number of new clients in the corporate banking sector per employee</td>
</tr>
<tr>
<td>Improve customer satisfaction</td>
<td>Number of new clients in retail banking per employee</td>
</tr>
<tr>
<td>Create loyalty</td>
<td>Customer satisfaction indices</td>
</tr>
<tr>
<td></td>
<td>Number of client complaints</td>
</tr>
<tr>
<td></td>
<td>Customer retention rate</td>
</tr>
<tr>
<td></td>
<td>Relative market share</td>
</tr>
<tr>
<td><strong>Internal Business Processes Perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Create a high-quality service</td>
<td>Number of serviced clients per branch</td>
</tr>
<tr>
<td>Reduce the service delivery time</td>
<td>Number of serviced clients per employee</td>
</tr>
<tr>
<td>Innovation in the provision of services</td>
<td>Number of mistakes</td>
</tr>
<tr>
<td></td>
<td>Average time needed for troubleshooting</td>
</tr>
<tr>
<td></td>
<td>The average waiting time in line at the counter</td>
</tr>
<tr>
<td></td>
<td>Number of transactions via electronic banking</td>
</tr>
<tr>
<td></td>
<td>Number of transactions via mobile banking</td>
</tr>
<tr>
<td><strong>Learning &amp; Growth Perspective</strong></td>
<td></td>
</tr>
<tr>
<td>Effective knowledge management</td>
<td>Managers retention rate</td>
</tr>
<tr>
<td>Continuously develop the skills of employees</td>
<td>Days of training per employee (year level)</td>
</tr>
<tr>
<td>High level of employee satisfaction</td>
<td>Average wage costs per employee</td>
</tr>
<tr>
<td>High level of employee motivation</td>
<td>Employee satisfaction indices</td>
</tr>
</tbody>
</table>

Source: Author’s illustration

The model can be used for measuring the organizational efficiency of the branch offices in order to identify their relative efficiency. The application of the model makes it easier to define the steps and initiatives for maintaining or improving the efficiency level of the observed organizational units following the company strategy. It may be used in other companies in the service sector with minor adjustments as well.
Testing the proposed model

In order to test the proposed model on the sample of 10 branches of the XYZ bank, the data was collected through 10 semi-structured interviews with 10 branch representatives (one per branch). The interviews were conducted in April and May 2018. Each interview was strictly focused on specific questions about the data on each of the elements of BSC and the inputs and outputs used in the DEA models (Figure 2). The interviewees provided answers based on the available secondary data from the company’s documentation where this was possible (e.g., surveys about employee and customer satisfaction), as well as on their knowledge and opinions where there was no secondary data. The data in all the models refer to the previous period (January 2017 – December 2017). All the employees per branch were included in the calculated averages, which was 5-18 employees, depending on the branch.

The data were analyzed using the software package MaxDEA7 Basic and the results are shown in Table 2. The results show the relative efficiency of the observed branches. As we can see in Table 2, all ten branches demonstrated relatively high levels of performance. The results show that the Internal processes perspective (Model 2), in general, requires special attention, with an average score of 87%. Furthermore, there are two problematic DMUs, which have shown the lowest scores in terms of internal processes (Branch 5 and Branch 7). Regarding the Customer perspective (Model 3)
Table 2
Models 1, 2, 3, 4 presenting the relative efficiency of the observed branches

<table>
<thead>
<tr>
<th>No.</th>
<th>Decision-Making Units</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Branch 1</td>
<td>77.78 %</td>
<td>100 %</td>
<td>92.45 %</td>
<td>95.11 %</td>
</tr>
<tr>
<td>2</td>
<td>Branch 2</td>
<td>99.52 %</td>
<td>74.70 %</td>
<td>81.60 %</td>
<td>100 %</td>
</tr>
<tr>
<td>3</td>
<td>Branch 3</td>
<td>91.89 %</td>
<td>100 %</td>
<td>84.60 %</td>
<td>100 %</td>
</tr>
<tr>
<td>4</td>
<td>Branch 4</td>
<td>100 %</td>
<td>100 %</td>
<td>82.26 %</td>
<td>80.36 %</td>
</tr>
<tr>
<td>5</td>
<td>Branch 5</td>
<td>95.33 %</td>
<td>71.71 %</td>
<td>100 %</td>
<td>90.88 %</td>
</tr>
<tr>
<td>6</td>
<td>Branch 6</td>
<td>100 %</td>
<td>75.93 %</td>
<td>80.80 %</td>
<td>96.36 %</td>
</tr>
<tr>
<td>7</td>
<td>Branch 7</td>
<td>100 %</td>
<td>73.21 %</td>
<td>100 %</td>
<td>85.18 %</td>
</tr>
<tr>
<td>8</td>
<td>Branch 8</td>
<td>100 %</td>
<td>78.86 %</td>
<td>88.22 %</td>
<td>93.90 %</td>
</tr>
<tr>
<td>9</td>
<td>Branch 9</td>
<td>84.45 %</td>
<td>99.49 %</td>
<td>85.80 %</td>
<td>100 %</td>
</tr>
<tr>
<td>10</td>
<td>Branch 10</td>
<td>94.02 %</td>
<td>100 %</td>
<td>80.29 %</td>
<td>91.71 %</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>94.30 %</td>
<td>87 %</td>
<td>87.60 %</td>
<td>93.30 %</td>
</tr>
<tr>
<td></td>
<td>St. Dev.</td>
<td>7.7 %</td>
<td>13.3 %</td>
<td>7.5 %</td>
<td>6.2 %</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
<td>100 %</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>77.78 %</td>
<td>71.71 %</td>
<td>80.29 %</td>
<td>80.36 %</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Conclusion

This paper analyses a possible way of integrated application of the Balanced Scorecard (BSC) and Data Envelopment Analysis (DEA) methods in the banking industry. Based on the key theoretical and methodological features of both methods, the paper presents a practical example which shows that if the BSC method is first applied, as a framework for defining goals and performance measures, and then the four interactive DEA models are developed to evaluate efficiency in each of the BSC perspectives, certain limitations of their individual application will be removed and synergy will be created.

The paper presents an illustration of a possible way of synergistic application of the BSC and DEA methods, the so-called BSC-DEA model for measuring the relative efficiency of the bank’s branches. This illustration aims to motivate and support the measurement of organizational efficiency based on the strategy, taking into account not only the material, but also the intangible factors of efficiency in the banking sector. In this way, the paper shows that the application of these methods can be equally effective in profit organizations, not only in the non-profit sector, where the Data Envelopment Analysis method has been applied more often.

However, the paper is different from most other studies in the banking industry (e.g. Macedo et al. 2012; Chen et al. 2008) which used a single DEA model to evaluate the performance of bank branches using indicators from different BSC perspectives. Namely, we have applied four interconnected DEA models, one for each one of the BSC perspectives, by using the outputs of one model as inputs for the following model. This way of combining BSC and DEA was first proposed by Amado et al. (2012) and the results in this study are complementary to theirs, so this paper additionally strengthens the proposition that „moving away from a unique all-embracing DEA model towards multiple complementary models is advantageous, leading to
enhanced performance assessment" (Amado et al. 2012, p. 401). The research shows that the BSC-DEA model proposed by Amado et al. (2012) can be successfully applied for measuring the relative efficiency of bank branches.

Practical research implications are reflected in defining the steps for applying the BSC-DEA model in any company in order to identify the relative efficiency of their organizational units. Besides, in this way, it is possible to raise some relevant issues, which may indicate the causes of the inefficiency of the organization and facilitate the identification of the necessity of change. Of course, this approach to combined application of the methods may be adjusted depending on the strategy of each specific company and various situational factors, by creating a specific BSC and choosing different inputs and outputs in DEA models. The paper has confirmed that the model can work in practice.

The limitation of the research relates to the fact that none of the two methods provides complete objectivity in determining the weight coefficients in the DEA method. Therefore, in the future, it is possible to explore whether it is beneficial to combine BSC and DEA with some of the multi-criteria decision-making methods, such as, for example, the AHP method, as a third method. Another possibility of future research is the application of the BSC-DEA method for measuring organizational efficiency in successive time periods to obtain information on the success in managing the efficiency of the analyzed organizations. The research could also be improved by expanding the sample of DMUs and by including more inputs and outputs in the analysis. For example, the BSC could be expanded with a risk management perspective as suggested by Chen et al. 2008.

Besides, it is important to note that the study of XYZ Bank is just an illustration of possible combined use of BSC and DEA. The data was collected from the respondents from the bank itself, who may be subjective or prone to giving socially desirable answers. Data accuracy was not verified using some secondary sources. However, bearing in mind that this is only an illustration of the possible application of two methods, reliability of data is not crucial for conclusions, since the basic goal of the work is not to test the efficiency of this bank, but to show that it is possible to measure the efficiency in the banking sector in general by the combined application of the BSC and DEA methods, while eliminating their shortcomings.

References


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Impact of Fraud Risk Assessment on Good Corporate Governance: Case of Public Listed Companies in Oman

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Abstract

Background: Fraud risk assessment as a control mechanism is becoming necessary due to continuous and never-ending fraudulent activities. Frauds arise regardless of the existence of codes for corporate governance and available control activities such as those of internal and external audit units. It is high time for the corporate governance functions such as Audit and Risk Committees and Senior Management to identify the controls, which can assist in achieving good corporate governance and at the same time provide satisfaction to the shareholders. Objective: This paper intends to identify the relationship between fraud risk assessment and good corporate governance of companies listed in the Muscat Stock Market in the Sultanate of Oman. Methods/Approach: A quantitative method with a descriptive cross-sectional survey design has been utilized and data have been analysed by utilizing PLS-SEM. Result: Fraud risk assessment has a significant direct impact on good corporate governance, and the adoption and implementation of the fraud risk assessment will assist in the achievement of good corporate governance. Conclusion: It is highly recommended that organizations adopt fraud risk assessment as fraud detection, control mechanism, and embed it in their corporate governance policies, which will eventually aid in the achievement of good corporate governance.

Keywords: fraud risk assessment, good corporate governance, corporate governance, audit, and risk committee, senior management

JEL classification: G3, G34

Paper type: Research article

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Introduction

Organizations that contend and dealt with frauds such as Bank Muscat, Oman national gas, Enron, Satyam, and WorldCom necessitated the enhanced focus on controls related to fraud, which includes fraud risk assessment (Bhasin, 2013; Singleton & Singleton, 2010). Several committees and ordinances have been created after the...
occurrence of fraud; however, according to ACFE (2016) fraud amounts and number fraud encountered organizations are increasing every year. These ever-increasing frauds are occurring despite the fact of the availability of controls and codes of corporate governance. Moreover, it is high time for organizations to develop anti-fraud controls and provide innovation in the field of corporate governance (Singleton & Singleton, 2010). This innovation in controls could have termed as fraud risk assessment and innovation in corporate governance can be called as the realization and accomplishment of good corporate governance.

Several kinds of literature are available, which emphasizes on the implementation of corporate governance; moreover, compliance with the codes of corporate governance is also made mandatory by many regulators, including Capital Market Authority (CMA) in Oman (CMA, 2016). However, in the current business environment, corporate governance is just becoming a compliance checkbox (Abdel-Meguid, Samaha & Dahawy, 2014; Rehman & Hashim, 2019).

Organizations are adopting corporate governance for the sake of disclosure purposes, and the governance management system responsible for corporate governance appears to be of least concern. For this study, governance management is considered to be Audit and Risk Committee (ARC) and Senior Management (SM) of the organization as ARC is directly responsible towards the risk of fraud and SM is directly responsible towards the implementation of policies and detection of fraud (Rehman & Hashim, 2019; Mohd-Sanusi, Rameli, Omar, & Ozawa, 2015). Corporate governance is relatively new in Oman, as new codes have been introduced in the year 2016 (CMA, 2016). Moreover, very few studies are available, which can be related to Oman's corporate governance. It is worth mentioning that, like any other country, Oman is also not safe regarding fraud. Few fraud cases were reported in Oman that can be categorized as bribery and financial misconduct frauds (Reuters, 2014; Reuters, 2011). At present, there are no guidelines available in Oman, which can determine that corporate governance is good or can be categorized as poor.

This study proposes that Fraud Risk Assessment (FRA), which is the independent variable, possesses a direct relationship with good corporate governance (GCG), which is the dependent variable. FRA is the cornerstone of fraud risk management and plays a vital role in shaping an organization’s objectives, strategies, and goals. Furthermore, FRA also assists in the achievement of the true meaning of corporate governance (KPMG, 2014). This study also attempts to integrate relevant empirical research and literature to extend the intended potentials of FRA on GCG, particularly in Omani public listed companies. Corporate governance is contingent upon many constituents, and two of the crucial constituents or factors are ARC and SM (Wilkinson & Plant, 2012; CMA, 2016). It is worth mentioning that the available past studies demonstrate a single constituent relationship with GCG and not with primary two, which are ARC and SM. Therefore, this study is unique in its way by testing two significant components or constituents towards GCG.

**Literature Review**

Corporate governance is an inevitable part of any Omani public listed companies (CMA, 2016). Rules to establish an organization are framed in a manner that obliges the organization to adhere to the basic and essential requirements of corporate governance such as having the board of directors, creating board related committees and hiring SM (Vona, 2010). However, organizations are just utilizing corporate governance as another compliance tool rather than implementing it as a strategic initiative towards sustainable future growth. Fraud is the primary cause where organizations not only suffer from financial losses but also lose their credibility and
reputation (Gatzert, Schmit, & Kolb, 2016). Achievement of GCG with the implementation of FRA can provide sustainable growth that can be free from fraud and can offer satisfaction to shareholders.

**Good corporate governance**

Poor corporate governance ensures the collapse of an organization as it can encounter fraud, bankruptcy and even closure of the organization (Nwagbara, 2012). A similarity to corporate governance, GCG is also dependent on legislation including well-defined board culture that can safeguards policies and processes (Homayara, Md. Jahangir, Saeed, & Sawlat, 2008). GCG provides vital and critical steps for market confidence and encourages sustainable investments (Pintea & Fulop, 2015). Because of GCG, market confidence enhances, stakeholders’ support increases, which eventually affects positively in nourishing business and prolonging business sustainability. GCG ensures sustainable long-term growth and development, creates foundations that incorporate regulated board and accuracy and reliability in financial reporting. GCG assists in implementation of laws and regulations, system of responsibility and accountability, protecting the interest of minority shareholders and with GCG organizations realizes their optimum efficiency and effectiveness by mitigating fraud and exploitation of power (Homayara et al., 2008; Hashim, Mahadi & Amran, 2015). As mentioned earlier, the existence of organizations is subjected to the availability of corporate governance; however, it is dependent upon the board of directors and related committees and SM to achieve corporate governance in a manner that can be considered as good or bad. GCG augments the organizational values, and on the other hand, poor governance performs the opposite. Table 1 defines the principles of GCG (Oso & Semiu, 2012).

**Table 1**

**Principals of good corporate governance**

<table>
<thead>
<tr>
<th>Principals of Good Corporate Governance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholders rights along with unbiased treatment</td>
<td>Fundamental rights and entitlements should be provided to shareholders. These rights are required to be adequately articulated and available in the organizational charter and also on its website. Shareholders, regardless of their number of shareholding, are needed to be treated equally.</td>
</tr>
<tr>
<td>Interest of stakeholders</td>
<td>Approved policies and processes should exist towards the protection of stakeholders’ interests.</td>
</tr>
<tr>
<td>Board of director’s roles and responsibilities</td>
<td>Formation of the board and its related roles and responsibilities should be formally available in terms of reference or board’s charter. Composition of the board members should be made in a manner that the greater percentage of the board members should have capability and knowledge which can directly be attributable to organizational business, accounting, and auditing.</td>
</tr>
<tr>
<td>Ethical behavior and Integrity</td>
<td>This is elementary for GCG. Board members and senior management are required to perform with ethics and integrity. Conflict of interest should be avoided and duty should be performed with due professional care.</td>
</tr>
<tr>
<td>Transparency and disclosure</td>
<td>Organizations must provide complete and proper disclosures in financial statements. Organizations are also obliged to give all related parties transactions</td>
</tr>
</tbody>
</table>

Source: Oso and Semiu (2012)
For the achievement of the above-mentioned principals, ARC and SM play a significant role. These two constituents of GCG are explained below.

**Audit and risk committee**
ARC are persons who ensure that SM has strong and active internal controls and also have systems of risk management aiming towards the safeguarding of shareholders’ interests and organization’s assets (CMA, 2016). ARC performs a vital role in the establishment of corporate governance and the achievement of GCG. The success of ARC is dependent upon their regulating responsibility and their working involvement with other constituents of corporate governance, which includes board of directors, SM, internal auditors, and external auditors (Abdel-Meguid, Samaha & Dahawy, 2014; Wilkinson & Plant, 2012; Rezaee, Daniel, Ha & Suen, 2016).

There are no mandatory requirements for the formation of ARC; however, by CMA (2016), ARC members should be comprised of people who are independent and should be present in the board of directors. Minimum number of ARC members should be three who should be well versed in the field of accounting, auditing and fraud (CMA, 2016; Zakaria, 2012)

For the achievement of GCG, ARC is required to be majorly engaged in oversight of anti-fraud programs and recommendations for the approval of financial policies (Singleton & Singleton, 2010). Furthermore, the ARC’s effectiveness is also dependent upon its number of effective meetings and its related frequencies (Shir, 2013). Meetings of ARC should be conducted in a manner that covers and reflects business necessities and its associated requirements (Al-Moataz, 2003). Effective ARC meetings reduce the organizational risk and can also enhance corporate governance (Stewart & Munro, 2007; Wilkinson, 2014, Mohd-Sanusi et al., 2015) that can eventually lead towards the attainment of GCG.

ARC directly reports to the board of directors and also presents its internal control disclosure in organizations’ financial statements. ARC deals with matters such as ensuring strategic plans alignment with organizational objectives, finance, and risk management system, internal and external audit and transparency of an organization’s performance (Krishnan & Lee, 2008). Furthermore, it is determined by Efiong (2012) and Abbot, Park, and Parker (2000) that the current ARC reduces fraud elements and assists in enhancing corporate governance.

For ARC to be capable and contribute towards the achievement of GCG, internal and external auditors should directly report to ARC (Hoitash & Hoitash, 2009; CMA, 2016; Saud & Marchand, 2012). The ARC should formally discuss the audit reports and its related findings or observations with SM. These discussion obliged SM to implement recommendations suggested by internal and external auditors which ultimately reduces the risk and improve organizational performance (García et al., 2010; Laux & Laux, 2009)

The ARC should possess the knowledge and should have expertise which can identify fraud-related risk and highlight these to the board of directors’ attention. Even though ARC does not have the authority to approve, but its assuring role can ensure that an organization’s strategies and objectives are free from risk, elements of fraud are highlighted, reported and mitigated for the achievement of the better-governed organization (Bentley-Goode, Newton & Thompson, 2017; Wilbanks, Hermanson & Vineeta, 2017).

**Senior management**
It is a widely known fact that without positive support of SM, frauds are more likely to occur. Moreover, SM is required to provide support for financial reporting, fraud
prevention and the implementation of the strategic plan (Weber, 2010; Bruisnsma & Wemmenhove 2009). SM is supposed to set the tone at the top, which can be further defined as the culture of ethics and integrity developed and adopted by SM. Once this tone is set, it drilled down to the whole of the organization (Brennan & McGrath, 2007; Patelli & Pedrini, 2015). All of the employees in an organization can follow SM’s actions and mindset for the prevention of fraud (Weber, 2010; Bruisnsma & Wemmenhove 2009; Akkeren & Buckby, 2017).

SM provides the surety that strategic planning is aligned with the objectives of the organization (Mod-Sanusi et al., 2015). Strategic plans are endorsed by ARC and approved by the board of directors. SM must implement the strategic plan to achieve organizational goals and objectives and to achieve the true meaning of corporate governance. GCG establishes the segregation of duties between the board of directors and SM (Mod-Sanusi et al., 2015). Organizations which demonstrated the poor corporate governance usually have the same person as head of an organization and also the chairman of the board of directors (Keasey, Thomson & Right, 2012). Furthermore, and to achieve shareholder satisfaction, GCG obliges organizations to adopt a two-tier system namely board of directors and SM, where shareholders appoint the board, and SM is appointed by the board (Korine & Gomez, 2014).

It is one of the significant duties of SM to develop, implement and monitor corporate strategy which is required for the attainment of organizational goals. SM also has to accept the gaps and flaws identified in the strategic system, and they should be ready to amend it as and when identified and reported. SM is a combination of executive people who are liable for the organizational performance (e.g., CEO, CFO, and COO). SM reviews the corporate strategy periodically intending to identify any gaps between actual performance and objectives; moreover, SM has to discuss the strategy of the organization following every three years (COSO, 2016; Bentley-Goode, Newton & Thompson, 2017) for assuring its practicality and continuous alignment with corporate objectives.

**Fraud risk assessment**

FRA is a major part of fraud risk management and is a core element for the achievement of GCG (Singleton & Singleton, 2010). FRA deals with the risks which are directly attributable to fraud, its impact and its prospect of occurring. FRA contributes to GCG by becoming part of the governance structure of an organization in the shape of written policies as these policies express the expectation of the board of directors (Law, 2011). These policies are approved by the board and SM is obligated for its implementation. FRA drafts a mechanism which assesses the SM function not only for the implementation of policies but also monitor their compensation, performance-based bonuses, and un-authorized related parties transactions. FRA creates tones at the top by ongoing compliance and mitigating program (KPMG, 2014). FRA also obliges ARC to perform the task effectively towards fraud and related risk by reviewing the policies and updating them as and when required. FRA also assists ARC towards the resolution of internal and external audit observations and the implementation of their approved recommendations.

FRA is a control that identifies important and integral fraud risk and paves the way for the achievement of GCG (Law, 2011). FRA documents the schemes of fraud that occurred in the past and occurred within a similar industry. FRA is scheme and scenario-based rather than inherent and control based and therefore provides better control towards the prevention of fraud and assists in the achievement of organizational goals. FRA offers complete guidance for ARC and SM for the policies, which can be impacted by the fraud and its related activities (Vona, 2010), and at the
same time, FRA assesses the effectiveness of ARC and SM (Siregar & Tenoyo, 2015). Furthermore, FRA is a continuous and ongoing approach, and it’s not a one-off exercise that also assesses the code of conduct, its process, and its implementation. FRA is dependent upon several factors and elements. These elements are measured on the scale of occurrence and its related impact on the organization. These scales are often referred to as heat maps (Anderson, 2011). The inclusion of FRA is becoming a necessary part of all sorts of audits. Additional auditing standards are introduced to cater to the FRA by the American Institute of Certified Public Accountants and Institute of Internal Auditors.

For the achievement of effective FRA, Table 2 defines factors which should be considered (Singleton & Singleton 2010): These factors can be notified at different levels such as people, divisions, products or services, accounting or business process and controls.

**Table 2**
Factors of Effective Fraud Risk Assessment

<table>
<thead>
<tr>
<th>Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate environment factor</td>
<td>Specific industries are more susceptible to fraud and thus require more controls.</td>
</tr>
<tr>
<td>Internal factors</td>
<td>Employees of organizations are more susceptible to fraud.</td>
</tr>
<tr>
<td>Fraud factors</td>
<td>This factor identifies the fraud schemes which can be inferred by employees or outside organizations</td>
</tr>
</tbody>
</table>

Source: Singleton and Singleton (2010)

Effective FRA can result in minimized financial losses due to fraud, decreasing the cost of responding to fraud, enhancing compliance with local regulations, improving employee awareness, increasing in potential reporting of fraud (whistleblowing), and resulting in more effective corporate governance (Abdullahi & Mansor, 2015; Abdullatif, 2013; Leonard, 2010) with the potential of achieving GCG.

**Corporate governance in Oman**

Corporate governance concept is new in Oman and like any other country; Oman is not safe from fraudulent activities. In the last five years, few of the reported cases of fraud are ranging from USD 39 million to USD 2.6 million (Mukrashi, 2016; Reuter, 2011; Reuter, 2013; Reuter, 2014) and spread around various industries or sectors. However, the majority are falling under the fraud category of ethical misconduct. By World Bank (2016), the governance score of Oman for the year 2016 related to control of corruption is almost constant of the score achieved in 2006, moreover by ACFE (2016) number of reported fraud cases in Oman is increasing every year. The reason for such fraudulent activities is lack of oversight by the board of directors and lack of ethical culture developed by SM, and due to this reason, governance plays a reduced role towards control of fraud and corruption (Halbouni, Nada & Abeer, 2016).

In Oman, new codes of corporate governance are implemented in the year 2016, whereas former codes were adopted in 2002. These new codes still require certain amendments and modifications to cater for the achievement of GCG and to provide satisfaction to shareholders. There are one hundred and fifteen companies listed in Muscat Stock Market (MSM) and distributed under the financial, industrial and service sectors. Public listed companies are governed by Commercial Companies Law, Capital Market Rules and codes of corporate governance.
Methodology

A descriptive cross-sectional survey design along with the quantitative research method approach was utilized to identify the relationship between FRA and GCG. The unit of analysis is Omani public listed companies. For this study, five-point Likert scale logic was utilized ranging from highly agree to highly disagree, and questions were distributed into different sections for FRA, ARC, and SM. These sections explain the definition and define the significant element of GCG as ARC and SM. Due to the small population size, census sampling was utilized and the contribution of all 115 companies was taken into consideration.

Questions in Table 3 related to ARC and SM deals with all the major factors or elements required for the achievement of GCG. Organizations are obliged to follow the basic requirements of corporate governance, which include conducting the meetings of ARC. Nevertheless, it is the effectiveness of the meetings of ARC, which should be minuted and defines the proceedings and instructions of ARC (Mohd-Sanusi et al., 2015). Similarly, ARC performs an essential role in strategic planning which leads towards the achievement of goals and objectives and provides enhanced corporate governance (Krishnan & Lee, 2008), which can be termed as GCG. ARC operates like the board’s advisor; however, the assistance of internal and external audit is required. These two independent departments perform the tasks, provide information to ARC towards achievements of organizational goals, and define recommendations. ARC has to discuss the extensiveness, pervasiveness and commonness of audit findings and related recommendations in audit reports with senior management (Laura et al., 2010; Laux & Laux, 2009) enabling the achievement of GCG. For SM, the questionnaire covers the area of strategic planning, objectives and corrective actions. These are the three main elements of the accomplishment of GCG as they are directly linked with organizational goals and affect organizational performance.

Questions in Table 3 related to FRA cover all the aspects, which can be considered necessary for the FRA for the achievement of GCG. Following the ACFE (2016), the significant aspects of fraud risk governance which can enhance the organizational corporate governance are effective tone at the top which can also be defined as ethics and code of conduct policies (Siregar & Tenoyo, 2015), whistleblowing policy and protection of whistleblower, assessment of executive management and evaluation of audit committee. These questions are comprehensive and widespread, covering the areas of corporate governance, which can ultimately lead towards the attainment of GCG.

Respondents were requested to answer fifteen questions, including three related to demographics. The respondents included in this study are members of the board of directors and its related committees, company secretaries, SM and internal auditors. Data was collected with the assistance of Internet-based application and analysis was conducted by utilizing Statistical Package for Social Science (SPSS) and Partial Least square and Structural Equation Modeling (PLS-SEM).

For the assessment of the measurement model, internal consistency and reliability are measured by utilization of composite reliability (Henseler, Ringle, & Sarstedt, 2015; Ramayah, Cheah, Chuah, Ting & Memon, 2018). Assessment of convergent validity is conducted via average variance extracted (AVE) and assessment of discriminant validity is conducted with Heterotrait-monotrait (HTMT) ratio. Assessment of AVE, composite reliability (CR) and discriminant validity can be categorized as the evaluation of measurement model (Henseler et al., 2015; Hair, Hult, Ringle, & Sarstedt, 2017). Acceptable values for AVE, CR and discriminant validity are defined by Ramayah et al., (2018) and presented in Table 4.
### Table 3
Research instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>The question used in research</th>
<th>Adopted/Adapted</th>
<th>Original question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Good Corporate Governance – Audit and Risk Committee; Source Mohd-Sanusi et al., 2015</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC.4.B.1</td>
<td>My company’s audit and risk committee meetings are held regularly and minuted, with actions noted by new codes of corporate governance issued by the capital market authority</td>
<td>Adapted</td>
<td>Board’s meetings were held regularly and minuted, with actions noted</td>
</tr>
<tr>
<td>ARC.4.B.2</td>
<td>My company’s audit and risk committee discuss the pervasiveness of audit findings/recommendations in audit reports with senior management.</td>
<td>Adapted</td>
<td>Board Discuss reasonableness of audit finding/recommendation in audit reports with management</td>
</tr>
<tr>
<td>ARC.4.B.3</td>
<td>My company’s audit and risk committee ensure that strategic planning is in line with the organization’s objectives.</td>
<td>Adapted</td>
<td>Strategic planning has a clear relationship with the organization’s objectives</td>
</tr>
<tr>
<td><strong>Good Corporate Governance – Senior Management; Source Mohd-Sanusi et al., 2015</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM.4.D.1</td>
<td>In my company, there is strategic planning lasting three years or more</td>
<td>Adapted</td>
<td>There is strategic planning lasting three years or more and is updated annually.</td>
</tr>
<tr>
<td>SM.4.D.2</td>
<td>My company’s strategic planning has a clear relationship with the organization’s objectives</td>
<td>Adapted</td>
<td>The strategic plan has a clear association with the organization’s goals.</td>
</tr>
<tr>
<td>SM.4.D.3</td>
<td>Senior management of my company seriously views corrective actions as an avenue for improvements</td>
<td>Adapted</td>
<td>Senior management of my company seriously sees corrective actions as an avenue for improvements</td>
</tr>
<tr>
<td><strong>Fraud Risk Assessment; Source: Siregar and Tenoyo (2015)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.1</td>
<td>In my company, ethics policy should be assessed by fraud risk assessment</td>
<td>Adapted</td>
<td>Good fraud risk management covers ethics policy</td>
</tr>
<tr>
<td>FRA.C.3.6.2</td>
<td>In my company, the code of conduct should be assessed by fraud risk assessment</td>
<td>Adapted</td>
<td>Good fraud risk management covers the code of conduct</td>
</tr>
<tr>
<td>FRA.C.3.6.3</td>
<td>In my company, well-defined whistleblowing policy should be assessed by fraud risk assessment</td>
<td>Adapted</td>
<td>Good fraud risk management covers whistleblowing policy</td>
</tr>
<tr>
<td>FRA.C.3.6.4</td>
<td>In my company, useful senior management function should be assessed by fraud risk assessment</td>
<td>Adapted</td>
<td>Good fraud risk management covers useful board function</td>
</tr>
<tr>
<td>FRA.C.3.6.5</td>
<td>In my company, effective audit and risk committee should be assessed by fraud risk assessment</td>
<td>Adapted</td>
<td>Good fraud risk management covers effective board function</td>
</tr>
<tr>
<td>FRA.C.3.6.6</td>
<td>My company has a system in place for reporting of suspicions of fraud and misconduct</td>
<td>Adapted</td>
<td>Good fraud risk management includes a system for reporting of suspicions of fraud and misconduct</td>
</tr>
</tbody>
</table>

Source: Authors’ work
Table 4
Acceptable values - measurement model analysis

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Index Name</th>
<th>Acceptable Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Consistency</td>
<td>CR</td>
<td>Composite reliability ≥ 0.70</td>
</tr>
<tr>
<td>Indicator reliability/Factor Loadings</td>
<td>Indicator Loading</td>
<td>Values below 0.4 should be deleted. Loadings indicators &gt; 0.7, 0.6, 0.5 is adequate.</td>
</tr>
<tr>
<td>Convergent validity</td>
<td>Average Variance Extracted (AVE)</td>
<td>Retained indicators should have AVE ≥ 0.50. Indicators &lt; 0.5 should be deleted.</td>
</tr>
<tr>
<td>Discriminant validity</td>
<td>HTMT</td>
<td>HTMT - all values must be &lt; 0.85</td>
</tr>
</tbody>
</table>

Source: Ramayah et al., (2018)

Structural model assessment is required once all the criteria of measurement model are met. Structural model assessment comprises of collinearity measurement, determination of path coefficient, $R^2$ and $Q^2$ (Hair et al., 2017). Table 5 defines the acceptable values related to the assessment of the structural model.

Table 5
Acceptable values for model evaluation - structural model analysis

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Index Name</th>
<th>Acceptable Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collinearity</td>
<td>Variance inflator factor (VIF)</td>
<td>VIF values for specific indicators should be &gt; 5</td>
</tr>
<tr>
<td>Path Coefficient</td>
<td>Path Coefficient</td>
<td>p-value &lt;0.01, t value &gt;2.33 (one-tailed)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>Coefficient of determination</td>
<td>0.26- Substantial, 0.13- Moderate, 0.02- Weak</td>
</tr>
<tr>
<td>$Q^2$</td>
<td>$Q^2$ predictive relevance (Stone Geisser)</td>
<td>A value greater than zero specifies that the independent variable has predictive relevance over the dependent variable</td>
</tr>
</tbody>
</table>

Source: Hair et al., (2017)

Results

Responses were received from 110 organizations, which make up to 96% of the population. The response rate is consistent with the other studies where census sampling was utilized but the response rate was not 100% (Yeboah, Kwafoa, & Amoah, 2017). The analysis was performed on 107 responses as three respondents did not complete the entire questionnaire. These three respondents are considered as missing data and therefore taken out of the study.

The demographic profile of 110 respondents is presented in Table 6. 95% of the respondents were male, whereas only 5% were the female respondents. For the qualification, 46% of respondents were having professional qualifications followed by the Master’s qualification which is 33%. Other qualifications include a degree in law and chartered secretary certifications. 66% of respondents belong to the role of SM, followed by ARC members which are 15%. The lowest percentage of respondents was from the remuneration committee.
Table 6  
Demographic profile of respondents

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Number of Respondents</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>106</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Highest Qualification</td>
<td>CA/ CPA/ MIPA/ CIA/ CRMA</td>
<td>51</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>CFE or other fraud-related education</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Masters</td>
<td>36</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Bachelors</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Role/ Position in Organization</td>
<td>Board of Director</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Audit and Risk Committee</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Remuneration Committee</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Senior Management</td>
<td>73</td>
<td>66</td>
</tr>
</tbody>
</table>

Source: Authors’ work

The measurement model was assessed by utilizing PLS-SEM and by following the acceptable values defined by Ramayah et al., (2018) which are presented in Table 4. All indicators or questions are retained as outer loading for all of them was 0.5 and above. Outer loading defines the relationship between reflective construct and measured indicators. The average variance extracted (AVE) of GCG is 0.542 and composite reliability (CR) of GCG is 0.875. AVE of FRA is 0.818 and CR of FRA is 0.964. AVE and CR values are reported in Table 7; moreover, values of HTMT ratio is below 0.85.

Table 7  
Outer loading, average variance extracted and composite reliability

<table>
<thead>
<tr>
<th>Variable and Question Code</th>
<th>Outer Loading</th>
<th>Average Variance Extracted</th>
<th>Composite Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Corporate Governance (GCG)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC.4.B.1</td>
<td>0.685</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC.4.B.2</td>
<td>0.581</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARC.4.B.3</td>
<td>0.659</td>
<td>0.542</td>
<td>0.875</td>
</tr>
<tr>
<td>SM.4.D.1</td>
<td>0.858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM.4.D.2</td>
<td>0.803</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM.4.D.3</td>
<td>0.796</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fraud Risk Assessment (FRA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.1</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.2</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.3</td>
<td>0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.4</td>
<td>0.92</td>
<td>0.818</td>
<td>0.964</td>
</tr>
<tr>
<td>FRA.C.3.6.5</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRA.C.3.6.6</td>
<td>0.55</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ work

Structural model assessment can be conducted now as the requirements for the measurement model are met, as presented in Table 7.

The assessment of the structural model was conducted following the information available in Table 5. For collinearity assessment, the result suggests that the value of VIF is one; therefore, there is no problem of multi-collinearity (Carbonell, Alcázar, & Gardey, 2015). The value of $R^2$ is 0.121 and the value of $Q^2$ is 0.051. Both $R^2$ and $Q^2$ values are meeting the acceptance criteria (Hair et al., 2017).
For the significance of the direct effect-path coefficient, the application of bootstrapping was utilized with 5000 sub-samples for the 107 respondents. Acceptable values for the path coefficients are available in Table 5 (Hair et al., 2017). Table 8 defines that significance of direct effect – path coefficients:

### Table 8
The significance of Direct Effect – Path Coefficients

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Beta (β)</th>
<th>Standard Error (STDEV)</th>
<th>T Statistics (β/STDEV)</th>
<th>P Values</th>
<th>R²</th>
<th>Q²</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRA → GCG</td>
<td>0.348</td>
<td>0.104</td>
<td>3.351***</td>
<td>0.00</td>
<td>0.121</td>
<td>0.051</td>
</tr>
</tbody>
</table>

Note: ***p<0.01 (t>2.33) (One Tail)

It is evident from the result presented in Table 8 that beta (original mean) is 0.348 which is positive, the t-value is 3.351 and the p-value is 0.00. Positive beta demonstrates that the relationship is direct, whereas t-values more than 2.33 and p-values less than 0.05 demonstrate the significance of the result. Henceforth, it is ascertained that FRA is positively statistically significant and influencing GCG. The arrived result is in coherence with the literature review, where it is mentioned that FRA can influence GCG. The influence of FRA on GCG is in the form of policies and procedures by implementing risk registers, risk profiles, their likelihood, and related impact.

### Conclusion
FRA is the cornerstone of good corporate governance and can be considered as vital control towards the elimination of fraud within an organization. FRA is a control that can be available in the form of policies and procedures. Frauds can be identified before its occurrence and mitigating factors can be developed once FRA is properly developed and implemented. Concurrently, GCG can operate effectively once the organization is free from fraud and fraudulent activities. Fraud free environment also enables GCG to provide satisfaction to shareholders. For this study, GCG is measured by its two main constituents, namely ARC and SM.

This paper is intended to identify the relationship of fraud risk assessment with good corporate governance for the companies listed in the Muscat Stock Market in the Sultanate of Oman. For this reason, a quantitative survey was performed for all one hundred and fifteen organizations listed in MSM, from which 93% of respondents were analyzed and assessed. The questionnaire was only forwarded to the board of directors and related committee members and SM as they possess the knowledge of the organization and can respond on behalf of the organization. The internet-based tool was utilized to collect the data and it was analyzed by the utilization of PLS-SEM and SPSS. The result of this study proposes that FRA is having a direct and significant relationship with GCG as the t value is 3.351 and the p-value is 0.00.

This study makes meaningful participation in the literature review and also provides practical application to organizations. Practical application cannot only limit to the Omani public listed companies but can be applicable for all organizations across the globe. GCG is the fundamental requirement for all organizations and can be considered for organizations other than public listed companies such as private and government-owned companies. Similarly, fraud is also impacting all organizations regardless of its categorization; therefore the implementation of FRA is essential towards elimination, mitigation and controlling of fraud.

There are two limitations to this study. Firstly this study is only directed towards public listed companies; there are only 115 public listed companies in Oman and inclusion of private limited companies with paid-up share capital of USD 10 million or more would
have provided better results. However, the scope of this study is only limited to public listed companies. For research limitation, this study is conducted at the firm level where one individual replied on behalf of the organization; however, the responses of at least three respondents could have enhanced the result and provides a better situation of the organization towards FRA and GCG.

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Do Business Ethics and Ethical Decision Making Still Matter: Perspective of Different Generational Cohorts

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University North, Croatia
Ana Aleksić
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Nikolina Vinković
University North, Koprivnica, Croatia

Abstract

Background: Research in business ethics shows that individual differences can influence one’s ethical behaviour. In addition, variability in attitudes towards ethical issues among different generations is emphasized. Still, results are inconclusive and call for an additional examination of possible generational differences with regard to ethics and ethical values. Objectives: Our objective is to test if the perception of the importance of business ethics, attitudes towards ethical issues and aspects influencing ethical behaviour, differ among the four generations currently present in the workforce. Methods/Approach: Theoretical implications are empirically tested on a sample of 107 individuals, members of Baby Boomers, Generation X, Millennials and Generation Z. Results: In general, the results indicate that there are little or no generational differences related to the analysed aspects of business ethics. The significant difference is present only in the importance given to factors that influence ethical decision-making: (i) formal rules and procedures, (ii) performance management system and (iii) job pressures, between the members of Generation Z and older generations. Conclusions: In spite of employee diversity, ethics continues to present an important aspect of the business environment. Thus, organizations need to be oriented towards creating ethical leaders and a positive ethical climate that ensures that ethical values and behaviours are present throughout the organization.

Keywords: business ethics, ethical decision making, generations
JEL classification: M1, M14
Paper type: Research article

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Introduction
Because of major business scandals and crises, business ethics has been under the spotlight of not only academics and scientists but also business practitioners and professionals for the last decades. Significant efforts have been done in theoretically and empirically exploring different aspects of business ethics, ethical decision-making, and development of business curricula aimed at enhancing knowledge of this important interdisciplinary scientific field.

The imperative of a successful organization calls for the “clutter” of ethics and profitability. As a part of general and practical ethics, business ethics focuses on moral or ethical principles and issues that occur in the business environment, providing judgments as to good and bad, right and wrong, acceptable and non-acceptable, and what ought to be (Singh et al., 2018). It reflects the ethical choices made by stakeholders in the realization of certain activities and examines the application of personal norms in relationships between employees, managers, business entities, and the environment (Vujić et al., 2012, p. 48). In the centre of its inquiry, there are balanced and strong relations between personal, legal and social ethics and the consequences of decisions on certain structures of society and the business system as a whole. In the end, as Gerde et al. (2019, p. 916) stress, business ethics is aimed at connecting ethics and the economy to achieve general welfare.

However, it is difficult to implement the concept of ethics as it contains the idea of universality or equality in the applicability of the rules. What ethics and ethical behaviour are for one organization or an individual, in one country and culture can be completely unimaginable for another organization, individual, in another country and culture. Ethical behaviour and ethical decision-making are under the influence of many individual attributes and organizational, social and cultural environments (Loe et al., 2000; Kish-Gephart et al., 2010; Ma et al., 2012), and they need to be acknowledged.

When it comes to individuals, as Ma et al. (2012) emphasize ethics is the result of the process of moral development. This process can be under the influence of many personal experiences as well as situational factors that shape one’s behaviour. The generational theory emphasizes accordingly that individual ethics and ethical values are strongly influenced by common political, social, and historical events that were significant for a group of people born and living at a certain timeline (VanMeter et al., 2012), the so-called generations. Each generation develops consequently their distinctly personal and works values, thus potentially leading to differences regarding ethical values and ethical behaviour. Previous reports (Verschoor, 2013), as well as empirical results of specific generation ethical ideology (e.g. VanMeter et al., 2013), do indicate variability in attitudes towards ethical issues among different generations. Still, there is a lack of empirical support that differences truly exist (Costanza et al., 2015).

Therefore, within this paper, we wanted to test if members of different generations do show distinct attitudes to several aspects of business ethics and ethical decision-making. More specifically, our objective is to test if the perception of the importance of business ethics, different attitudes towards ethical issues and towards aspects influencing ethical behaviour, as well as towards pressures for unethical behaviour, differ among the four generations in the current workforce. Theoretical implications have been empirically tested on a sample of individuals, members of Baby Boomers, Generation X, Millennials and Generation Z.
After the introduction, the paper provides an overview of business ethics and ethical decision-making, their main approaches as well as their distinct contribution and role in business and organizational context. This is followed by an analysis of the current theoretical framework and empirical work on generational differences concerning ethical values. The empirical part refers to methodology and presents the main research results. Discussion of research results, research limitations, future research direction, and final remarks conclude the paper.

**Literature review**

**Ethics in the organizational context**

In general, ethics can be defined as the systematic reflection on values and norms: their content and changes, and their meaning, justification, and determination (Becker, 2019, p. 15). In the business environment, business practices were first developed in trade, and in the beginning, they were just the customs that eventually became the rules of conduct. With the development of the world economy and the emergence of an industrial revolution, trade laws were introduced for each particular country, and different laws were passed that defined the rules of business conduct at that time. The period between the two world wars was marked by the adoption of different codes of conduct in certain activities, while after 1945 much of the business conduct was regulated by the rules and directives of the United Nations Organization. The study of ethics in business began in the 1950s (Mladenovic et al., 2019) as this is the period when workers began to fight for their rights. The mid-1980s and early 1990s witnessed advancements in the field, as many theoretical models applying ethics while making decisions were developed (O’Fallon et al., 2005). With globalization, business ethics gained a new dimension, and a large number of companies in their business increasingly include a code of ethics and emphasize their social responsibility (Aleksić, 2007).

van Luijk (1997, p. 1579) definitions of business ethics captures the essence of today’s ethics, defining it as “a social configuration, consisting of a mixture of shared basic concepts, well-tested methods of moral analysis, local customs in commercial transactions and employment policies, historically grown assumptions on fairness, decency and misdemeanor, long-term positions of power and influence, and specific market constraints and opportunities”. The ultimate mission is to provide guidance and in terms of ethics to enrich activities and decisions at the personal, organizational and systemic levels and their interconnections (De George, 1987; Enderle, 2018).

It needs to be emphasized that ethics and morality are often considered interrelated with corporate social responsibility and somehow interdependent (Joyner et al., 2002). However, as O’Ferrell et al. (2019, p. 492) emphasize ethics is considered to be “more related to individual and social unit decision making while corporate social responsibility relates more to the impact on stakeholders.”

Ethics has received growing attention among employees as well as employers, as it is seen as a certain signpost that directs their professional and personal success, but also influences overall organizational performance (Joyner and Payne, 2002; Lipska et al., 2019). Besides, in the end, ethics can help improve company image and bring various benefits to different stakeholders like investors, employees, consumers, local communities and actors on the labour market (Lipska et al., 2019).

Study of ethics in business has expanded into two main streams (i) normative ethics, providing individuals with guidelines, principles, and norms how they should behave, and mostly residing in moral philosophy and theology and (ii) descriptive, empirical
ethics concerned with explaining and predicting individual actual behaviour, residing mostly in the management field (O’Fallon et al., 2005).

The ethical decision, in general, is seen as a decision that in terms of legal and moral requirements is suitable to a larger society (Jones, 1991). Ethical decision-making includes the perception of a moral problem, the process of moral reasoning and moral behaviours (Ma et al., 2012).

The starting point for business ethics is primarily from organizational managers and leaders who present a key to creating an ethical climate in their organization. When ethical leaders fairly treat their employees and exhibit a high level of ethical conduct, they provide examples for their employees; create a positive ethical climate and a sense of obligation for their employees to reciprocate similar behaviour (Babalola et al., 2019). Furthermore, employees’ perception of their leader’s ethics can be seen as a strong predictor of ethical practice (Greenwood et al., 2018). In addition to these informal ways, managing business ethics in organizations includes the following formal components (Crane et al., 2004, p. 144): (i) company values, (ii) code of ethics, (iii) reporting and counselling lines, (iv) ethical managers, employees, and committees, (v) ethical consultants, (vi) ethical education and training, (vii) reporting, accounting, and auditing. Research (e.g. Trevino et al., 1999) shows that although formal programs and components can have a positive impact, these programs were found to be relatively unimportant when compared to informal ones.

**Generational cohorts' differences and ethics**

Special attention in the study of ethics is on individuals and their behaviour when faced with ethical issues and decision making, where individual differences have been often analysed and seen as a possible factor contributing to deviations in ethical behaviour. For example, gender is one of the most studied individual variables, with results indicating no or very few gender differences (e.g. Loo, 2013) or found men less ethical than women (e.g. Arlow, 1991; Glover et al. 2002,). Research on age has also produced mixed results (e.g. O’Fallon et al., 2005).

The emergence of generational theory brought new interest into individual factors and raised the question if one generation, as opposed to previous generations, has distinct and novel attitudes and aptitudes towards ethics that are a result of their environment (Oblinger, 2003). Generation presents an identifiable group that shares specific events (Kupperschmidt, 2000). These specific events have influenced that individuals from identifiable groups have similar work and personal values, eventually affecting their work behaviour and work-related outcomes.

Distinguishing features of generational cohorts engaged in the current labour market and their presumed values are presented in the following Table. An earlier generation, the veteran generation (born till 1940) as well as alpha generation (born after 2010) are not included in the analysis.

As regard to ethics and ethical values, research (e.g. Boyd, 2010; van der Walt, Jonck et al., 2016) suggests generational differences in perception of ethical and unethical behaviours as well as facets of work ethics. Furthermore, the literature suggests in terms of work ethics, older generations give higher emphasis on it than the younger generation. Zabel et al. (2017) in their paper stress how previous research, for instance, showed Baby boomers incline more towards ethics, as opposed to Millennials (generation Y) and in most cases as opposed to Generation X members. VanMeter et al. (2012) in their research support the notion that specific generation Y values affect their ethical ideologies and the way they will behave regarding workplace ethical norms and standards.
Table 1
Characteristics of generational cohorts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td>Postwar</td>
<td>Political transition</td>
<td>Globalization</td>
<td>Mobility and multiple realities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Capitalism and meritocracy dominate</td>
<td>Economic stability</td>
<td>Social networks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emergence of internet</td>
<td>Digital natives</td>
</tr>
<tr>
<td><strong>View</strong></td>
<td>Communal, unified thinking</td>
<td>Self-centred and medium-term</td>
<td>Egotistical, short term</td>
<td>No sense of commitment, be happy with what you have and live for the present</td>
</tr>
<tr>
<td><strong>Aim</strong></td>
<td>Solid existence</td>
<td>Multi-environment, Secure position</td>
<td>Rivalry for the leader position</td>
<td>Live for the present</td>
</tr>
<tr>
<td><strong>Self-realization</strong></td>
<td>Consciou carrier building</td>
<td>Rapid promotion</td>
<td>Immediate</td>
<td>Questions the need for it at all</td>
</tr>
<tr>
<td><strong>Values</strong></td>
<td>Patience, soft skills, respect for traditions, EQ, hard work</td>
<td>Hard work, openness, respect for diversity, curiosity, practicality</td>
<td>Flexibility, mobility, broad but superficial knowledge, success orientation, creativity, freedom of information takes priority</td>
<td>Live for the present, rapid reaction to everything, initiator, brave, rapid information access and content search</td>
</tr>
<tr>
<td><strong>Other possible characteristics</strong></td>
<td>Respect for hierarchy, exaggerated modesty or arrogant inflexibility, passivity, cynicism, disappointment</td>
<td>Rule abiding, materialistic, fair play, less respect for hierarchy, has a sense of relativity, need to prove themselves</td>
<td>Desire for independence, no respect for tradition, quest for new forms of knowledge, inverse socialization, arrogant, home office and part-time work, interim management, undervalue soft skills and EQ</td>
<td>Differing viewpoints, lack of thinking, happiness, pleasure, divided attention, lack of consequential thinking, no desire to make sense of things, the boundaries of work and entertainment overlap, feel at home anywhere</td>
</tr>
</tbody>
</table>

Source: Adapted from Bencsik et al. (2016), Francis et al. (2018)
Verschoor (2013) in his paper provides an overview of major findings from Generational Differences in Workplace Ethics report. Results indicate a change in perception in younger workers, as a high percentage of Millennials consider certain behaviours to be ethical (e.g. using company software for personal use). Furthermore, Millennials report they observe unethical behaviour more often than their older colleagues do, but at the same time, they are more willing to ignore this type of behaviour if they consider that behaviour will help save jobs. Verschoor (2012) also reports that younger ones more often feel pressure from their peers to go against defined ethical norms and rules. In terms of formal and informal guidance, older employees would more often consult formal company channels and be guided by organizational values, whereas younger workers consult more often their family members. Baby Boomers are least likely to talk to their co-workers about a certain ethical dilemma.

Change in perception of acceptable ethical behaviour is even more expressed among Generation Z, as results of an additional study (Barna, 2018) reveal Generation Z’s morality has dramatically shifted with a belief of moral relativism as a prevailing one. More specifically, generation Z members consider changes in what is morally right and wrong are under a strong influence on society and depend on personal believes.

**Empirical Research**

**Sample and procedure**

Several authors (e.g. Perry et al., 2011) critically question the existence of differences in ethics among generations, as of many methodological and theoretical issues. Besides, Costanza et al. (2015) emphasize a lack of empirical evidence that differences truly exist about ethical values, while Zabel et al. (2017) through their analysis of published studies found no support for the effect of generations on ethics endorsement.

Therefore, through our research, we test the perception of the importance of business ethics, different attitudes towards ethical issues and aspects influencing ethical behaviour, as well as towards pressures for unethical behaviour, and if they differ among the four generations currently present in the workforce.

We used a convenience sample, including 107 respondents, equally represented members from 4 generational cohorts: Baby boomers, Generation X, Millennials and Generation Z, working mostly in public sector organizations (83.7%). Respondents were mostly women (72.6%) with high school (47.7%) or university (29.9%) degree and with average more than 20 years of work experience (57%).

We provided respondents with a list of statements and asked them to assess if certain statements refer to them and their organization, by using a 1 to 7 Likert scale (1 - completely disagree, 7 – completely agree).

**Results**

At first, we wanted to analyse the practice of respondents’ organizations regarding business ethics, the presence of formal ethical framework and guidelines, as well as forms of communication about organizational ethical activities.

Table 2 presents an outline of several elements and practices related to business ethics inside respondents’ organizations, and percentage of respondents that agreed with the specific statement.
Most of the organizations have implemented several aspects of ethics in their business and organizational practice. Most of the sample respondents state their organization has an ethical code and/or some other document that defines rules of expected employee behaviour. Furthermore, most of the organizations have a practice that upon employment new employees are introduced with a code of ethics and learn about ethical guidelines and rules they can use in their future behaviour. Still, it looks, upon results received, that organizations do not work too much further into ensuring ethical employee behaviour. Only 49.1% of respondents state that their organization has formal structures and policies for implementing and ensuring employee ethical behaviour, and only 31.8% of them state their organizations have organized additional employee education in aspects related to ethical behaviour.

Table 2
Business ethics elements and practice (n=107)

<table>
<thead>
<tr>
<th>Business ethics statement regarding organizational practice</th>
<th>Affirmative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of a document that defines rules of employees’ behaviour</td>
<td>86.9</td>
</tr>
<tr>
<td>Presence of the code of ethics</td>
<td>82.2</td>
</tr>
<tr>
<td>Learning about code of ethics upon employment</td>
<td>73.1</td>
</tr>
<tr>
<td>Structures in charge of implementing ethical employee behaviour</td>
<td>49.1</td>
</tr>
<tr>
<td>Employee education related to ethical behaviour</td>
<td>31.8</td>
</tr>
<tr>
<td>Organizational support for charity campaigns in its environment</td>
<td>60.7</td>
</tr>
<tr>
<td>Encouraging employee volunteering in the local community</td>
<td>22.4</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Some aspects of corporate social responsibility are also present, as respondents state their organizations do support charity campaigns (60.7% of organizations) but do not encourage enough employee volunteering in the local community (only in 22.4% of cases). The organizations use to publicly present ethical aspects of their business to interested stakeholders (employees, management, local community) respondents state that most often this is done through internal acts of communication (including Intranet) (89.6%) or as a part of their annual financial reports (11.4%). When it comes to individual perception of business ethics, in general results reveal respondents attribute significant importance to business ethics and its influence on various aspects of the business (Table 3.).

As average grades show, ethics is considered to ensure good company reputation, increases trust in relations to different internal and external stakeholders, and ensures an increase in efficiency and efficacy of business. Furthermore, it contributes to employee growth and development as well as lowering the costs associated with omissions in the workplace.

By using Anova one-way test we aimed to analyse if perception about ethics contribution to business differs among respondents depending on the generation they belong. Results of differences (Table 3) regarding importance attributed to business ethics show no statistically significant difference regarding the perception of business ethics importance across generational groups for all but one statement. The exception is the perception that ethics increases trust in relations both in an internal and external organizational environment, where results of the Tukey post hoc test indicate a detectable statistically significant difference between Generation X and Z members. Generation Z members give less importance to business ethics contribution
for increasing trust in relations both in the internal and external organizational environment.

Table 3
Influence of ethics on business – Total mean values and Anova test according to cohorts

<table>
<thead>
<tr>
<th>Ethical business...</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases efficiency and efficacy</td>
<td>5.89</td>
<td>1.396</td>
<td>1.962</td>
<td>0.124</td>
</tr>
<tr>
<td>Ensures good reputation</td>
<td>6.19</td>
<td>1.326</td>
<td>1.903</td>
<td>0.134</td>
</tr>
<tr>
<td>Increases trust in relations both in the internal and external organizational environment</td>
<td>6.14</td>
<td>1.292</td>
<td>2.376</td>
<td>0.074*</td>
</tr>
<tr>
<td>Contributes to employee growth and development</td>
<td>5.85</td>
<td>1.420</td>
<td>1.016</td>
<td>0.389</td>
</tr>
<tr>
<td>Lowers the costs associated with omissions in the workplace</td>
<td>5.50</td>
<td>1.562</td>
<td>1.479</td>
<td>0.225</td>
</tr>
</tbody>
</table>

Source: Authors’ work; * Statistically significant at 10%; 1- completely disagree, 7 – completely agree

Furthermore, we asked respondents about their perception of their supervisory manager’s business ethics (Table 4). To test for perception of their supervisor’s behaviour regarding ethics and ethical decision making, we asked respondents to assess in which degree from 1 to 7 (1- completely disagree, 7 – completely agree) statements refer to the ethical behaviour of their supervisory manager. Average grades, as well as F and p values of Anova, used to test for differences between groups are present in Table 4.

As regards to their supervisor’s ethical behaviour, average grades indicate not completely ethical behaviour of the respondent’s supervisory manager. Among respondents’ manager’s behaviour, several aspects of unethical behaviour are considered more present, such as favouring employees (average - 5.37) or transferring guilt to other employees in order to protect him/herself (average - 4.73).

As emphasized in our literature review, previous studies reveal younger employees are more subject to pressure from their environment to behave unethically. Therefore, we further tested if respondents do things they consider unethical if their supervisor asks them and if there is a significant difference between generations. In general, most of the respondents (61.7%) state they do not do things considered unethical if their supervisor asks them, 27.1% of them stated sometimes, while 11.2% said yes. In general, as seen, respondents do not engage in unethical behaviour as of supervisor’s pressure.

Analysing if differences between generations exist by Anova one way, results show no statistically significant difference are present among members of different generations [F (3.103) =0.249, p= 0.862].
In general, it is considered that the supervisor’s behaviour is the most relevant factor influencing one’s ethical decision making in organizations (average - 6.05) followed by a reward system (average - 5.72) and formal rules and procedures (average - 5.64). (Table 5.)

However, there are differences when it comes to the analysis of factors that influence ethical decision making regarding generational groups, as presented in the table above. Results of Anova on differences regarding importance attributed to elements influencing ethical decision-making indicate a statistically significant difference between groups regarding importance given to formal rules and procedures, performance assessment system and job pressures. Results of Tukey post hoc test shows there is a statistically significant difference in relevance given to formal rules and procedures for ethical decision-making, performance management system as well as job pressures between the members of Z generation and older generation.
More specifically, as opposed to Baby boomers, generation Z member gives less importance to formal rules and procedures (p=0.004), and performance assessment system (p=0.006) in influencing ethical behaviour. Also, results show less importance given to job pressures by members of generation Z, as opposed to Baby boomers (p=0.041) and X generation (p=0.032) and marginally also as opposed to Millennials (p=0.051).

Table 5
Factors that influence ethical decision-making – Total mean values and Anova tests according to cohorts

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal rules and procedures</td>
<td>5.64</td>
<td>1.538</td>
<td>4.265</td>
<td>0.007***</td>
</tr>
<tr>
<td>Supervisors’ behaviour</td>
<td>6.05</td>
<td>1.501</td>
<td>0.589</td>
<td>0.624</td>
</tr>
<tr>
<td>Performance assessment system</td>
<td>5.59</td>
<td>1.584</td>
<td>3.883</td>
<td>0.001***</td>
</tr>
<tr>
<td>Reward system</td>
<td>5.72</td>
<td>1.612</td>
<td>0.689</td>
<td>0.561</td>
</tr>
<tr>
<td>Job pressures</td>
<td>5.21</td>
<td>1.807</td>
<td>3.361</td>
<td>0.022**</td>
</tr>
</tbody>
</table>

Source: Authors’ work; *** Statistically significant at 1%; ** 5% 1- completely disagree, 7 – completely agree

Discussion and Conclusion

Workplace diversity implies organizations encompass individuals who are members of different generations, and thus with presumed differences in work values. As of specific economic, social and cultural events members of certain generations have developed a specific set of beliefs and values that eventually can influence their perception of ethical values and beliefs.

Perception and attitudes towards business ethics among members of four generational groups, namely members of Baby Boomers, Generation X, Millennials and Generation Z were assessed through this research paper.

Results of our empirical research show that all respondents give significant support for ethics in business as respondents consider ethics can help to ensure good company reputation, increases trust in relations with stakeholders, ensures the increase in efficiency and efficacy of business, contributes to employee growth and development as well as to lower the cost associated with omissions in the workplace. Still, we did not ask about the specific behaviour and if it is considered ethical, as this would probably result in differences in perception between generations, as previous results did show shift in ethic values among newer generations when it comes to acceptable and unacceptable ethical behaviour (Verschoor, 2013; Barna, 2018).

Most of the respondents have ethical codes in their organization and upon employment; new employees are introduced with a code of ethics and learn about ethical guidelines and rules for their future behaviour. Still, it looks, upon results received that organizations do not work too much further into ensuring ethical employee behaviour after their employment and positive ethical climate needs to be more enhanced. Especially as, in general, results indicate not completely ethical behaviour of respondents’ supervisory manager and several aspects of unethical behaviour, like favouring employees, are considered more present. For the implementation of business ethics into an organizational context, organizations must ensure continuous training programs, as well as other formal and structural components (Murphy, 1988).

In this process of implementation, top management has a crucial role, and its role is even greater in the creation of an ethical climate and ensuring ethical behaviours at different organizational levels.
Our result regarding pressure for unethical behaviour, contrary to previous research (e.g. Verschoor, 2013), did not indicate differences between generations and that younger generations are more subject to pressure. In general, results reveal most of the respondents’ state when it comes to pressure to do things considered unethical they do not do it despite the supervisor’s pressure.

Supervisors’ behaviour is considered as the most relevant factor influencing one’s ethical decision making among members of all generations, while members of Z generation consider formal rules and procedures, and performance assessment system less important than Baby boomers. These results tie well with previous studies that confirm older workers are more guided by formal organizational rules and systems as opposed to younger workers. Besides, result show generation Z members consider job pressures less important for ethical decision making then members of other generations. Taken altogether results confirm that Z generation is more oriented on individual believes than organizational guidelines for ethical behaviour and thus confirming emerging research results on this subject.

Besides this, in general, our result provides support for little or no generational differences related to the analysed aspect of business ethics between members of different generations, which is in accordance to some existing research (e.g. Zabel et al., 2017). Our results also imply organizations should be more oriented towards creating the ethical climate and positive ethical leadership in the organization, as opposed to creating specific formal rules and guidelines. There are necessary as of importance given to them by older workers, but the emphasis needs to be on creating ethical leaders and a positive ethical climate that ensures ethical values and behaviour are present throughout the organization, at all organizational levels.

Still, our research has certain limitations that potentially affected research results. The first is related to sample size and a limited number of respondents per each generation. Furthermore, our sample was gendered bias (72.6% of women) which could potentially affect our results as previous research did show women to be more ethical than men. Second, there is the question of subjectivity connected with questionnaires as well as that we analysed respondents’ perceptions. Therefore, besides a larger number of respondents, future research should analyse concrete ethical behaviour and decision making in real-time situations or examples. Besides, in this paper, we oriented on an individual dimension, while for some future studies it could be valuable to analyse mutual influences of this individual and organizational (e.g. culture), situational (e.g. national culture) and issue-related factors (e.g. importance of subject matter), that can all simultaneously affect individual ethical behaviour. In that sense, more clear insights into generational differences in ethics could be captured.

References


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Impact of Institutional Quality on Foreign Direct Investment Inflow: Evidence from Croatia

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Abstract

Background: Foreign direct investment (FDI) flows are unevenly distributed around the world and determined by different factors. The literature points out to economic and non-economic determinants of FDI flows, while the latter have shown to generate ambiguous effects across regions. Objectives: The primary goal of this paper is to examine the relationship between non-economic determinants and the FDI inflow in Croatia from 1996 to 2017, thus capturing different periods of the economic cycle. The importance of non-economic institutional determinants of FDI is analysed in parallel with the economic determinants. Methods/Approach: This study uses available data on FDI per capita and a set of non-economic (institutional) and economic determinants. We employed the OLS regression analysis to determine the significance of FDI inflow determinants and compare the relevance of non-economic to economic factors. Results: Results of this exploratory study show that institutional quality variables included in the model (regulatory quality, political stability, and government effectiveness, the rule of law and control of corruption) could not be pointed out as important determinants of the FDI inflow in Croatia. Economic variables GDP per capita and average gross wage prove to be important in determining the FDI inflow in Croatia. Conclusions: The research results point to a variety of FDI determinants among countries and economic cycle periods. Given the evidence from Croatia, variations, especially in institutional determinants, might be caused by the diverse FDI inflow characteristics and specificities of receiving economies.

Keywords: Croatia; economic determinants; foreign direct investment; institutional quality

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Introduction

Foreign direct investments (FDI) have been one of the key elements of globalization and international integration of developing economies in the past few decades, holding a particularly important role in the diffusion of knowledge across borders (Alguacil et al., 2011; Dasgupta, 2012). Thus, FDI is seen as a driver of growth, increasing the available capital, competition, and productivity of local firms through new technologies and human capital development. However, certain prerequisites must be met in the host country to attract FDI inflow and convert the potential benefits into positive spillovers (Crespo et al., 2007; Gorodnichenko et al., 2014).

FDI flows have been unevenly distributed between economic regions and across countries, in volume, the form of investment (greenfield and brownfield), underlying motives (market-seeking, resource-seeking, efficiency-seeking, and strategic-asset seeking) and intensity across sectors. Many developing countries have been actively seeking to attract foreign investors by creating promotion strategies and offering a variety of investment incentives. The literature on the FDI flows determinants presents both economic (“traditional”) and non-economic (“non-traditional”) determinants (Kahai, 2004). In the previous decades, most of the research was oriented towards economic determinants, while non-economic determinants, including the institutional quality dimension, have gained interest in recent research. A country’s institutional framework, mainly leaning on good governance, is thought to stimulate the FDI absorptive capacity. The most important argument for foreign investment is that good governance and quality institutions reduce transaction costs of investing in a particular country (Brouthers et al., 2008).

Findings of the relevant literature examining the influence of institutional factors on FDI flows in different countries, discussed in the next chapter, point out to ambiguous results. There is some evidence, especially in developing countries, that countries should improve the overall business climate, including improving policies, laws, and regulation related to entrepreneurship and investments, as well as reducing administrative barriers and corruption to attract FDI (Bénassy-Quéré et al., 2007, Assunção et al., 2011; Saidi et al., 2013; Staats et al., 2012). On the other side, several empirical research show the opposite results especially regarding corruption level (Helmy, 2013; Bellos et al., 2011) or find institutional factors as statistically insignificant determinants for attracting FDI flows (Bayar et al., 2016; Abdella et al., 2017). It is important to point out that FDI determinants can change over time and theories need to be re-examined (Eicher et al., 2012).

Post-transitional Central and Eastern European (CEE) countries give a unique opportunity to test the hypothesis on FDI determinants, as before the 1990s flows to this region hardly existed and opening of these economies created a surge of capital inflow. Empirical studies on FDI inflow determinants in the CEE countries have mostly investigated the traditional determinants (Botrič and Škuljić, 2006; Kersan-Škabić et al., 2007; Derado, 2013). Only a few studies exploring the role of institutions in developing countries include several CEE countries data (Kersan-Škabić, 2013; Peres et al., 2018). Also, there is limited research encompassing the crisis period that was prolonged in most of these countries in comparison to the developed European countries, and there is almost no evidence on this nexus that includes the post-crisis period, which changed the dynamics of FDI flows globally.

Some countries tend to decrease the control of corruption in the crisis period. This was noticeable among developing countries including Croatia, which proved to be the post-transition country with the most negative changes in control of corruption and the rule of law during the last crisis (Peres et al., 2018). Also, according to UNCTAD (2018), Croatia had four new investor-state dispute settlement claims in 2017, which
made her the most frequent respondent in this field in the world for the mentioned year. Besides these negative institutional quality changes, Croatia makes a specially interesting case being usually classified both as a CEE and a South-East European (SEE) country and the second-largest recipient of FDI per capita in both of these regions, attracting mostly brownfield investments largely motivated by market-seeking activities in service industries (Jurčić et al., 2018). Others, especially Visegrad countries (Czech Republic, Slovakia, Poland, and Hungary), have attracted larger volumes of FDI to export-oriented industries, thus receiving more investment in greenfield production facilities.

This paper aims to explore institutional and economic determinants of FDI, focusing on the evidence from Croatia. Determinants are examined within the period from 1996 to 2017, encompassing a range of economic cycle periods within a single country. The research hypothesis states that both institutional factors and economic factors have a statistically significant impact on FDI per capita inflow. According to the theory, improving both institutional and economic factors would lead to an increase in FDI per capita inflow. Using OLS regression analysis, this research assesses the institutional determinants of FDI inflows but also tests the statistical significance of selected economic determinants to reach a conclusion on the prevailing determinants in the case of Croatia. Institutional determinants include a set of governance quality measures (control of corruption, the rule of law, political stability, government effectiveness, and regulatory quality), while economic determinants include GDP per capita and average gross wage.

The purpose of this study is to point out to different findings on institutional determinants of FDI flows and show its effects in Croatia. The study sheds light on the diversity of determinants across time-periods, given the specifics of FDI inflows and economies.

The paper consists of the literature review on institutional determinants of FDI flows with a special focus on the CEE region, a description of the methodology and results of this empirical research with a discussion of the findings.

**Literature review**

In the past few decades, transition economies strived to attract FDI while expecting them to restructure their economies and bring prosperity and industrial upgrading. To attract FDI inflow and convert the potential benefits into positive spillovers, certain prerequisites must be met in the host country. In other words, a certain level of absorptive capacity is needed. Kalotay (2000) stresses that “absorptive capacity” shows the ability of a host country to integrate the maximum FDI stock in a particular economy in a useful way. “Absorbability” involves the realization of the FDI project and converting benefits from FDI into the capabilities of a recipient country (Nguyen et al., 2009). This research focuses on the first stage of absorption, specifically on different competitive factors that could attract FDI inflow.

Dunning (1998) through his OLI (organization, location, internalization) framework suggests that FDI decisions are driven by possibilities of increasing market power through production process ownership, location benefits and possibilities of internalizing externalities, while stressing the importance of institutional factors and their effects on three primary determinants in an extended model (Dunning et al., 2008). Furthermore, with the investment development cycle theory, Dunning (1986) attempted to explain the dynamic relationship between FDI and economic development with the analysis of determinants behind the net outflow of FDI as the postulate of the theory. By analysing investment development cycle of Croatia and other EU member states, Franc (2013) concluded that Croatia, Portugal, and the new
EU member states are at lower stages of the cycle, while the old EU member countries are at the higher level of the investment development cycle. This is following the assumptions of Dunning’s model.

Traditional determinants of FDI have been broadly analysed, and most of the literature points out to following determinants within this group: market size, gross domestic product (GDP), GDP per capita, GDP growth, population, labour costs and other production costs, openness and inflation. Analysis of market-seeking determinants (GDP, GDP per capita, GDP growth, population) in the SEEC market has shown mixed results (Botrić and Škuflić, 2006; Derado, 2013), while openness has shown to be a statistically significant variable for attracting FDI inflow.

As non-traditional determinants, usually the quality of institutions, governance, human capital, and the degree of economic freedom have been analysed. Most recent relevant literature has focused on governance quality. Governance is usually defined as “the traditions and institutions that determine how authority is exercised in a country” (Kaufmann et al., 2005). The features of good governance have been highly acclaimed by different international organizations as an important precondition for economic development (Litjohbo, 2008). Mukherjee et al. (2011) show that countries that invest more in governance tend to attract higher levels of FDI.

Institutional differences between the country of origin and the host country have shown to have an adverse effect on FDI flows in the previous decades (Benassy-Quere et al., 2007). The largest strand of literature on institutional determinants includes corruption, with the assumption that the higher corruption level leads to lower FDI flows. However, research has shown mixed results. Brouthers et al. (2008) point out that determinants of attracting market-seeking and resource-seeking FDI flows are not the same while emphasising a specific difference in case of corruption, showing to be statistically insignificant in market-seeking activities, but important in cases of resource-seeking activities. Abed et al. (2000) have shown that in some of the cases lower levels of corruption are beneficial for attracting FDI.

Another widely explored determinant is political stability which can be defined as “the solidity of government to political shocks, terrorism and domestic violence which can reduce the risk of doing business and deter investments” (Yerrrabati i Hawkes, 2016, 6). Presumably, foreign investors are more likely to invest in politically stable countries. Research in this field like Busse et al. (2007), Baek et al. (2011), Busse et al. (2011), Gordon et al. (2012), Arbatti (2011), Tian et al. (2017) has shown mixed results. Besides the mentioned factors, recent studies also point out the importance of regulatory restrictiveness, which is also controlled by governments (OECD, 2010).

Several studies using panel data analysis included a set of institutional quality dimensions and reached different conclusions on their importance. Not many relevant studies show a positive relationship. Saidi et al. (2013) have shown that political stability and regulatory quality can positively influence FDI inflows. Staats et al. (2012) indicate that the rule of law and judicial strength are significant FDI inflow determinants.

On the other hand, several studies, also using the panel data analysis, show a set of institutional factors as statistically non-significant for attracting FDI flows. Bayar et al. (2016) have shown that control of corruption and the rule of law had no statistically significant impact on FDI inflows. Madr et al. (2015) identify and quantify the influence of the political environment including the quality of democracy, political instability and the level of corruption on the inflow of FDI in emerging markets. Their results show that the influence of the political environment on FDI is not unambiguous in emerging markets, while political instability shows to be a statistically significant variable. Abdella et al. (2017) show that corruption has no statistically significant effect on the FDI flows in the BRIC countries (Brazil, Russia, India, and China), while trade openness and
political stability are statistically significant. Peres et al. (2018) examined the impact of institutional quality (measured by control of corruption and the rule of law indicators) on FDI in developed and developing countries. Their research has shown that institutional quality is a significant determinant of FDI in developed countries having a positive impact, while it is not a significant variable in developing countries which can be attributed to the weak institutional structure.

Some research point out unexpected results. Helmy (2013) researched the effects of corruption on FDI inflows in the Middle East and North African (MENA) countries using a panel analysis and found that FDI varies positively with corruption, GDP per capita, openness, freedom, and security of investments, while negatively with the tax and homicide rates. Helmy points out to twofold explanations of this unexpected positive connection between corruption and FDI. In this region, corruption is seen as a mean of overcoming bad or restrictive laws and behaviors, while these costs are lower than the value of economic expansion in the region and, on the other side, it might seem that the other factors that positively affect FDI inflows are more important than corruption. Bellos et al. (2011) while analysing FDI determinants of transition countries in the period from 1996-2005 also found that corruption has a positive coefficient. They concluded that competition of foreign companies is conducive to paying bribes to get business contracts, what in the end increases corruption even more. Bellos et al. (2011) suggested that corruption does not deter bilateral FDI stock.

Research of institutional determinants including the CEE countries also gives different results. Some of the studies focusing on SEE, CEE and “Eastern Europe” include Croatia in the analysis.

In one of the first studies on institutional factors effects on FDI inflow in CEE, Pournarakis et al. (2002) using panel data analysis examined the civil and political rights, freedom of the press (Freedom House indices), corruption (Corruption Perceptions Index), GNI, country risk, and economic risk and inflation effects on FDI inflows during the first decade of market economies in these countries, in the period from 1997-2000. They pointed out the business environment as a prerequisite to attract and absorb FDI inflows in these countries, which was set mainly to low tech sectors and within the category of market-seeking investments. In that period FDI inflows to CEE accounted for a relatively small share of world FDI.

Among traditional determinants, Botrić et al. (2006) distinguish market-related (GDP, GDP per capita, GDP growth) and trade-related ones (openness, external debt), but also emphasise the importance of non-traditional ones such as human capital. Their analysis of FDI flows in the SEE countries (including Croatia) in the period from 1996-2002 pointed out that FDI in SEE could not be considered as market seeking, as GDP level, GDP per capita, GDP growth, and population growth gave mixed signals in different specifications, while the only variable robust to different specifications has shown to be the increase of openness. Botrić et al. (2006) did not analyse the business climate, yet they pointed it out as very important, stressing foreign investors’ initiative in Croatia striving for a better business climate, and recommended researching the business climate upon the availability of data capturing it.

Doytch et al. (2012) studied institutional determinants of FDI in three main sectors: agriculture, manufacturing, and services in twenty-one Eastern Europe and Central Asian countries in the period 1994-2008. They found that resource endowments have a positive impact on FDI in agriculture and manufacturing, while educated labour attracts FDI inflow in services sectors. Also, they point out that the institutional quality measured by democratic accountability and investment profiles of these countries has a statistically significant effect on overall FDI inflows. Democratic accountability shows to be more important for the agricultural sector, and investment profiles show
to be more important for both agriculture and manufacturing sectors, while the services sector shows to be not affected by the quality of institutions.

Kersan-Škabić (2013), while analysing economic and institutional determinants of FDI inflows in the SEE (including Croatia) in the period from 2001-2010, found that GDP per capita, inflation, corruption, large scale privatization, the development of trade and forex system and overall infrastructure reform have a statistically significant impact on FDI inflow. It is important to stress that in the SEE region institutional structures have remained embedded with ethnic and political divisions and levels of corruption remained relatively high in comparison to EU member states (Miloloža, 2015).

Derado (2013) focused on Croatia while exploring “gravity-type” economic factors, but also stressed the importance of including quality of an internationally competitive business environment in further research.

Presented relevant literature shows that several studies included Croatia in the analysis, given its specific characteristics and position within SEE and CEE, but no in-depth study on the effects of institutional factors on FDI inflow in Croatia has been presented so far.

**Methodology**

The primary aim of this paper is to test the significance of institutional determinants of FDI in parallel with exploring whether the economic factors had a statistically significant influence on FDI flows in Croatia. The main research question addresses this nexus in the context of the Republic of Croatia in the period from 1996 to 2017, covering a range of economic cycle periods. Thus, the aim is to explore whether these variables have a statistically significant impact, as theory suggests, or will results show more similarities to recent empirical studies covering this nexus in non-developed and developing countries that were discussed in the literature review. Two separate models are employed to test the effects of both sets of determinants independently.

The dependent variable in this empirical study is FDI per capita inflow in Croatia covering the period 1996-2017, available from the Vienna Institute for International Economic Studies (WIIW) data (2019). The FDI data include new equity investment, reinvested earnings, and debt instruments. Explanatory variables are divided into two groups: (1) institutional factors, and (2) economic factors, according to the main strands of literature dealing with this topic.

Different international institutions publish data on institutional development based on surveys and experts’ rating (World Bank Ease of Doing Business Index and Worldwide Governance Indicators, EBRD Transition Indicators, Transparency International Corruption Perception Index, etc.). For the analysis in this study, Worldwide Governance Indicators (WGI) data (World Bank, 2019) are used to measure the quality of institutions on several levels. Kaufmann et al. (1999, pp. 1) define governance as “traditions and institutions by which authority in a country is exercised”. The explanation of all variables and data sources used in regression analysis are given in Table 1.
Table 1  
Description of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Label</th>
<th>Measure</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Direct Investment per Capita</td>
<td>FDI pc</td>
<td>EUR</td>
<td>FDI (OECD, 2008) stands for “cross-border investment made by a resident in one economy to establish a lasting interest in an enterprise that is resident in another economy” (ownership of at least 10% of the voting power of the direct investment enterprise).</td>
<td>WIIW</td>
</tr>
<tr>
<td>Regulatory Quality</td>
<td>RQ</td>
<td>Indicator ranging from min -2.5 to max 2.5</td>
<td>“Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.”</td>
<td>WB</td>
</tr>
<tr>
<td>Political Stability</td>
<td>PS</td>
<td>Indicator ranging from min -2.5 to max 2.5</td>
<td>“Measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.”</td>
<td>WB</td>
</tr>
<tr>
<td>Government Effectiveness</td>
<td>GE</td>
<td>Indicator ranging from min -2.5 to max 2.5</td>
<td>“Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.”</td>
<td>WB</td>
</tr>
<tr>
<td>Rule of Law</td>
<td>RL</td>
<td>Indicator ranging from min -2.5 to max 2.5</td>
<td>“Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.”</td>
<td>WB</td>
</tr>
<tr>
<td>Control of Corruption</td>
<td>CC</td>
<td>Indicator ranging from min -2.5 to max 2.5</td>
<td>“Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as &quot;capture&quot; of the state by elites and private interests.”</td>
<td>WB</td>
</tr>
<tr>
<td>GDP per Capita</td>
<td>GDP pc</td>
<td>EUR</td>
<td>“Most frequently used measure for development.”</td>
<td>WB</td>
</tr>
<tr>
<td>Average Gross Wage</td>
<td>AGW</td>
<td>EUR</td>
<td>“A measure of total income after taxes divided by the total number of employees employed.”</td>
<td>WB</td>
</tr>
</tbody>
</table>


In the first model, we include the following independent variables: Rule of Law (RL), Control of Corruption (CC), Regulatory Quality (RQ), Government Effectiveness (GE) and Political Stability (PS). According to Rodrik and Subramanian (2003), we can categorise these independent variables into three groups encompassing the overall institutional quality. RL and CC measure the quality of market-creating institutions, RQ measures the quality of market-regulating institutions while GE and PS the quality of market-stabilizing institutions. Thus, the only institutional-quality segment that is not measured through this model are market-legitimising institutions that create favorable socio-economic systems. Selected independent variables can attain value on a scale...
from -2.5 to 2.5 (World Bank, 2019). Data include the period from 1996 to 2017 with omitted data for 1997, 1999 and 2001, due to their unavailability. The regression model exploring the quality of institutions effects on FDI pc flows is defined with equation 1:

\[
FDI\ pct = \beta_0 + \beta_1RQ + \beta_2PS + \beta_3GE + \beta_4RL + \beta_5CC
\] (1)

In the second model, we investigate two frequently analysed economic determinants of FDI inflows: GDP per capita as a market-seeking determinant, and average gross wage as a resource-seeking determinant (Botrić et al., 2006). The data were collected from The Vienna Institute for International Economic Studies (WIIW) database and included the period 1996–2017, thus capturing the end of the transition period, pre-crisis, crisis, and post-crisis period. The regression model exploring the traditional economic variables effects on FDI per capita flows is defined as follows:

\[
FDI\ pct = \beta_0 + \beta_1GDPpc + \beta_2AGW
\] (2)

Regression models are presented, following the diagnostic tests to check if the underlying assumptions have been fulfilled. Thus, we test heteroscedasticity using the White’s test, autocorrelation using the Breusch-Godfrey LM test and normality using the Jarque-Bera test.

**Results and discussion**

Ordinary least squares regression analysis was applied to examine the effects of two sets of independent variables addressing the quality of institutions and the economic factors influencing FDI per capita inflow in Croatia. Table 2 presents the summary statistics of the key variables in this study.

The average FDI per capita inflow amounted to 356.68 EUR, with a standard deviation of 221.68 EUR pointing out to relatively high variability of FDI per capita inflow over the observed period.

Table 2
Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>FDI pc</th>
<th>RQ</th>
<th>PS</th>
<th>GE</th>
<th>RL</th>
<th>CC</th>
<th>GDP pc</th>
<th>AGW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>356.69</td>
<td>0.32</td>
<td>0.46</td>
<td>0.42</td>
<td>0.07</td>
<td>0.04</td>
<td>8531.82</td>
<td>862.28</td>
</tr>
<tr>
<td><strong>St. Dev.</strong></td>
<td>221.68</td>
<td>0.25</td>
<td>0.27</td>
<td>0.24</td>
<td>0.23</td>
<td>0.22</td>
<td>2471.05</td>
<td>206.84</td>
</tr>
<tr>
<td><strong>Min.</strong></td>
<td>57.66</td>
<td>-0.17</td>
<td>-0.04</td>
<td>0.00</td>
<td>-0.63</td>
<td>-0.58</td>
<td>4400.00</td>
<td>476.52</td>
</tr>
<tr>
<td><strong>Max.</strong></td>
<td>842.04</td>
<td>0.57</td>
<td>0.75</td>
<td>0.71</td>
<td>0.41</td>
<td>0.29</td>
<td>11800.00</td>
<td>1079.22</td>
</tr>
<tr>
<td><strong>Count</strong></td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

The lowest institutional quality, measured through governance quality indices, was shown within the corruption control, with a mean of 0.04, followed by the rule of law with a mean of 0.07. The highest rank within the listed institutional variables has a political stability index, amounting to a mean of 0.46. The minimum GDP per capita is 4400 EUR and the maximum GDP per capita is 11800 EUR, while the average gross wage varied from 476.52 EUR to 1079.22 EUR. Table 3 shows the results of the regression analysis conducted using STATA software, including institutional determinants (1) and a separate regression analysis including economic determinants (2).
Table 3
The summary output of regression models including institutional and economic determinant

<table>
<thead>
<tr>
<th></th>
<th>Model 1- Institutional determinants</th>
<th>Model 2-Economic determinants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent</td>
<td>FDI pc</td>
<td>FDI pc</td>
</tr>
<tr>
<td>GDP pc</td>
<td>0.222** (0.0992)</td>
<td></td>
</tr>
<tr>
<td>AGW</td>
<td>-2.157* (1.185)</td>
<td></td>
</tr>
<tr>
<td>RQ</td>
<td>411.8 (471.7)</td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>288.5 (633.8)</td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>-313.4 (657.3)</td>
<td></td>
</tr>
<tr>
<td>RL</td>
<td>192.4 (410.2)</td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>-282.9 (457.4)</td>
<td></td>
</tr>
<tr>
<td>cons</td>
<td>220.6* (123.2)</td>
<td>319.1 (237.7)</td>
</tr>
<tr>
<td>N</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>R²</td>
<td>0.206</td>
<td>0.357</td>
</tr>
<tr>
<td>Prob&gt;F</td>
<td>0.545</td>
<td>0.015</td>
</tr>
</tbody>
</table>

Note: Standard errors in parentheses; * p < 0.1, ** p < 0.05
Source: Authors’ calculations

Regression estimates of institutional determinants (1) show positive effects of improving RQ, PS, and RL on FDI per capita inflow, while CC and GE have a negative coefficient. The F-statistic equals 0.83 with a corresponding empirical significance level of 0.545, thus showing that the regression model is not statistically significant.

The results of the second regression model reveal that economic variables explain 35.7% of the variance. The empirical significance level of 0.015, shows the overall regression significance at 5% significance. As expected, parameter GDP per capita has a positive value, while AGW has a negative value. At 5% significance, independent variable GDP pc is statistically significant, while AGW is not, while at 10% significance both GDP pc and AGW have shown to be statistically significant variables.

To address the potential heteroscedasticity problem that is common in time series, we have conducted a White’s test using STATA software. The results of the test are presented in table 4. The null hypothesis assumes homoskedasticity. Given the probability of 0.670, shown in table 4, we do not reject the null hypothesis and conclude that the variance is homoscedastic.

Table 4
Results of White’s Test of Heteroscedasticity

<table>
<thead>
<tr>
<th>White’s test for H₀: homoscedasticity against Ha: unrestricted heteroscedasticity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>chi²(5) =</td>
<td>3.19</td>
</tr>
<tr>
<td>Prob&gt; chi² =</td>
<td>0.670</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

The normality of distribution is tested using the Jarque-Bera test (Figure 1). As shown in figure 1 the estimated model using eVIEWS software shows JB=0.945008, with the probability of 0.623439, pointing to the conclusion that on any commonly used significance level we do not reject the null hypothesis on the normality of distribution of relation errors.
Autocorrelation has been tested using the Breusch-Godfrey LM test for autocorrelation (Table 5). With the level of significance of 10%, we can confirm the null hypothesis stating there is no autocorrelation in the model that can be accepted.

Table 5
Results of the Breusch-Godfrey LM Test for Autocorrelation

<table>
<thead>
<tr>
<th>lags(p)</th>
<th>chi2</th>
<th>df</th>
<th>Prob&gt;Chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.069</td>
<td>1</td>
<td>0.0798</td>
</tr>
</tbody>
</table>

**H0: no serial correlation**

Source: Authors’ calculations

Thus, all the presumptions have been confirmed, and the results of the regression model including the economic determinants of FDI inflow per capita can be used to conclude the Croatian case. The estimated regression model is as follows:

\[
FDI_{pc} = 319.1835 + 0.222GDP_{pc}t - 2.157AGW_t
\]  

(3)

This empirical analysis shows that FDI inflow per capita in Croatia was not determined by the institutional quality measured with the governance quality indicators. The only determinant that was statistically significant at the 5% level of significance is GDP per capita, while at 10% significance, average gross wage also shows to be statistically significant. Results are somewhat different from prior studies. Differences might be due to several reasons: different time period of the analysis, different economic characteristics of Croatia to other countries, and the inclusion of different variables in the model, given there are diverse ways of measuring institutional quality with available quantitative measures.

Presented results of the study might also be a consequence of the fact that Croatia has received most of its FDI as a result of the privatization process and it was market-seeking, thus pointing to GDP per capita as a statistically significant determinant. Due to this fact, investors had the opportunity to compensate the costs of institutional governance shortcomings that might have caused business barriers, by using higher market prices of products, and thus had a return on their investment, as suggested by Brouthers et al. (2008). A large volume of FDI inflow in Croatia included brownfield investment. Not rarely, these investments included so-called “cherry-picking
takeovers” of monopolistic companies (Jurčić et al., 2018). Croatia, together with other CEE countries, offered “one-off” opportunities to the private sector to ensure a rapid shift towards market-economy and show the commitment to private ownership (Holland et al., 2000). Also, given the high share of FDI inflow to services sectors, the statistical non-significance of institutional determinants is following the results of Doytch et al. (2012) study, which pointed out that FDI in services sectors shows not to be affected by the quality of institutions. Furthermore, corruption control (CC) holds the lowest index level among the variables in the model and has shown negative changes during the crisis. As Helmy (2013) suggests, it might be a means of overcoming inappropriate laws and behaviours as long as the costs are lower than the value of economic expansion. Following the research results from Peres et al. (2018) pointing to CC and RL as important in determining FDI inflow in developed countries, but not important in developing countries due to weak structure of institutions, we can conclude this is true for Croatia, given the low indices of governance, especially for the two measures of quality of market-creating institutions.

Literature review and empirical research show that FDI determinants can significantly vary across countries and periods. Thus, detailed data on the FDI flows are needed to reach a broader conclusion. This study can motivate further in-depth studies which can also decompose FDI flows. Capital flows can be divided into new capital inflow, reinvested earnings and borrowings, to see if their determinants differ. More detailed analysis can also be conducted using greenfield project announcements that are available within the UNCTAD database. A detailed study encompassing different forms of investment and capturing its motives is not yet possible as macroeconomic data do not provide such information. Thus, only some additional conclusions addressing forms of investment related to motivational factors (primarily divided as resource-seeking and market-seeking) could be made through survey-based research. It is also important to understand the limitations of institutional determinants measurement. International institutions use specific methodologies that strive to quantify the qualitative institutional quality variables. Thus, it is also important to include and test different institutional quality measurements.

Conclusion
In this paper, a review of relevant literature related to non-economic determinants of FDI inflows was presented, as well as empirical evidence of this nexus in Croatia. Non-economic determinants include institutional-quality determinants which are mostly oriented towards the assessment of governance quality factors. In this paper, World Bank Worldwide Governance Indicators data are used. The quality of market regulating institutions is measured by Regulatory quality index, while market stabilising institutions are measured by Government Effectiveness and Political Stability indices. Finally, the quality of market-creating institutions is measured through the Rule of Law and Control of Corruption indices and shows the lowest values among these governance quality determinants. Besides analysing the non-economic determinants that have recently gained attention in FDI research, we also examine the importance of economic determinants addressing market-seeking activities using GDP per capita and resource seeking activities through average gross wage.

The results of the empirical analysis differ from the general belief that quality institutions attract FDI. The results indicate that institutional quality factors have not been important in determining FDI inflow per capita in Croatia. Among economic variables, GDP per capita has shown to be important being statistically significant at 5% significance, while the gross average wage has shown to be insignificant on the same significance level. At a 10% significance level, both variables have shown to be
statistically significant. Presented results might be the consequence of FDI structure that was largely oriented to takeovers of previously monopolistic companies. Thus, foreign investors might have seen the opportunity to gain ownership, and given the fact that most of them were in market-seeking activities, the potential costs of corruption and other institutional shortcomings could be compensated through higher prices on the same market. Also, the largest recipient sectors were different service industries, which have shown to be less affected by the institutional framework in the prior research.

The main limitation of this study derives from the shortcomings of institutional determinants measurement because international institutions use specific methodology while striving to capture these qualitative variables and quantify them. Therefore, it is advisable to analyze by comparing different sets of variables provided by different institutions. Also, conclusions could be widened if detailed statistical data on different forms and characteristics of FDI (brownfield/greenfield; horizontal/vertical; market-seeking/ resource seeking) would be provided. Additional research in other developing countries is needed to improve the understanding of the ambiguity of FDI flows and institutional development nexus within the same regions and across different economic cycle periods.

References
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Croatian Defense Industry Competitiveness Cluster: Knowledge Management and Innovation Perspective

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Abstract

Background: Industry clusters and their relationship with the organization’s success, competitive advantage and innovations have been gaining research interest for decades, with the recent focus on defence industry. Objectives: The aim is to investigate how Croatian Defense Industry Competitiveness Cluster (CDICC) fosters the knowledge management and innovation performance of its members. Methods/Approach: Survey has been performed on a portion of CDICC members, and responses have been analysed using the factor analysis and the correlation analysis. Results: The results indicate that CDICC actively contributes to knowledge creation and acquisition, innovation performance and market performance of its members. However, the analysis revealed that knowledge storage and knowledge dissemination are not sufficiently supported by CDICC. Conclusions: The current problems with the various aspects of knowledge management within a cluster provide a direction for overcoming possible obstacles for further development of industrial clusters.

Keywords: defence industry cluster; knowledge management; innovation performance; Croatian Defense Industry Competitiveness Cluster; factor analysis

JEL classification: D83, C38

Paper type: Research article

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Introduction

Competitiveness industry clusters has become a major trend in modern organizations, as well as in the defence industry, since industry clusters support the synergy between companies operating in the same field of expertise and in close geographical proximity. Competitiveness industry clusters have many advantages, such as economies of scale as well as the increased cooperation (Porter, 1998), but without the loss of flexibility which often emerges with the increase in size. Competitiveness industry clusters have also a significant impact to knowledge management, which is relevant due to the strong impact of knowledge management to companies’ performance especially innovation (de Hoog, 2009).

Competitiveness industry clusters in the defence industry emerged in the last several decades in large number, fostered by opportunities that such cooperation provides for the development of innovative products and new markets’ penetration. In Croatia, which is a post-transition country, such cluster emerged several years ago, entitled as Croatian Defense Industry Competitiveness Cluster (CDICC). The objective of this research is to investigate the impact of industry defence clusters to the knowledge management and innovation performance of its members, using CDICC as a case study. In order to get insight into this area, we have conducted the analysis of strategic documents of CDICC, and a survey research on a sample of CDICC companies. Factor analysis and correlation analysis were used in order to investigate a support of industry cluster to its members in the areas such as innovation performance and knowledge management.

Literature Review

Knowledge management came into research focus in the mid-1990s (de Hoog, 2009). Its various definitions describe main aspects of knowledge manipulation in an organization and main processes that focus on: knowledge creation and acquisition, knowledge formalization and storage, knowledge sharing and using (Dominguez Gonzalez, & Martins, 2017; Girard, & Girard, 2015). Inter-organizational transfer of knowledge is also very important (Easterby-Smith, Lyles, & Tsang, 2008) because relationships with other organizations and access to supplementary knowledge have positive impact on innovation performance and competitive advantage (Knudsen, 2007), as can be seen in organizations that are connected in so-called clusters (Tallman, Jenkins, Henry, & Pinch, 2004).

Porter (1998) states that clusters are “geographic concentrations of interconnected companies and institutions in a particular field” (p. 79) that foster productivity, innovation, and development of new businesses. In Europe, much effort is being made towards strengthening clusters and cluster policy and a platform for helping clusters’ collaboration is developed as an aid for finding new partnerships (Ketels, Lindqvist, & Sölvell, 2012).

Several studies demonstrated that knowledge management related activities and processes have a positive influence on the innovativeness of organizations in various settings, such as Taiwan top companies (Chen & Huang, 2009), New Zealand organizations with more than 50 employees (Darroch, 2005) and Spanish companies from high and medium-high technology sectors (Luengo-Valderrey, & Moso-Díez, 2016). Relationship with knowledge management and its positive influence was proven for various sectors, such as Iranian manufacturing factories (Ebrahimi Mehrabani, & Shajari, 2012), mobile telecommunication companies in Jordan (Hajir, Obeidat, Al-dalahmeh, & Masa’deh, 2015), Brazilian information technology industry
Special attention has been given to the small and medium-sized enterprises (SMEs and mid-caps). For example, Valdez-Juárez, de Lema, and Maldonado-Guzmán (2016) conducted research in Spain that showed that more effort in several knowledge management elements positively influences innovation performance of SMEs. Another research of SMEs by Price, Stoica, and Boncella (2013) found the differences in the influence of innovation and knowledge on business performance between family and non-family firms.

Two decades ago, it was shown that firms in geographical industry clusters are strong (larger own-sector employment) and have more innovative activity (Baptista, & Swann, 1998). The impact of clusters on organization, innovation and performance, in general, has also been researched from various aspects, for specific industries and different types of organizations. Part of the research is performed for several clusters together, mostly different in one industry and sector. The survey of industry clusters in six special economic zones in Taiwan detected various cluster relationships and their positive impacts (Hsu, Lai, & Lin, 2013). Chang, Tsai, and Henderson (2012) performed research in three science-based parks in Taiwan, concentrated on business performance and how it is effected by knowledge innovation capability, clusters, and also by regional innovation systems (Chang, Tsai, & Henderson, 2012). Similar relationship between knowledge management and innovation performance, which was confirmed for industry cluster members (Lai, Hsu, Lin, Chen, & Lin, 2014).

Blanvillain, Hurard, Mazari, and Degres (2014) showed that each of three aeronautics clusters from different countries, mostly comprised of SMEs, and has its own innovative practice. Another research in this field showed a low to medium level of open innovation in the Brazilian aerospace industry cluster (also mostly SMEs) (Armellini, Kaminski, & Beaudry, 2014). Impact of the access to cluster’s resources (Prim, Amal, & Carvalho, 2016) and involvement in overlapping cluster organizations cliques (Lerch, Provan, & Sydow, 2008) on innovation was also researched, first for Brazilian manufacturing industry cluster, and second for photonics cluster in Germany. SMEs are also of interest in discovering the interconnection of clusters and innovation, for example, a research of Greek manufacturing SMEs (Vassakis, Voulgaris, Xekardakis, & Lemonakis, 2015), and of small cluster TenunCual Union (Aryanto, & Fransiska, 2012). Defence industry clusters gather mainly small to medium-sized enterprises (SMEs) trying to overcome their size caused disadvantages, such as lack of resources, although they are influenced by political, social, economic and security conditions of the state and many important factors, such as government bodies or agencies (Erenel, Demir, & Caymaz, 2015). Defence systems export can largely contribute to national income, as an example of defence cluster in Turkey shows (Demir, Caymaz, & Erenel, 2016). Guillou, Lazaric, Longhi, and Rochhia (2009) compared organizations that are not in the defence industry, those that are and those that are additionally funded by it, and found out that the last group was more knowledge management-oriented and had higher level of innovation. Briones PeñaVer (2013) shows through analysis of the Spanish defence industry that this industry is an agent of research, development and innovation through knowledge management activities, with its own economic structure and innovation as business strategy, where results of defence innovation system are transferred to civil applications.

Therefore, it is understandable that there are several formal defence industry clusters in Europe, for example, Centre for defence, space & security in Denmark, Estonian Defence Industry Association, EDEN Cluster and Toulouse Midi-Pyrénées Defence and Security in France, and CDICC in Croatia.
The defence industry is closely connected to innovation and, as was stated above, many clusters in this industry are formed. In spite of that fact, research about the relationship between innovation and products in the defence industry is mostly oriented on knowledge management in general, and there has not been any substantial research regarding the relationship of clusters with innovation specifically for the defence industry.

Background

Croatian Agency for Investments and Competitiveness is the main body that formally establishes competitiveness industry clusters, and defines them as follows: “A competitiveness industry cluster is a sector-specific non-profit organization, identified and established on the initiative of the Government of the Republic of Croatia, which brings together the commercial, scientific and policymaking communities in a formal structure” (Croatian Agency for Investments and Competitiveness, 2016). On its web page, Croatian Agency for Investments and Competitiveness lists 13 competitiveness industry clusters in Croatia from various industries, for example, food processing, automotive, medical, ICT, as well as defence.


CDICC (2017b), gathers approximately 50 members (number varies with new and leaving members; there were 46 at the time of research), divided into three sectors: private sector and business clusters, public sector and professional organizations and associations, and lastly science and research sector. Its mission is aimed at the development of new technologies and innovative products for the domestic and international market that should improve defence potentials (CDICC, 2017a, 2017c). Its activity is largely directed by the following strategic documents: Industrial Strategy of the Republic of Croatia 2014-2020, Strategy of Support to Innovations of the Republic of Croatia 2014-2020 and Smart Specialization Strategy. Croatian research and development investments, as well as interconnections between research institutions and business sector, are below EU average and clusters are therefore important for competitiveness, including security as one of five priority areas, where CDICC has the most important role in defence (Government of the Republic of Croatia, 2016). These strategic documents clearly indicate the importance, which Croatian Government puts on knowledge and clusters to foster innovation, placing CDICC as their focal point.

In order to get more insight into the practice of CDICC, its strategic documents were examined. It was discovered that knowledge management is explicitly mentioned just once and only in the Croatian Armed Forces Long Term Development Plan 2015 – 2024 (Ministry of Defence 2014). However, document search by keywords connected with main knowledge management processes (being knowledge creation, knowledge acquisition, knowledge storage and knowledge sharing) revealed that all strategic documents do place importance on them. Knowledge creation and acquisition both relate to gaining knowledge and keywords connected to them (for example, discovery or generating) are mentioned 23 times in various forms. Knowledge storage ensures forms of knowledge that can be used by anyone that needs it in the system or by sharing and keywords connected with those processes (for example, shaping, transfer or dissemination) are mentioned 24 times. Keyword search for innovations revealed that they are actually mentioned most often (78 times), with explicit goals regarding innovation, pertaining to better market (38 times, for example, commercialization or new markets) and product (40 times, for example,
new products or product innovations) performance. All strategic documents accentuate better competitiveness on markets and expansion into new markets, as well as new and innovative products. These are the main reasons why the defence cluster was formed, and that is why it is important to see whether it achieved its goals, i.e., if it had a relationship with before mentioned concepts. Document search results also revealed that the current relationship only of the cluster as a whole is considered, probably because of the early phase of cluster creation and its slow development.

Taken into account these findings, the following five research propositions are created: (i) RP1: There is a relationship between CDICC and knowledge creation and acquisition; (ii) RP2: There is a relationship between CDICC and knowledge storage and dissemination; (iii) RP3: There is a relationship between CDICC and Innovation performance; (iv) RP4: There is a relationship between CDICC and market performance, and (v) RP5: There is a relationship between CDICC and product performance.

RP1 and RP2 are investigating the CDICC and knowledge management processes relationship, whereas RP3, RP4 and RP5 are investigating the relationship between CDICC and innovation as a whole and its elements connected to market and products. Other elements and connections are not found to be of current importance to CDICC, probably due to its low development stage.

**Methodology**

**Data**

The research was performed by using a survey research questionnaire that was distributed among the CDICC members. A total of 46 companies in cluster received the questionnaire; 23 returned questionnaires were usable, while additional 3 were incomplete. This yields a valid retrieval rate of 50%. Among them there are 5 middle-sized companies, 2 large, 12 small-sized, and 4 institutions; ownership wise, 13 are private, 7 are public, and 3 are mixed, and 11 of them all are producing companies. The data were collected in the period from July to December 2016.

We used the items from the research instrument developed by Lai, Hsu, Lin, Chen, and Lin (2014: p. 737), for which authors’ permission was obtained. The questionnaire has three areas: the effectiveness of industrial cluster, knowledge management and innovation performance. The original questionnaire had a larger number of questions, but the number of questions was reduced after the conducted analyses. The results section explains how the number of questions was reduced. The final questions for the three analysed areas are shown in Table 1.

| Table 1 |
| Research instrument (Likert scale 1-5) |
| **Effectiveness of industrial cluster** |
| The company can easily obtain individuals with talent and with high educational levels. |
| The company can obtain experienced and required core technique talents. |
| The company can easily access the knowledge and technology pools of colleges, universities and research institutions. |
| The company can have vertical cooperation with upstream and downstream firms in order to lower costs. |
| The company can connect with firms in the supply chain and be devoted to innovative techniques and production. |
| The company can easily develop strategic alliances. |
| **Effectiveness of knowledge management** |
| The company attaches great importance to knowledge sharing with customers, suppliers and competitors. |
The company can quickly obtain information related to new products, services, and markets.
The company establishes special project feedback to improve the performance of future projects.
Employees of the company can obtain data required for work from databases or other members.
The company has complete management mechanisms for professional techniques and knowledge.
The company manages professional techniques, knowledge, and content by a computer system.

**Innovation performance**
The percentage of commercialization is increased with products and techniques.
Customers of the company have high demand for products and techniques.
Customers of the company are highly satisfied with products and techniques.
Market share of the company increases continuously.
Because of the development of product innovation, frequency of design change and revision is lower.
Because of product innovation development, manufacturing costs of similar products are lower.
Because of product innovation development, time of similar products to the market is shortened.

Source: Lai, Hsu, Lin, Chen, and Lin (2014)

**Statistical methods**
The goal of the statistical analysis was to determine factors pertaining to three areas: the effectiveness of industrial cluster, the effectiveness of knowledge management and innovation performance. Therefore, three separate factor analyses were conducted for the above-mentioned areas. For the extraction of factors, the principal components approach to factor analysis.

**Results**

**Factor analysis**
Factor analyses were conducted separately for all three areas: the effectiveness of industrial cluster, the effectiveness of knowledge management and innovation performance. The results can be seen in Tables 2-4. Scale reliability was assessed using Cronbach’s alpha coefficients. As shown in Tables 2-4, all Cronbach’s alpha coefficients values were greater than 0.7, which indicates acceptable level of reliability. First, the appropriateness of factor analysis has to be evaluated. For this purpose, correlation matrix and Kaiser-Meyer-Olkin (KMO) measures were calculated. Correlations results reveal that all variables have at least one correlation coefficient with an absolute value greater than 0.4 (significant at 5% significance level). Tables 2-4 show that all KMO values are greater than 0.5. All above-mentioned information indicates the appropriateness of factor analysis.
The first factor analysis (Table 2) was conducted on eleven variables regarding the effectiveness of the industrial cluster, in our case CDICC. 5 variables with loadings smaller than 0.5 on all factors or with loadings bigger than 0.5 on more than one factor were excluded. Final factor analysis was performed on 6 variables. Two factors were extracted based on the Kaiser criterion (both eigenvalues were greater than one: 2.275 and 1.85). These extracted factors explain 68.8% of the total variance; they are related to the cluster support to the relationship development and others are related to the support to resources.

Table 2
Results of factor analysis for the effectiveness of industrial cluster

<table>
<thead>
<tr>
<th>Factors and variables</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KMO 0.705, Cronbach's a 0.774, Cumulative % of variance 68.80</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Factor 1 – Relationship support, Eigenvalue 2.275, % of variance 37.91</strong></td>
<td></td>
</tr>
<tr>
<td>The company can have vertical cooperation with upstream and downstream firms in order to lower costs.</td>
<td>0.821</td>
</tr>
<tr>
<td>The company can connect with firms in the supply chain and be devoted to innovative techniques and production.</td>
<td>0.799</td>
</tr>
<tr>
<td>The company can easily develop strategic alliances.</td>
<td>0.728</td>
</tr>
<tr>
<td><strong>Factor 2 – Resources support, Eigenvalue 1.853, % of variance 30.89</strong></td>
<td></td>
</tr>
<tr>
<td>The company can easily obtain individuals with talent and with high educational levels.</td>
<td>0.734</td>
</tr>
<tr>
<td>The company can obtain experienced and required core technique talents.</td>
<td>0.758</td>
</tr>
<tr>
<td>The company can easily access the knowledge and technology pools of colleges, universities and research institutions.</td>
<td>0.802</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

The second factor analysis (Table 3) was performed on sixteen knowledge management variables and ten variables with loadings smaller than 0.5 on all factors or with loadings bigger than 0.5 on more than one factor were excluded. Final factor analysis was performed on six variables and two factors were extracted based on the Kaiser criterion. Both eigenvalues are greater than one (2.572, 1.87). The extracted factors explain 74.1% of the total variance; they are Knowledge storage and dissemination and Knowledge creation and acquisition.

Table 3
Results of factor analysis for the knowledge management

<table>
<thead>
<tr>
<th>Factors and variables – Knowledge management</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KMO 0.643, Cronbach’s a 0.773, Cumulative % of variance 74.10</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Factor 1 Knowledge storage and dissemination, Eigenvalue 2.572, % of variance 42.87</strong></td>
<td></td>
</tr>
<tr>
<td>Employees of the company can obtain data required for work from databases or other members.</td>
<td>0.813</td>
</tr>
<tr>
<td>The company has complete management mechanisms for professional techniques and knowledge.</td>
<td>0.909</td>
</tr>
<tr>
<td>The company manages professional techniques, knowledge, and content by a computer system.</td>
<td>0.877</td>
</tr>
<tr>
<td><strong>Factor 2 Knowledge creation and acquisition, Eigenvalue 1.874 % of variance 31.23</strong></td>
<td></td>
</tr>
<tr>
<td>The company attaches great importance to knowledge sharing with customers, suppliers and competitors.</td>
<td>0.845</td>
</tr>
<tr>
<td>The company can quickly obtain information related to new products, services, and markets.</td>
<td>0.828</td>
</tr>
<tr>
<td>The company establishes special project feedback to improve the performance of future projects.</td>
<td>0.665</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation
The third factor analysis (Table 4) was conducted on ten variables regarding innovation performance. According to the factor loadings and communalities, only three variables were excluded. Factor analysis on 7 variables resulted in two factors, extracted on the basis of the Kaiser criterion (both eigenvalues were greater than one: 3.410 and 1.844). These two extracted factors explain 75.07% of the total variance; they are Market performance and Product performance.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Results of factor analysis for the innovation performance and its elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors and variables – Innovation performance</td>
<td>Factor loadings</td>
</tr>
<tr>
<td><strong>KMO 0.715, Cronbach’s a 0.845, Cumulative % of variance 75.07</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Factor 1 Market performance, Eigenvalue 3.410, % of variance 48.72</strong></td>
<td></td>
</tr>
<tr>
<td>The percentage of commercialization is increased with products and techniques.</td>
<td>0.895</td>
</tr>
<tr>
<td>Customers of the company have high demand for products and techniques.</td>
<td>0.776</td>
</tr>
<tr>
<td>Customers of the company are highly satisfied with products and techniques.</td>
<td>0.867</td>
</tr>
<tr>
<td>Market share of the company increases continuously.</td>
<td>0.835</td>
</tr>
<tr>
<td><strong>Factor 2 Product performance, Eigenvalue 1.844, % of variance 26.35</strong></td>
<td></td>
</tr>
<tr>
<td>Because of the development of product innovation, frequency of design change and revision is lower.</td>
<td>0.858</td>
</tr>
<tr>
<td>Because of product innovation development, manufacturing costs of similar products are lower.</td>
<td>0.638</td>
</tr>
<tr>
<td>Because of product innovation development, time of similar products to the market is shortened.</td>
<td>0.775</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

**Correlation analysis**

Correlation analysis was conducted in order to investigate further the relationship between variables. For this purpose, extracted factors were used. The results of these analyses are shown in Table 5 below. These results show that the effectiveness of industrial cluster has positive relationship with knowledge creation and acquisition, showing support for RP1 at 5% significance level. The results also show that the effectiveness of industrial cluster has positive relationship with innovation performance, showing support for RP3 at 1% significance level. Finally, the results show that the effectiveness of industrial cluster has positive relationship with market performance, showing support for RP4 at 1% significance level, and the RP5 is supported in a similar manner. Figure 1 presents the distributions of the observed variables and their scatterplot diagrams.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Correlation coefficients of effectiveness of industrial cluster and knowledge management and performance variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>CDICC effectiveness</td>
</tr>
<tr>
<td><strong>Knowledge creation and acquisition</strong></td>
<td>0.617**</td>
</tr>
<tr>
<td><strong>Knowledge storage and dissemination</strong></td>
<td>0.202</td>
</tr>
<tr>
<td><strong>Innovation Performance</strong></td>
<td>0.478*</td>
</tr>
<tr>
<td><strong>Market Performance</strong></td>
<td>0.477*</td>
</tr>
<tr>
<td><strong>Product Performance</strong></td>
<td>0.311*</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation

Note: Number of observations: 23, *p<0.05, ** p<0.01
Discussion

Importance of knowledge management as a whole still is not recognized in Croatian strategic documents also pertaining to defence sector. However, importance is placed on individual knowledge management processes and innovations, as well as on market and product performance, which is why CDICC was formed. This study was conducted in order to see whether it has relationship between before mentioned concepts because document search discovered that a cluster as a whole is expected to have relationship with them. Therefore, it was important to see whether the set goals were achieved.

Based on the importance placed on knowledge management processes and innovation, five hypotheses were proposed, out of which three were confirmed. Those results show the following contributions of this research.

First, confirmation of RP1 shows that cluster forming has a relationship with the amount of acquired knowledge, which is necessary for further improvement of Innovation performance. This relationship could be even stronger trough Knowledge storage and dissemination, but rejection of RP2 shows that this is currently not the case. What the barriers that prevent this process are remains to be formally investigated, but it is interesting that members do see improvements in knowledge generation, but not in knowledge transfer. This may indicate that they themselves are not as open as they should be to share inside the cluster as opposed to acquiring. In addition, if they consider sharing as problematic, the question is what actual sources of more
knowledge are they acquire. Such problems in knowledge flow can slow down CDICC development and must be resolved.

Second, since Innovation performance is mentioned almost twice as often than knowledge management processes in strategic documents, the confirmation of RP3 shows that an important goal of cluster formation is achieved. This mostly applies to marketing performance, according to RP4. Product performance does not have relationship with cluster, since RP5 is rejected, which shows that cluster members do not base their product development on cluster resources and relations, but on their own research, as they were before they entered the CDICC. On the other hand, according to RP4, they count on CDICC to be their mediator to new markets and better competitiveness. It is obvious that efforts to improve interconnections in CDICC for research and product innovations should be made.

Third, if we look at both findings together, they lead to conclusion that there is a general opinion that knowledge sharing and product performance are not good inside CDICC, and they are very much related, because cluster members poses various knowledge that can affect new products development. Since analysis of strategic documents showed that cluster resources and relations are not recognised as important parts of cluster relationships, it is obvious that those problems first must be resolved at strategical level, so that CDICC members can recognize and fully use all benefits of the cluster.

The limitation of the chosen research approach is the size of the cluster itself and ratio of members in private sector and business clusters to those in research and development sector, which gives the results the view more from the first sector. In addition, the CDICC is in its initial development stage, develops very slowly and still does not recognize some important elements, such as the inclusion of knowledge management as a whole.

Key problems and space for improvement are still to be addressed through future research, for this one did not show that CDICC has relationship with Knowledge storage and dissemination, as well as on Product performance. The reasons for lack of this relationship that are mentioned above should be formally investigated, as well as connection between relationship between Knowledge storage and dissemination, and Product performance. The research of perception of knowledge management as a sum of interrelated processes could give some answers. In addition, attention should be given to elements of cluster relationships, such as cluster resources and relations, because they can create space for cluster’s further development, but they first must be resolved at strategical level.

Conclusion
The CDICC research identifies factors that can help enhance relationship between defence cluster and development of new and improved products, as well as with market expansion, the state of CDICC, its current achievements and problems that still need to be resolved.

Based on the importance placed on knowledge management processes and innovation, five hypotheses were proposed, out of which three were confirmed: (1) a relationship between CDICC and Knowledge Creation and Acquisition, showing support for RP1; (2) a relationship between CDICC and Innovation Performance, showing support for RP3; (3) a relationship between CDICC and Market Performance, showing support for RP4.

Previously conducted research by Lai et al (Lai, Hsu, Lin, Chen, & Lin, 2014) proposed and confirmed all four hypotheses which consider influence between cluster, knowledge management and innovation performance; whilst hypotheses in this
article consider a relationship between CDICC and alike matters, with RP3 being the most similar hypotheses in both studies. Their research was conducted on 15176 firms divided in export processing zone, industrial zone and science parks, where most firms fall under industrial zone also employing the biggest number of employees (Lai, Hsu, Lin, Chen, & Lin, 2014: p.736), whilst this research was conducted on 23 firms: divided in private, public, and mixed- and 11 of them all are producing companies. Another research by Chang et al (Chang, Chung & Handerson, 2012) also proposed four hypotheses, which consider how knowledge innovation capability effects business performance, but also explore the role of industrial clusters and regional innovation systems. Two hypotheses were confirmed and two were partially confirmed. The research was conducted on three science-based industrial Taiwanese parks, on 126 IC, Optoelectronics, Precision Machinery and Computer & Accessories firms (Chang, Chung & Handerson, 2012: pp. 12-13. The third research by Lai et al (Lai, Hsu & Lin, 2013) that we can relate our research to, for it is a very narrow field, has seven confirmed hypotheses related to cluster resources and their relationships, correlations or effects with various elements such as cluster relationships, geographic proximity of cluster relationships, resource sharing across supply chain, vertical integration of cluster relationships, cooperation among companies, horizontal competition and company performance. The research was conducted on six Taiwanese clusters (parks) in special economic zone (SEZ), on 266 companies (Lai, Hsu & Lin, 2013: p. 12). Additionally, we emphasize that none of this research included government institutions that have its specifics (especially military), so proper comparison would be very difficult.

The results of this research show that CDICC does bring certain benefits to its member companies. There is space for improvement and further strengthening of cooperation will intensify synergy and competitiveness. On one side, this research showed that CDICC started to achieve some of its goals even in early phase of development. On the other side, it revealed problems that can potentially slow down its development if they are not attained.

The limitation of this paper is the size of the cluster and the ratio of members in different sectors. Future implications could be the potential future research regarding CDICC’s relationship with Knowledge storage and dissemination, with Product performance, whilst connection between Knowledge storage and dissemination, and Product performance should be further investigated. The research of perception of knowledge management as a sum of interrelated processes, and elements of cluster relationships should be addressed.

References


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Forecasting Cinema Attendance at the Movie Show Level: Evidence from Poland

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Abstract

Background: Cinema programmes are set in advance (usually with a weekly frequency), which motivates us to investigate the short-term forecasting of attendance. In the literature on the cinema industry, the issue of attendance forecasting has gained less research attention compared to modelling the aggregate performance of movies. Furthermore, unlike most existing studies, we use data on attendance at the individual show level (179,103 shows) rather than aggregate box office sales. Objectives: In the paper, we evaluate short-term forecasting models of cinema attendance. The main purpose of the study is to find the factors that are useful in forecasting cinema attendance at the individual show level (i.e., the number of tickets sold for a particular movie, time and cinema). Methods/Approach: We apply several linear regression models, estimated for each recursive sample, to produce one-week ahead forecasts of the attendance. We then rank the models based on the out-of-sample fit. Results: The results show that the best performing models are those that include cinema- and region-specific variables, in addition to movie parameters (e.g., genre, age classification) or title popularity. Conclusions: Regression models using a wide set of variables (cinema- and region-specific variables, movie features, title popularity) may be successfully applied for predicting individual cinema shows attendance in Poland.

Keywords: cinema attendance, movie, IMDb, forecasting, data mining, decision support models
JEL classification: L82, C53, D81, Z11
Paper type: Research article

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**Introduction**

Participating in cultural events is an important determinant of an individual’s quality of life (e.g. Casson, 2006; Weziak-Bialowolska et al., 2018). In this paper, we focus on a considerable segment of cultural expenditures: the cinema industry. Forecasting cinema attendance may be crucial in cinema management for several reasons. Firstly, we observe the long-run decline in cinema ticket sales. This phenomenon is influenced by, among others, the development of television, DVD and other home video products (Cameron, 1988), piracy (Li, 2012) or video streaming (Wayne, 2018). It is important though to verify empirically the evidence on the factors driving cinema attendance. Secondly, as with many other cultural events, cinema programmes are set in advance. Cinema operators usually rely on their own intuition and experience when planning a cinema repertoire. Such forecasts, based on human judgment, maybe a subject of significant bias and are typically outperformed by econometric modelling (Makridakis et al., 2009). Thirdly, given the fact that cinema operators often apply a bundling strategy, higher cinema attendance also contributes to sales of complementary products, such as snacks or beverages (this phenomenon is especially evident in large cinemas, e.g. Doury, 2001; Dewenter and Westermann, 2005) as well as revenues from advertising.

The literature on forecasting consumer demand or behavioural patterns indicates not only to identify new determinants but also to combine those related to the product’s features and its’ reputation, location of the business or macroeconomic situation. Applications in the field of economics and business include, among others, predicting the credit risk (Sztaudynger, 2018), modelling credit card usage (Goczek and Wiktowski, 2016) and travel behaviour (Klinger and Lanzendorf, 2016). However, in accordance with our best knowledge, the issue of modelling and forecasting cinema attendance has not been fully researched in the field yet. When considering the broader scope of studies on leisure services, up to this point multilevel models are limited to tourism research (Jeffrey and Barden, 2001; Yang and Cai, 2016). In addition, recent contributions to the field of business forecasting also include data gathered from social media (e.g. Bukovina, 2016; Yuan et al., 2018). We partially address this issue by considering variables from the Internet Movie Database (IMDb). Finally, a number of papers suggest a higher level of uncertainty after the Global Financial Crisis (Bloom 2014; Moore 2017). In such a volatile environment, there is an even greater need for forecasting and business planning.

Therefore, we attempt to answer the question: which variables are useful in the short-term forecasting of cinema attendance at the individual show level? We use a dataset derived from a large cinema network in Poland that covered 19 months of sales history. Our study may be perceived as unique due to dataset structure that includes the attendance at individual shows (characterised by the date and time, location of the cinema and movie title), while prior studies (e.g., Hand, 2002; Walls, 2005; Collins et al., 2009) rely on aggregate box-office sales for titles or cinemas. Within the presented approach, it is possible to plan not only the repertoire (e.g. Marshall et al., 2013) but also the showing time or distribution across cinemas.

The aim of the paper is to build short-term forecasting models of cinema attendance and to examine which factors improve predictive power for forecasting cinema attendance at the individual show level. In order to complete research objectives, four groups of factors were firstly specified and further 16 regression models with different variables sets (cinema-specific, region-specific, movie parameters and title popularity) were compared.

The paper has the following structure. Firstly, an overview of the literature in the field of modelling and forecasting phenomena in the cinema industry was presented.
Secondly, the characteristics of data and methods were described. Thirdly, the errors of the out-of-sample forecasts were analysed. The research procedure included also robustness checks. Finally, the discussion and concluding remarks were presented.

**Literature review**

Modelling and forecasting phenomena in the cinema industry have been present in the literature for a long time. The first strand of the literature focuses on aggregate cinema ticket sales, including notable decreases in cinema attendance that were observed in the 1960s as well as the 1980s. These studies concluded that the drop in cinema attendance was mainly caused by the development of television, the arrival of home video formats like VHS, demographic factors and lower quality of movies (Jones 1986; Cameron, 1988; MacMillan and Smith, 2001; Pautz, 2002). Hand and Judge (2012) showed that using the number of searches of terms related to movies or cinemas (i.e. Google Trends data) may improve short-term forecasts of aggregate cinema admissions.

A large amount of the literature analyses cinema attendance across movies, using data observed at the movie level, i.e. the overall tickets sold for a movie (e.g., Walls, 2005; Marshall et al., 2013; Gmerek, 2015; Treme et al., 2018). Walls (2005) predicted financial success during the early stages of new movies where only the parameters of the movie itself were used for forecasting. The feature that distinguishes this study is the inclusion of movie characteristics such as negative cost, opening screens, whether it was a sequel, stars, genre, rating, and year of release. The results confirmed that a robust regression model is a better tool for predicting the financial success of movies than the often-applied least-squares regression model. In a recent study, Treme et al. (2018) verified the dependence between variables expressing cast (in particular, the gender of the movie’s stars) and box office performance. The model, which explained the movies’ commercial success, included variables such as stars (number and gender), budget, the maximum number of domestic theatres where the movie was played, major distributors (dummy variables), genre, different ratings (ratings from the Motion Picture Association of America (MPAA), critics, viewers), decade, and release date. The results of this study showed that having at least one star in the cast increases the movie’s revenue by 10%. What is more, this revenue grows when there are male stars in the cast. Marshall et al. (2013) focused on a system for forecasting movie attendance, using weekly attendance data across the movies. This study is close to ours in terms of the set of independent variables, including genre, country of origin, age rating, movie popularity, whether the film was a sequel and seasonality. Variables related to movie awards and finance (e.g. budget, public subsidies) are also included in cinema attendance analysis (Nelson et al., 2001; Jansen, 2005; Feng, 2017). Recent studies focus on the impact of movie popularity on social media (Treme and VanDerPloeg, 2014, Ding et al., 2017) or word-of-mouth reviews (Dellarocas et al., 2007; Duan and Whinston, 2008; Craig et al., 2015) on box-office performance.

Few papers analyse the cinema industry at the cinema-level. Hand (2002) applied univariate time series models (including autoregressive moving average – ARMA) to predict cinema admissions. Hand concluded that even if individual movie admissions are not predictable (De Vany and Walls, 1999), we could predict attendance at the cinema level. Collins et al. (2009) analysed a conventionality index—a measure of cinema programme differentiation. However, while the study examined the impact of several factors (size of the market, age structure, per capita income, and a dummy variable for multiplexes) on the conventionality, it ignored attendance.

The propensity that an individual goes to the cinema is separate and at the same timeless related issue in the literature (Collins and Hand, 2005; Cameron, 1999;
Dewenter and Westermann, 2005; Sisto and Zanola, 2007). These studies mostly use the characteristics of the individual or the household, which are not accessible in our study (typically the viewer is not identified by the cinema). However, we proxy these factors by the average salary in the region where the cinema is located and typically the customer has the place of residence (Goczek and Witkowski, 2016).

It should also be underlined that the cinema industry is similar to other branches of the entertainment industry. In the literature, we can find studies that have been devoted to forecasting attendance, for example in a museum (Cuffe, 2018). The results of Cuffe’s study show that rainfall during certain hours of the day can significantly affect museum attendance.

Data and methods

The paper examines which of the variables is useful in predicting cinema attendance in a one-week time horizon. Thus, we compare the forecasts obtained from multivariate regression models, including different sets of independent variables. Before we describe the forecasting method and the models, let us introduce the sources and properties of the data.

We build on the dataset at the individual show level, where a single observation denotes the number of tickets sold for a particular cinema screen at a given time. Compared to the most popular movie-level data, our dataset also distinguishes the time and the place of the movie show. These data are obtained from a large cinema network functioning in Poland (henceforth referred to as the Operator). The sample used in this study covers 25 cinemas (located in 24 Polish cities) and the period from October 2016 to March 2018. During that period, the Operator exhibited 259 unique titles. Overall, the dataset contains 179,103 observations, of which the last 16 weeks were used for forecasts’ verification (51,980 out-of-sample observations—i.e., 29% of the full sample). In this study, we include the opening week (the week that the particular movie is released) from the dataset. This approach is motivated twofold. Firstly, the evidence from studies analysing box-office performance of movies suggest that attendance during the first week is specific, determined by the promotion, social media news or the sentiment of movie reviews (Ainslie, 2005; Sharda and Delen, 2006; Yu et al., 2012) and should be modelled separately from subsequent weeks. Secondly, our model relies on data that are not available (or hardly achievable) before the movie release (e.g. movie popularity from IMDb).

Table 1 presents descriptive statistics of the dependent variable as well as the results of variance analyses (ANOVAs, break down by titles and cinemas).

<table>
<thead>
<tr>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>S.D.</th>
<th>ANOVA (Title)</th>
<th>ANOVA (Cinema)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>410</td>
<td>29.9</td>
<td>35.9</td>
<td>98.0</td>
<td>278.4</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Two conclusions emerge when looking at Table 1. The first is that the distribution is right-skewed and has large dispersion. Second, the statistics of the ANOVA tests show the high explanatory power of the titles or cinemas with respect to attendance. While both factors are significant (at almost any significance level, including 0.1%), the F statistics of the ANOVA test with the cinema factor is three times larger than with the title factor. This result provides yet another motivation to forecast at the level of the individual movie show, rather than the aggregate attendance of a given title.
In general, we examine the role of four groups of variables. We group variables that provide similar information about cinema characteristics, movie characteristics and its popularity, and the macroeconomic conditions of the region. A similar approach was previously proposed, among others, by Hofmann-Stölting et al. (2017) and Wu et al. (2018). In these studies, we can find variables reflecting product quality, pricing factors, cinema configurations, competition, advertising, and selected external factors. Our approach is comprehensive in the sense that we include factors grounded in the economy, entertainment industry economy as well as cultural events planning. In addition to listing the variables, we provide motivation for using the variables in the study.

- **Cinema-specific** – features of the cinema, such as the number of screens in the cinema (Screens) and capacity—number of seats (Seats), collected from the Operator’s database. Such features serve here as a proxy for the reputation of a particular cinema (e.g., Collins et al., 2009), which attracts audience irrespective of other factors.

- **Region-specific** – average monthly earnings in each NUTS-4 region (RegionWage) and population in each NUTS-3 region (RegionPopul), collected from the Polish Statistical Office – Local Data Bank (https://bdl.stat.gov.pl/BDL/start). Average earnings represent income, which is typically considered when modelling demand and the population expresses the market size. These variables, expressing the characteristics of the place of residence, were used also when modelling the propensity for holding a payment or credit card (e.g. Goczek and Witkowski, 2016). The data on earnings and population are available with quarterly and bi-annual frequency, respectively.

- **Movie parameters** – running time in minutes (MovieLength), genre (9 dummy variables, representing 10 genres present in the dataset), country of the producer (2 dummy variables, representing Poland and the United States), dummy for 3D sound (Sound), dummy for sequels (Sequel), number of stars from top the 20 stars according to the IMDb (Stars20), dummy for movies targeted at small children (Childr), age classification, taking values 0, 6, 7, 10, 12, 13, 15, 18 (AgeClass), age of the movie in years (year it was shown minus the year of release; MovieAge). Such variables describe the final product being offered and play a key role in the choice of the movie; they are routinely used in the literature on modelling and forecasting a movie’s attendance or revenue (e.g., Litman 1983; Walls, 2005).

- **Title popularity** – average rating (RatingIMDB) and a number of votes (VotesIMDB) collected from IMDb. Including these variables in the regression is motivated by studies on the relationship between the influence of popularity (e.g., the number of visits to internet auctions sites) and customer feedback on sales (e.g., Duan and Whinston, 2008; Baranowski et al., 2018).

Table 2 presents summary statistics of the independent, continuous variables used in the study. The results presented in Table 2 show that the sample is diverse. More specifically, the sample covers different types of cinemas (i.e. from 2 to 8 screens, and the screens ranging from 57 to 483 seats). The sample is also diversified across the regions—both with respect to income (wage) per capita and population. The Operator exhibited mostly new movies (shown during the first year of release), though the movies varied greatly in popularity indicators (number of votes and rating from IMDb).
We mainly apply linear specifications; then we examine some non-linear alternatives to check the robustness. Due to the strong seasonality that is typical of entertainment services, all models contain monthly, weekly and intra-daily seasonal dummy variables. In addition, to account for the average performance from the first (opening) week we included unobserved movie reputation, consumer loyalty, pre-launch marketing instruments and movie features not captured by other variables (e.g., Machowska, 2018). A number of papers suggest that a movie’s opening performance is a good predictor of the financial success of the movie (e.g., Gmerek, 2005; Sharda and Delen, 2006). Therefore, we include a movie opening in all models.

The baseline specification relies on a small set of variables and allows for one-week-ahead forecasting:

\[
y_{i,t} = \beta_0 + \beta_1 y_{i,t-1} + \sum_{j=2}^{12} \beta_{m,j} d(\text{month} == j)_{t} + \sum_{j=2}^{7} \beta_{w,j} d(\text{weekday} == j)_{t} + \sum_{j=0}^{23} \beta_{h,j} d(\text{hour} == j)_{t} + \epsilon_{i,t}
\]

where:

- \( y_{i,t} \) – attendance (number of tickets sold for the show),
- \( y_{i,t-1} \) – an average attendance of the movie during the opening week,
- \( d(\text{month} == j)_{t}, d(\text{weekday} == j)_{t}, d(\text{hour} == j)_{t} \) – dummies for the month, day of the week and hour, respectively,
- \( \epsilon_{i,t} \) – error term.

As already described, in addition to the baseline specification, we extend the model (1) with the variables representing features of the cinema, the movie as well as the title’s popularity and characteristics of the region. The cross-sectional dimension prevails over the time-series dimension (i.e., \( N >> T \) and the fraction of variance of the dependent variable attributed to the cross-sectional dimension exceeds 80%). Moreover, the dataset does not contain shows with zero attendance; hence no censoring is present. Therefore, ordinary least squares (OLS) provides consistent and unbiased estimates of structural parameters, even under heteroscedasticity. The results based on the weighted least square estimator, which is efficient under heteroscedasticity, are presented in the Robustness checks section.

The forecasts are formulated one week ahead (a typical planning horizon for cinemas) and the out-of-sample forecasting procedure aims to mimic “real-time” projections. As a result, the procedure follows three steps: (i) Estimate the model using OLS, using the first \( t \) weeks of the sample; (ii) Predict the attendance for the week \( t+1 \), using the values available during week \( t \), and (iii) Save the forecasted values and repeat steps 1 and 2 for further weeks until the end of the sample.
In order to assess forecasting performance, we use ex-post prediction error measures. Firstly, we consider the root mean square error (RMSE), which expresses the forecasting accuracy. In addition, we examine the proportion between the mean error (ME) and the mean absolute error (MAE), which is a measure of forecasting bias. In out-of-sample forecasting, adding new variables does not necessarily improve the performance of the models.

Results

This section presents the out-of-sample forecasting performance of the models, using the procedure described in the previous section. All the models include seasonality and the first-week performance of the title. For the remaining variables, we consider all possible (16) combinations of groups of variables, mentioned in the previous section: cinema, region, movie parameters, and title popularity.

When discussing the accuracy (Table 3), we mostly rely on the RMSE to evaluate the quality of the forecasts and to rank the models. Among the variables blocks, the largest gain in predictive accuracy (ca. 1% of RMSE on average) is achieved due to cinema characteristics (two variables, which express mostly cinema size). When region-specific variables (population and earnings) are included, the gain in the out-of-sample performance of the models was less noticeable (ca. 0.3% of RMSE). However, the three best performing models (i.e. models with lowest RMSE, ranked from 1 to 3, see Table 3) are those that use both cinema and region characteristics as well as at least one of the following: movie parameters or movie popularity. Based on this we can conclude that a successful forecasting model requires using cinema- and region-specific and at least some movie characteristics (which could be related to either ‘technical’ movie parameters or its popularity over the web / in social media). Compared to the existing evidence for Poland (Gmerek, 2015), we find that movie-related variables play a minor role (however, the study by Gmerek operated at movie-level data, and consequently the findings are not proportionate).

Table 3
Forecasting accuracy across the models

<table>
<thead>
<tr>
<th>Cinema-specific</th>
<th>Region-specific</th>
<th>Movie parameters</th>
<th>Title popularity</th>
<th>Ranking</th>
<th>RMSE</th>
<th>ME / MAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>1</td>
<td>36.56</td>
<td>-1.12%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>2</td>
<td>36.58</td>
<td>2.17%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>3</td>
<td>36.61</td>
<td>1.27%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>4</td>
<td>36.69</td>
<td>0.99%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>5</td>
<td>36.72</td>
<td>4.18%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>6</td>
<td>36.74</td>
<td>3.29%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>7</td>
<td>36.74</td>
<td>-2.76%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>8</td>
<td>36.86</td>
<td>-0.71%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>9</td>
<td>36.96</td>
<td>-2.04%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>10</td>
<td>36.97</td>
<td>1.89%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>11</td>
<td>36.98</td>
<td>1.11%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>12</td>
<td>37.05</td>
<td>-0.04%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>13</td>
<td>37.07</td>
<td>3.79%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>14</td>
<td>37.08</td>
<td>3.01%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>15</td>
<td>37.16</td>
<td>-3.77%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>16</td>
<td>37.23</td>
<td>-1.79%</td>
</tr>
</tbody>
</table>

Source: Authors’ work
In addition to analysing forecasting performance, we present the results of the regression applied to the full sample (see Table 4). In column 1, we show the results of the full specification forecasting model. To assess model robustness, we provide the results of the model excluding time dummy variables (column 2) and the model without time dummy variables as well as dummy variables for the movie genre (column 3). The results indicate that the majority of the variables used the full specification is significant. Except for Stars20, for which we find the unexpected (negative) effect, all the variables have proper economic interpretation. As the price of the tickets for 3D movies is much higher, compared to the 2D ones, the negative effect of the 3D dummy is less surprising. We also show the key role of the dummy variable expressing seasonality. The model (1) strongly outperforms models (2) and (3) in terms of the in-sample fit, expressed by the R-squared coefficient.

Table 4
Estimation results of the regression applied to the full sample

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Constant</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>attended</td>
<td>during the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Screens</td>
<td>opening week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seats</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RegionWage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RegionPopul</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MovieLength</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AgeClass</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MovieAge</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RatingIMDB</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>VotesIMDB</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stars20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dummy for</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>children</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dummy for</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3D sound</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dummy for</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>sequel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>producer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>genre</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>month</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>weekday</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hour</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Authors’ work</td>
<td>Note: ‘<em>’, ‘<strong>’, ‘</strong></em>’, ‘****’ denote significant at the 10%, 5%, 1% and 0.1% level respectively.</td>
<td></td>
</tr>
</tbody>
</table>
Robustness checks
In addition to the results presented in the previous section, we perform several robustness checks. Below we show the detailed results of the two of the checks.

Firstly, we exclude first-week attendance from the set of variables. This makes it possible to consider even more parsimonious models. Secondly, we perform a robustness check related to heteroscedasticity. Heteroscedasticity is typically encountered in regressions using large microeconomic samples. It was detected in our models by using Breusch-Pagan tests, at a 1% significance level. In order to tackle this issue, we apply a two-step weighted least squares regression (henceforth: WLS) assuming that the variance of errors is proportional to the absolute value of fitted values from the corresponding OLS model (i.e., similar to the specification of the Breusch-Pagan test). In Table 5 we present the out-of-sample errors of the forecasts based on the alternative models.

The results of the first robustness check (Table 5, panel “No opening week”) indicate that removal of first-week attendance does not change the ranking of the models. As previously, the best performing model uses cinema and region characteristics as well as title popularity. Moreover, the best three specifications are the same in the case of the baseline models (Table 3). Finally, the results indicate the important role of the first-week attendance – the removal of a single variable caused a 2% increase in RMSE, while often much smaller effects are visible after removing a single group of variables.

Table 5
Forecasting accuracy across the alternative models

<table>
<thead>
<tr>
<th>Cinema-specific</th>
<th>Region-specific</th>
<th>Movie parameters</th>
<th>Title popularity</th>
<th>No opening week</th>
<th>Weighted LS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RMSE ME / MAE</td>
<td>RMSE ME / MAE</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.23 1.37%</td>
<td>37.56 9.17%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.25 2.36%</td>
<td>37.60 9.56%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.33 5.10%</td>
<td>37.59 7.70%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.35 0.54%</td>
<td>37.40 2.73%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.36 0.43%</td>
<td>37.75 2.29%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.43 1.13%</td>
<td>37.69 1.77%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.48 6.87%</td>
<td>37.90 12.52%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.57 4.96%</td>
<td>37.53 16.11%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.79 3.17%</td>
<td>37.93 12.25%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.81 2.3%</td>
<td>37.74 10.83%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.87 1.4%</td>
<td>37.81 1.39%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.90 0.54%</td>
<td>37.89 7.75%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>37.97 6.91%</td>
<td>37.97 13.61%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>38.03 5.09%</td>
<td>38.00 9.83%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>38.12 8.68%</td>
<td>37.84 8.63%</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>38.16 6.92%</td>
<td>37.96 13.36%</td>
</tr>
</tbody>
</table>

Source: Authors’ work

A comparison of the results obtained by using OLS (Table 3) and WLS (Table 5, panel “Weighted LS”) shows that the quality of forecasts is not robust to the estimation method. We argue that the lack of robustness does not bring into question the validity of the OLS-based results. Firstly, while both OLS and WLS are consistent, the WLS estimator provides more efficient estimates only if the errors’ variances are properly specified. The issue of proper variance specification is problematic, and for large samples, the efficiency gains are very small. Therefore, the usual practice in
microeconometrics is to use OLS and heteroscedasticity-consistent standard errors of the estimates (Cameron and Trivedi, 2005, p. 81). Secondly, the accuracy of the WLS-based forecasts is significantly worse than the accuracy of the OLS-based forecasts. For the benchmark specification, we get RMSEs equal to 37.23 and 38.16, respectively for WLS and OLS. Moreover, for the best model, the RMSEs are 36.56 and 37.23, respectively for WLS and OLS. In addition, most of the WLS forecasts are systematically biased (i.e., average ME / MAE across the models is 10% in absolute terms; see Table 4). Clearly, OLS-based forecasts outperform those based on WLS. Following the theory behind WLS estimation, this may indicate the misspecification of the variance of the error term. Similar results are obtained under several standard assumptions on the variances of the errors (and consequently the weights applied by WLS). Further robustness check consisted of the following: (i) including intra-day seasonality expressed in a 4-hour interval (instead of a 1-hour interval), (ii) including the region’s unemployment rate (instead of average earnings), (iii) including a dummy variable representing national holidays in addition to weekly dummies, and (iv) shortening the out-of-sample period.

The results appear to be robust with respect to these modifications (detailed results are available upon request). As mentioned, we also consider several variants of non-linear models (including an exponential specification or adding squares of the continuous variables). However, including non-linear specifications does not improve the out-of-sample accuracy compared to the models presented in the previous section. The inspection of the descriptive statistics suggests that the dataset may suffer from outliers (which might be due to blockbusters, e.g. De Vany, 2003; Koçaş and Akkan, 2016). We also checked the models using a regression method robust to outliers (namely Huber regression) instead of OLS. The results indicate that applying robust regression to deal with outliers increased the aggregate forecast errors (e.g. RMSE, on average, by 5%).

**Discussion**

We analysed a number of forecasting models based on data at the movie show level. Such a dataset has not been analysed in the literature so far. However, we discuss the results by comparing them with the studies using a large set of variables that overlap partially with our set of regressors.

Walls (2005) analysed the box-office revenues and identified that a sequel status improves performance, ceteris paribus while imposing restrictions on the viewer’s age decreases performance. The results presented in Table 4 indicate the equivalent relationship for similar movie performance indicators (number of tickets sold). Furthermore, Walls (2005) indicated a positive effect of the movie opening proxied by the number of screens during the first (opening) week, while our results are analogue, but based on an aggregate attendance during the opening week.

As in Walls (2005), we found small gains from including movie genres (after including 9 genre dummies increases R-squared only by 0.005, see Table 4). On the other hand, Treme et al. (2018) and Marshall (2013) got opposite results that were statistically significant at least for part of genre dummies. In addition, Treme et al. (2018) and Marshall et al. (2013) identified the negative effects of age classification (age rating) on the box office performance.

Treme et al. (2018) estimated the determinants of movie attendance. As in our study, they found positive effects of the number of top stars in the cast. A similar effect was found by Walls (2005), but he investigated a dummy for the appearance of at least one star, rather than the number of stars. In our regression, we surprisingly estimated that effects as negative.
Finally, both Treme et al. (2018) and Marshall et al. (2013) confirmed the positive influence of the reviews on movie attendance. Marshall (2013) included the quality of the reviews made by professional critics, while Treme et al. (2018) covered both the reviews by the critics and the viewers. In our study, we included the movie rating based on the opinions of the IMDb users, which covers non-professional opinions rather than professional critics.

The results presented in the paper could be also compared to the literature focused on the Polish cinema industry. To our best knowledge, the only empirical study examining cinema attendance in Poland was the one by Gmerek (2015). While Gmerek (2015) operated at movie-level data, we can confront the results with respect to variables directly related to movie titles (i.e. ‘movie parameters’ and ‘title popularity’ in our terminology). Our results are mostly consistent with the ones by Gmerek (2015). More specifically, Gmerek found a positive impact of sequel status, viewers rating and opening week attendance. In contrast to our findings, Gmerek (2015) found a significant impact of movie genre, but consider only comedy and history genres, while we included 10 main categories and estimated small gains from including genre dummies. A large number of papers, including our study, stressed the positive effects of number stars in the cast. However, Gmerek did not find this variable as significant.

Implications for practice
From a practical point of view, the models developed in the paper may be directly applied in the cinema industry. We do not claim that the list of variables used in the best performing model is valid for all cinema operators. However, our main conclusion should be universal. Therefore, at least for the cinemas operating in Central and Eastern Europe one can gain from including a broad set of predictors related to the movie title, region, and cinema. These models could be used in the cinema operator system, mainly to assist in planning the cinema programmes. More specifically, accurate forecasts may increase the volume of ticket sales when there is strong demand heterogeneity across the movie titles. For instance, when in the given cinema the model predicts higher attendance for the movie ‘A’ compared to the ‘B’, one may assign the ‘A’ to the room of higher capacity. Furthermore, the accurate demand prediction may be used for improving price policy (e.g. to apply for price discrimination or promotion).

It should also be underlined that typically the scale of business operations of cinema operators is large. In these circumstances, even small differences of RMSEs across the models may contribute to substantial differences in revenues.

Contributions to the literature
This paper contributes to the literature in at least three ways.

Firstly, most of the studies focus on a single factor or a group of factors (most often movie characteristics) that may influence cinema attendance or revenues (e.g., Walls, 2005; Marshall et al., 2013; Treme et al., 2018). As Litman (1983), Hofmann-Stölting et al. (2017) and Wu et al. (2018) showed, it pays off to include various factors when forecasting the success of movies. To our best knowledge, our set of variables, including factors related to cinema and movie characteristics, title popularity and the economic conditions of the region, is more comprehensive than those used in the literature so far.

Secondly, the vast majority of papers analyse the data at the movie-level (e.g., Hand, 2002; Marshall et al., 2013; Gmerek, 2015; Treme et al., 2018). Another notable strand of literature explores the propensity of the individual or household to participate
in cultural events such as movie-going. These studies are mostly interested in how socioeconomic factors influence individuals' attendance at the cinema. Our paper is closer to the first strand, however, we explore cinema attendance on the individual show level, which allows including also characteristics of the cinema or specific cinema room as well as intra-day and weekly seasonality.

Thirdly, previous empirical studies aimed at estimating the determinants of attendance. This allows identifying the size and statistical significance of each variable. In this paper, we go beyond this approach and focus on out-of-sample predictive performance with respect to the variable selection. This means we are interested in finding the variables useful in one week ahead prediction, rather than the ones with high in-sample contemporary correlation.

**Conclusion**

In this paper, we investigated cinema attendance forecasting based on data from a large Polish cinema operator. Our models explain the attendance of individual movie shows. The research strategy was to use several groups of variables in an out-of-sample forecasting procedure. In addition to movie parameters that are routinely used in the literature, we include cinema-specific, region-specific and movie popularity data. From a statistical point of view, using a large set of variables eliminates (or significantly reduces) omitted variable bias. The models developed in the paper operate on highly disaggregated data (i.e., at the individual show level) and similarly to machine-learning models, they may assist in making the business decision (Bose and Mahapatra, 2001). Our results can be used in planning the repertoire and allocating movies to the cinema rooms, contributing to the increase in the number of tickets sold. Our results may also be useful for other enterprises from the entertainment industry where cultural events are planned.

Our main conclusion is that forecasting the attendance of individual movie shows is feasible, contrary to the suggestions contained in some earlier studies. It turns out that the best performing models, in terms of aggregate accuracy, are those that include a wide set of variables, i.e., cinema- and region-specific variables in addition to movie parameters (such as genre, running time, age classification, etc.) or title popularity (number of votes and average rating from IMDb). The results are robust with respect to expressing seasonality, modifying regional characteristics or shortening the out-of-sample period.

**Limitations and further research**

The first limitation of the research is the fact that we use the dataset from a single Polish cinema operator. The question emerges if the results are also valid for other countries. We believe that to some extent we can extrapolate the results to other Central and Eastern European countries. The evidence from the literature suggests substantial cross-country similarities regarding the cinema industry. For example, Central and Eastern European countries have comparable movie preferences (Fu and Govindaraju, 2010) and the income elasticity of cinema demand is similar to the United States (Luňáček and Feldbabel, 2014). The second concern is the dataset representativeness – one may doubt if the database derived from one company describe the entire industry. Unfortunately, based on the data collected for this study we are not able to fully address this issue.

In our study, we make use of the data from social media. These data, however, are limited to average rating and the number of votes collected from IMDb. Employing additional sources of social media data, including Facebook or Twitter data, is a
natural candidate for further research. Within these data, one can pick both numbers of ‘likes’, ‘favorites’, ‘followers’ as well as the tone of word-of-mouth reviews.

Clearly, cinema attendance could be also related to weather conditions. Similarly, the negative effects of rain or snow have been recently found for museum attendance (Cuffe, 2018). However, given the very low quality of weather forecasts with a horizon longer than three days, a direct application for forecasting at one week ahead horizon is problematic.

Finally, most of the predictors used in the study are categorical or vary only across the regions. This could be the possible reason for the similar or even better performance of linear models when compared to the non-linear alternatives. Subsequently, in future research, we can also consider applying machine learning models such as support vector machines or neural networks.

References
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A Content Analysis of International Airline Alliances Mission Statements

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Abstract

**Background:** Mission statements have come to play an important role as tools for organizational value sharing. **Objectives:** This study aims to shed light on what types of values are highlighted in international airline alliance members’ mission statements, and whether there are significant differences or not. **Methods/Approach:** Quantitative content analyses have been conducted with the goal to investigate mission statements of 61 members of international airline alliances: Star Alliance, SkyTeam, and oneworld. **Results:** Frequency test outcomes reveal that “philosophy”, “self-concept” and “location” are the predominant components in oneworld, “philosophy” is the primary component in SkyTeam, and “philosophy” and “customer” are the focal components of Star Alliance. According to chi-square tests, Star Alliance members emphasize “customer” more often than others do, and oneworld members highlight “profitability” more often. One-way Anova tests with a post hoc analysis reveal that Star Alliance members cover more components than SkyTeam. **Conclusions:** The theoretical implication of these findings is that they reveal the existence of unique values among international airline alliances members offering a competitive advantage. As a practical implication, these findings will be helpful for international airline alliances and airline managers for comparative purposes. **Keywords:** international airline alliance, airline, mission statement, organizational value, content analysis

**JEL main category:** M
**JEL classification:** F23, M1, M16,
**Paper type:** Research article

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Introduction

In recent years, as a result of radical environmental changes surrounding the airline industry, for example, global economic recession and skyrocketing oil prices, deregulation, the privatization and commercialization of airline service, the global market penetration of new international airlines, etc., competition among airlines has intensified (Lin et al., 2018; Min et al., 2016). For these reasons, airlines are required to be competent enough to appeal to customers regarding their own merits (Lin et al., 2018; Lin et al., 2016), and they form international alliances and affiliate with alliances (Min et al., 2016). There exist many cases of failure of airline alliances and it has been pointed out that instability is in the nature of these alliances. Yet, in the airline industry, the influence of alliances has increasingly been extended (Morrish et al., 2002). Button et al. (1998) suggested that in the future, an airline that failed to be a member of an alliance would be isolated and encounter strategic disadvantages. Therefore, it is expected that the number of airlines participating in alliances will continue to increase (Evans, 2001). In fact, the members of Star Alliance, the biggest international airline alliance, have increased from eight airlines in 1998 to twenty-eight airlines in 2018.

Currently, not only competition among airlines but also competition among alliances has intensified. International airline alliances have implemented the expansion of route networks, integrating the loyalty programs of members to maintain competitive advantages (Min et al., 2016). In addition, they are enhancing efficiency and productivity by sharing airport lounge facilities and Computer Reservation Systems (CRS) among members. In addition, enhancing the overall brand value and organizational value sharing among members are available strategic options for ensuring competitive advantages (Min et al., 2016). For instance, an alliance itself plays a role as an “umbrella brand” and each member becomes a “sub-brand” (Evans, 2001). In this manner, the brand management at the overall alliance level is crucial for international airline alliances because, when customers use an airline, the service of the airline is connected with that of other partner airlines, and customers experience the whole alliance’s service. Weber et al. (2004) argued that when an airline leaves a bad image with customers, it badly affects the whole alliance. Meanwhile, service standardization between members and value sharing are also critical challenges for international airline alliances. For example, alliances set service standards so that airlines can provide similar service and maintain service quality (Min et al., 2016; Evans, 2001).

There has been an extensive discussion about the operational efficiency, productivity and financial performance of international airline alliances (Min et al., 2016; Tiernan et al., 2008; Oum et al., 2004; Kleymann et al., 2001). However, little attention has been given to what types of values are emphasized among alliance members. Corporate mission statements are significant in value sharing among alliance members as they imply particular types of values. In addition, a mission statement can be a hint when airlines and alliances choose optimal strategic partners. Mission statements include important information about airlines’ main services, strengths, relative similarities and differences (Kemp et al., 2003). In mission statements, airlines’ cultures and core values are reflected. Whether the culture and values of an airline fits one’s own company or not is a significant standard when choosing alliance partners (Medcof, 1997; Brouthers et al., 1995). However, regardless of its importance, it has been pointed out that very few studies have attempted to investigate the situation of mission statements in the airline industry (Law et al., 2018; Lin et al., 2018; Kemp et al., 2003).

The main purpose of this study is to clarify what kind of values are highlighted in international airline alliance mission statements. Hence, this study focuses on the
content analysis of 61 mission statements of three major international airline alliance member airlines.

This paper consists of five sections. The next section will focus on existing studies of international airline alliances and mission statements in the airline industry. In section three, content analyses including frequency tests, chi-square tests, and one-way Anova tests with post hoc analysis relevant to the mission statements of 61 airlines will be conducted. In section four, based on results, theoretical discussions are carried out. In section five, implications and limitations are described.

**International Airline Alliances**

The strategic alliance is “a particular and horizontal form of inter-organizational relationship in which two or more organizations collaborate, without the formation of a separate independent organization, to achieve one or more common strategic objectives” (Evans, 2001, p. 229). Traditionally, strategic alliances have been recognized as penetrations by multinational firms in inaccessible markets. Recently, as a strategic option, alliances have been highlighted (Evans, 2001). Strategic alliances are often seen in the pharmaceutical industry, the automobile industry, and the chemical industry. In addition, in the international airline industry, strategic alliances have been formed frequently (Evans, 2001). The phrase “airline alliance” indicates a strategic alliance of airlines. This is defined as “any collaborative arrangement between two or more carriers involving joint operations with the declared intention of improving competitiveness and thereby enhancing overall performance” (Morrish et al., 2002, p. 401).

Regarding the scope of collaboration in international airline alliances, simple level cooperation, such as transfer of passenger and baggage handling service, was implemented at an early stage. Recently, such relationships have evolved to include company-wide marketing collaboration and technological cooperation.

Great attention has been paid to the advantages and disadvantages of international airline alliances. Advantages of alliances can be classified into two categories: (i) advantages for airlines, and (ii) advantages for passengers.

Dyer et al. (2001) pointed out that, through an alliance, an airline can promptly acquire the complementary assets of other airlines. Moreover, the improvement of seat capacity and revenue has often been discussed (Wright et al., 2010; Kleymann et al., 2001; Park, 1997; Hannegan et al., 1995). Also, market penetration and the maintenance of market status, as well as ensuring a stable market and cost-saving, are other merits of alliances (Button et al., 1998). Finally, through an alliance, organizational values are shared among members and brand values are elevated (Min et al., 2016). As merits for passengers, it is reported that passengers can use better services as airlines’ destinations are increased and passengers’ transfer times are shortened (Kleymann et al., 2001). One-stop check-in service, better baggage handling service, and the use of a common lounge are also beneficial for passengers (Evans, 2001; Dennis, 2000). On the other hand, Min et al. (2016) argued that there is no apparent evidence of improvements in operational effectiveness and performance through alliances. In addition, it has been reported that each airline’s brand value has declined, flight schedules have become more complex, and operational flexibilities have disappeared, while the higher the degree of cooperation with collaborating, the higher the risk and fixed cost (Kleymann et al., 2001). Regarding demerits for passengers, the number of flight destinations shrinks as alliances monopolize flight routes. In other words, it would seem that participating in an alliance does not always guarantee airlines’ strategic advantages.
Evans (2001) suggested five criteria for selecting strategic partners when airlines form alliances and participate in them (Medcof, 1997; Brouthers et al., 1995). The first one is the competence of partners. This means that partners are decided according to financial stability and market status. The second one is the degree to which the partners share the same level of risk. The third one is whether an alliance is well controlled and its operational effectiveness is sufficiently maintained. The fourth criterion is geographic fitness. Generally, there is a tendency to avoid alliances of airlines with overlapping markets. The last criterion is the compatibility of relevant organizational culture and operations (Medcof, 1997).

Several comparative studies have been conducted on the effectiveness, productivity, and revenues of international airline alliances. Kleymann et al. (2001) suggested that the degree of risk and the revenue of airlines differs depending on their integration level. Oum et al. (2004) reported that horizontal alliances affect the airlines’ productivity, and that, in horizontal alliances, the higher the level of cooperation, the higher the productivity and profitability. Tiernan et al. (2008) compared alliances’ service quality performance regarding on-time arrivals, baggage reports, and flight cancellations. Finally, Min et al. (2016) compared the operational effectiveness and performance between alliance members and non-members. As a result, SkyTeam members and oneworld members’ revenues were found to be better than with Star Alliance. Table 1 indicates comparative airline alliance studies.

**Table 1**
Comparative airline alliance studies

<table>
<thead>
<tr>
<th>Author</th>
<th>Number of alliances and airlines</th>
<th>Criteria for evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kleymann et al., 2001</td>
<td>3 alliances, 15 airlines</td>
<td>Degree of risk and revenue</td>
</tr>
<tr>
<td>Oum et al., 2004</td>
<td>22 airlines</td>
<td>Productivity and profitability</td>
</tr>
<tr>
<td>Tiernan et al., 2008</td>
<td>4 alliances, 24 airlines</td>
<td>On-time arrivals, baggage reports, flight cancellations</td>
</tr>
<tr>
<td>Min et al., 2016</td>
<td>3 alliances, 59 airlines</td>
<td>Operational effectiveness, financial performance</td>
</tr>
</tbody>
</table>

Source: Kleymann et al. (2001), Oum et al. (2004), Tiernan et al. (2008), Min et al. (2016)

However, very few studies have been done to analyze differences in alliance members’ values as competitive advantages. In the next section, corporate mission statement issues in the airline industry will be discussed.

**Mission statements in the airline industry**

Mission statements are firms’ messages and promises to stakeholders (Bartkus et al., 2004). Mission statements are answers to questions as to how companies should be in the future (Wang et al., 2011). In mission statements, companies’ strategic directions and goals are reflected (David, 2001). Several studies perceived that “vision”, “value”, “faith”, “principle”, “strategy” and “philosophy” are similar to “mission” (e.g., Castro et al., 2014; Ireland et al., 1992; and Pearce et al., 1987).

It has often been said that mission statements play a significant role in relationship management with stakeholders. “A well-designed mission statement is essential for formulating, implementing and evaluating strategy” (Kemp et al., 2003, p. 635). Wang et al. (2011) argued that a mission statement is an indispensable factor of corporate management as it is an effective strategic tool. Through mission statements, companies attempt to achieve market differentiation (Lin et al., 2018; Kemp et al., 2003). A mission statement is a core factor of organizational culture (Klemme et al.,...
1991) and, as the ‘cultural glue’; it engages an organization’s members (Kemp et al., 2003). A mission statement is an important communication tool between a company’s inside and outside stakeholders such as employees, customers, investors, suppliers, the public, communities and the media (Law et al., 2018; Lin et al., 2018; Lin et al., 2016; Bartkus et al., 2004; Kemp et al., 2003). It has been reported that a well-designed mission statement positively influences employee and customer satisfaction (David et al., 2014; Jyoti et al., 2012). That is, a mission statement gives employees a sense of belonging (Lin, 2012), and produces emotional bonds and a sense of mission (Campbell et al., 1991). A clear mission statement confirms organizational values and strategic priorities (Kemp et al., 2003).

In terms of the advantages of mission statements, it has been reported that they can ensure a company’s competitive advantage and improvements in brand value. Additionally, several studies have argued for a correlation between good mission statements and companies’ financial performance (Williams et al., 2014; Desmidt et al., 2011; Pearce et al., 1987). Lin et al. (2016) claimed that airlines’ mission statements positively affect passengers’ brand trust and brand equity.

David (2007) suggested nine components of corporate mission statements, i.e., “customers”, “products”, “location”, “technology”, “concern for survival”, “philosophy”, “self-concept”, “concern for public image” and “concern for employees”. Lin et al. (2018), in addition to this, suggested “safety” as a new component, considering that it is emphasized more than other values in the airline industry.

Mission statement studies in the airline industry can be classified into two categories: (i) content analyses of mission statements, and (ii) influence of mission statements on passengers. Table 2 summarizes mission statement studies in the airline industry.

<table>
<thead>
<tr>
<th>Author</th>
<th>Data</th>
<th>Methodology</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemp et al., 2003</td>
<td>50 airline mission statements</td>
<td>Content analysis</td>
<td>To investigate ideal elements of mission statements</td>
</tr>
<tr>
<td>Castro et al., 2014</td>
<td>91 airport vision statements</td>
<td>Content analysis</td>
<td>To clarify types of international airports</td>
</tr>
<tr>
<td>Lin et al., 2016</td>
<td>518 passenger questionnaires</td>
<td>Questionnaire survey</td>
<td>To examine associations between mission statements and passengers’ perceived brand trust and equity</td>
</tr>
<tr>
<td>Law et al., 2018</td>
<td>200 airline mission statements</td>
<td>Content analysis, Network analysis</td>
<td>To identify dimensions and core values of mission statements in the airline industry</td>
</tr>
<tr>
<td>Lin et al., 2018</td>
<td>79 airline mission statements</td>
<td>Content analysis</td>
<td>To examine the current trend of mission statements</td>
</tr>
</tbody>
</table>

Source: Kemp et al. (2003), Castro et al. (2014), Lin et al. (2016), Law et al. (2018), Lin et al. (2018)

Kemp et al. (2003) analyzed 50 airline mission statements and clarified the ideal elements of mission statements. Castro et al. (2014) analyzed 91 international airport vision statements and found that international airports can be categorized according to “geographic location”, “passenger movement” and “airport governance models”. In addition, they suggest “tourism” as a new component. Lin et al. (2018) analyzed 79 airline mission statements compared with Kemp et al. (2003). Law et al. (2018)
analyzed 200 airline mission statements and suggested 6 mission statement themes; “service”, “customer”, “concern for stakeholders”, “concern for strategy”, “competitive advantage” and “development”. Finally, Lin et al. (2016) conducted questionnaire surveys with 518 passengers in Taiwan to clarify mission statements’ influence on passengers.

In spite of their importance, it has been pointed out that mission statement studies on the airline industry are limited (Law et al., 2018; Lin et al., 2018; Kemp et al., 2003). Also, little research has been done on alliance members’ distinctive value sharing through mission statements.

**Stakeholders in airline industry mission statements**

Stakeholders include inside and outside groups involved in a company’s profit. David (2001) argued that a company should cover all stakeholders widely in its mission statement. It has often been pointed out that a mission statement is a communication tool between a company and its outside stakeholders (Law et al., 2018; Lin et al., 2016; Bartkus et al., 2004). Airline business success depends on how well an airline manages relationships with its international and heterogeneous partners. Therefore, concern for an airline’s outside stakeholders can be crucial content in airline industry mission statements. However, concern for outside stakeholders has not received much attention in airline industry mission statement studies. For this reason, this study attempts to suggest “partners” as a new component and will explore its potential.

**Methodology**

**Research questions and content analysis**

Based on these previous discussions, this study set four research questions as follows:

- RQ1: What kind of values are highlighted in alliance members’ mission statements according to the alliance?
- RQ2: Are there any significant differences in mission statement contents among alliance members?
- RQ3: Are there any significant differences in mission statement component numbers among alliance members?

Krippendorff (2004) states that content analysis is a research technique for making replicable and valid inferences from textual data. According to Lin et al. (2018), content analysis has been used in many business management research studies including corporate mission management. Through cross-organizational content analyses, organizations’ values can be clarified.

Hsieh et al. (2005) claimed that a content analysis should be conducted relative to previous theoretical frameworks. By adopting a deductive measurement, in addition to previous studies, a new theoretical framework can be suggested. This study adopts a deductive measurement because components of mission statements in the airline industry have been established through several studies.

Specifically, the author adopts a content analysis research framework including the frequency tests, chi-square tests implemented by Levy et al. (2013). Data is collected, qualitative and quantitative analyses are carried out, and finally, based on the results, theoretical discussions are conducted. Table 3 summarizes the research design in this study.

In this study, “values” indicate alliances’ and airlines’ enduring beliefs (Brenda, 2000). “Components” are defined as elements of the alliance members’ mission statements. This study assumes that by analyzing the “components” we can get insights related to the “values” of alliances.
Table 3
Research design

<table>
<thead>
<tr>
<th>Research steps</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data collection</strong></td>
<td>Collecting 61 mission statements of the members of three major international airline alliances</td>
</tr>
<tr>
<td><strong>Coding</strong></td>
<td>Extracting mission statement components of each international airline alliance member</td>
</tr>
<tr>
<td><strong>Frequency test</strong></td>
<td>Counting emphasized components in mission statements</td>
</tr>
<tr>
<td><strong>Chi-square test</strong></td>
<td>Finding differences among three international airline alliances</td>
</tr>
<tr>
<td><strong>One-way Anova test</strong></td>
<td>Examining differences in component numbers</td>
</tr>
</tbody>
</table>

Source: Author’s work

Sample and data collection
The sample consists of the mission statements of 61 airlines participating in Star Alliance, SkyTeam, and oneworld, the three major international airline alliances. The market share of the three international airline alliances is almost 60% of the whole based on revenue, passengers and flight distance (Statista, 2017). Table 4 and Table 5 show profiles of three leading international airline alliances and their 61 partners.

Table 4
Three leading international airline alliances

<table>
<thead>
<tr>
<th></th>
<th>Star Alliance</th>
<th>SkyTeam</th>
<th>oneworld</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Members</strong></td>
<td>28</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td><strong>Destinations</strong></td>
<td>1,317</td>
<td>1,074</td>
<td>1,012</td>
</tr>
<tr>
<td><strong>Countries</strong></td>
<td>193</td>
<td>177</td>
<td>158</td>
</tr>
<tr>
<td><strong>Daily departures</strong></td>
<td>18,800</td>
<td>17,343</td>
<td>12,738</td>
</tr>
<tr>
<td><strong>Annual passengers (millions)</strong></td>
<td>725+</td>
<td>730+</td>
<td>527.9+</td>
</tr>
<tr>
<td><strong>Market share</strong></td>
<td>23.5 %</td>
<td>19.2%</td>
<td>16.4%</td>
</tr>
<tr>
<td><strong>Launch date</strong></td>
<td>1997</td>
<td>2000</td>
<td>1998</td>
</tr>
<tr>
<td><strong>Headquarters</strong></td>
<td>Frankfurt</td>
<td>Amsterdam</td>
<td>New York</td>
</tr>
<tr>
<td><strong>Revenue (US $)</strong></td>
<td>$194 billion</td>
<td>$156 billion</td>
<td>$132 billion</td>
</tr>
</tbody>
</table>


The author attempted to collect all 61 major alliance members’ mission statements from their official websites from December 2nd to December 31st, 2018. Among them, AIR CANADA, Air Europa, and Lufthansa did not disclose official mission statements. However, the author contacted related staff directly via Facebook messenger or email and succeeded in collecting all 61 mission statements.
Table 5
Airlines analyzed in this study (n=61)

<table>
<thead>
<tr>
<th>Star Alliance (28)</th>
<th>SkyTeam (20)</th>
<th>oneworld (13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADRIA Airways</td>
<td>EGYPTAIR</td>
<td>Aeroflot, Delta Airlines</td>
</tr>
<tr>
<td>AEGIAN Airlines</td>
<td>Ethiopian</td>
<td>Aerolíneas Argentinas, Garuda Indonesia</td>
</tr>
<tr>
<td>AIR CANADA</td>
<td>EVA AIR</td>
<td>Aeroméxico, KLM</td>
</tr>
<tr>
<td>AIR CHINA</td>
<td>LOT POLISH AIRLINES</td>
<td>Air Europa, Kenya Airways</td>
</tr>
<tr>
<td>AIR INDIA</td>
<td>Lufthansa</td>
<td>Air France, Korean Air</td>
</tr>
<tr>
<td>AIR NEW ZEALAND</td>
<td>SAS (Scandinavian Airlines)</td>
<td>Alitalia, Middle East Airlines</td>
</tr>
<tr>
<td>ANA (All Nippon Airways)</td>
<td>Shenzhen Airlines</td>
<td>China Airlines, Saudia</td>
</tr>
<tr>
<td>ASIANA AIRLINES</td>
<td>SINGAPORE AIRLINES</td>
<td>China Eastern Airlines</td>
</tr>
<tr>
<td>Austrian Airlines</td>
<td>SOUTH AFRICAN AIRWAYS</td>
<td>China Southern Airlines, Vietnam Airlines</td>
</tr>
<tr>
<td>Avianca Brasil</td>
<td>Swiss International Air Lines</td>
<td>Czech Airlines, XiamenAir</td>
</tr>
<tr>
<td>Avianca</td>
<td>TAP AIR PORTUGAL</td>
<td>Royal Jordanian</td>
</tr>
<tr>
<td>Brussels Airlines</td>
<td>THAI Airways</td>
<td>SriLankan Airlines</td>
</tr>
<tr>
<td>Copa Airlines</td>
<td>TURKISH AIRLINES</td>
<td>S7 Airlines</td>
</tr>
<tr>
<td>Croatia Airlines</td>
<td>UNITED Airlines</td>
<td></td>
</tr>
</tbody>
</table>

Source: oneworld (2018), SkyTeam (2018), Star Alliance (2018)

Coding
This study adopted 10 components and definitions from previous studies (Lin et al., 2018; David, 2007; Kemp et al., 2003; Pearce et al., 1987) In addition, based on the discussions in section 2, a new component “partners” is suggested. Table 6 shows the components of the mission statements and their definitions.

Table 6
Components of corporate mission statements

<table>
<thead>
<tr>
<th>Component</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td>The main target customer layers of airlines and alliances</td>
</tr>
<tr>
<td>Product</td>
<td>The principle products or services provided by airlines and alliances</td>
</tr>
<tr>
<td>Location</td>
<td>The geographic domains, competing areas or main competing markets of airlines and alliances</td>
</tr>
<tr>
<td>Technology</td>
<td>Airlines and alliances’ concern about technology</td>
</tr>
<tr>
<td>Profitability</td>
<td>Airlines and alliances’ commitment to financial success, growth, and profitability</td>
</tr>
<tr>
<td>Philosophy</td>
<td>The unique identities and personalities of airlines and alliances</td>
</tr>
<tr>
<td>Self-concept</td>
<td>The competitive advantages and selling points of airlines and alliances</td>
</tr>
<tr>
<td>Public image</td>
<td>The desired public images, and concern for community, social issues and environmental issues of airlines and alliances</td>
</tr>
<tr>
<td>Employees</td>
<td>The commitment to employees of airlines and alliances</td>
</tr>
<tr>
<td>Safety</td>
<td>The emphasis on safety of airlines and alliances</td>
</tr>
<tr>
<td>Partners</td>
<td>The concern for outside stakeholders of airlines and alliances including all partners and investors, etc.</td>
</tr>
</tbody>
</table>
Based on the above 11 components, the mission statements of 61 airlines participating in three leading international airline alliances were analyzed based on the guidelines in Kemp et al. (2003). To assess inter-rater reliability, two coders were involved in this study. Each coder independently analyzed and classified the mission statements. To assess the inter-rater reliability, Cohen’s (1960) kappa was calculated by SPSS to be 0.465, which indicates moderate inter-rater agreement (Landis et al., 1977).

### Results and Discussion

**Frequency of mission statements’ components**

Table 7 indicates the frequency test results. As shown in Table 7, in Star Alliance members’ mission statements, components emerged as follows: “philosophy” (89.28%, ranking 1), “customer” (89.28%, ranking 1), “product” (85.71%, ranking 2), “location” (78.57%, ranking 3), “self-concept” (71.42%, ranking 4), “partners” (67.85%, ranking 5), “profitability” (64.28%, ranking 6), “employees” (60.71%, ranking 7), “technology” (50%, ranking 8), “safety” (39.28%, ranking 9), and “public image” (35.71%, ranking 10). On the other hand, in SkyTeam members’ mission statements, components were as follows: “philosophy” (85%, ranking 1), “customer” (80%, ranking 2), “location” (70%, ranking 3), “product” (60%, ranking 4), “self-concept” (55%, ranking 5), “public image” (50%, ranking 6), “partners” (50%, ranking 6), “profitability” (40%, ranking 7), “safety” (40%, ranking 7), “employees” (35%, ranking 8), and “technology” (25%, ranking 9). Finally, in oneworld members’ mission statements, components emerged as follows: “philosophy” (84.61%, ranking 1), “self-concept” (84.61%, ranking 1), “location” (84.61%, ranking 1), “profitability” (76.92%, ranking 2), “customer” (69.23%, ranking 3), “product” (61.53%, ranking 4), “employees” (46.15%, ranking 5), “partners” (46.15%, ranking 5), “technology” (38.46%, ranking 6), “public image” (38.46%, ranking 6), and “safety” (38.46%, ranking 6).

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<th>oneworld</th>
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<td>N % Rank</td>
<td>N % Rank</td>
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<td>25 89.28% 1</td>
<td>16 80% 2</td>
<td>9 69.23% 3</td>
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<tr>
<td>Product</td>
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<td>12 60% 4</td>
<td>8 61.53% 4</td>
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<td>14 70% 3</td>
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<tr>
<td>Technology</td>
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<td>38.46% 6</td>
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<td>8 40% 7 10</td>
<td>76.92% 2</td>
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<td>17 85% 1</td>
<td>11 84.61% 1</td>
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<td>11 55% 5</td>
<td>11 84.61% 1</td>
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<tr>
<td>Public image</td>
<td>10 35.71% 10</td>
<td>10 50% 6</td>
<td>5 38.46% 6</td>
</tr>
<tr>
<td>Employees</td>
<td>17 60.71% 7</td>
<td>7 35% 8 6</td>
<td>46.15% 5</td>
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<tr>
<td>Safety</td>
<td>11 39.28% 9</td>
<td>8 40% 7 5</td>
<td>38.46% 6</td>
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<tr>
<td>Partners</td>
<td>19 67.85% 5</td>
<td>10 50% 6</td>
<td>6 46.15% 5</td>
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Source: Author’s work

This study mainly focuses on the most frequently highlighted components (only those ranking 1). “Philosophy” (84.61%), “self-concept” (84.61%) and “location” (84.61%) emerge as the predominant components in oneworld members’ mission statements. “Philosophy”
(85%) in SkyTeam members’ mission statements, and “Philosophy” (89.28%) and “customer” (89.28%) in Star Alliance members’ mission statements.

“Philosophy” is highlighted in the members’ mission statements of all three alliances. Examples of these highlighted components with this author’s comments are as follows: (i) ‘It is a value-driven aviation group, bringing Indonesian hospitality to the world’ (Garuda Indonesia); (ii) ‘Our goal is to be the undisputed leader in domestic and international air travel in Russia and one of the best airlines in the world, combining dynamic development, high reliability and quality of service’ (Aeroflot); (iii) ‘Become a world-class carrier with staff devotion, customers loyalty, shareholders satisfaction, public trust’ (China Eastern Airlines).

“Philosophy” is the basic faith and policy of airlines. It indicates airlines and alliances’ unique identities and DNAs. It is reported that corporate philosophy is deeply involved in an organization’s sustainable strategic success (Gellerman, 1989). While “self-concept” is emphasized in oneworld members’ mission statements. “Self-concept” indicates airlines and alliances’ strengths. The examples are as following: (i) ‘We are a competent, proactive and diligent team. Our contribution is recognized and rewarded’ (SriLankan Airlines); (ii) ‘Qatar Airways has earned many awards and accolades, becoming one of an elite group of airlines worldwide to have earned a 5-star rating by Skytrax’ (Qatar Airways).

“Philosophy” and “self-concept” are related to airlines and alliances’ differentiation strategies. It is presumed that due to fierce competition in the airline industry, “philosophy” and “self-concept” are highly emphasized in mission statements. Also, “location” is revealed as oneworld’s most prevalent component. Examples are as following: (i) ‘Finnair is a network airline that specializes in passenger and cargo traffic between Asia and Europe’ (Finnair); (ii) ‘To be the airline of choice connecting Jordan and the Levant with the world’ (Royal Jordanian; (iii) ‘To be the most preferred airline in Asia’ (SriLankan Airlines).

For airlines, clarifying their position in the market is essential for the formulation of an effective strategy (Kemp et al., 2003). It is considered that oneworld members emphasized “location” in their mission statements because oneworld mainly consists of flagship airlines (e.g., British Airways, American Airlines, Japan Airlines, Qatar Airways, Malaysia Airlines, Finnair, Royal Jordanian, and Cathay Pacific) representing countries and locations. On the other hand, Star Alliance members most frequently highlight “customer” in their mission statements: (i) ‘Our customers expect technical reliability, punctuality, and an orientation to service. And as a leading quality airline in Europe, we offer all of these’ (Austrian Airlines); (ii) ‘Recognized for the high quality of its product, the company offers differentials to customers’ (Avianca Brasil).

“Customer” indicates a concern for target customers of the airline (David et al., 2014). The emphasis on “customer” shows the companies’ customer-oriented service endeavors and their pursuit of higher customer satisfaction. David et al. (2014) assumed that customer-oriented mission statements are related to higher customer satisfaction. Star Alliance has the longest history among major alliances. Also, they were the world’s best international airline alliance, selected by Skytrax, in 2017 and 2018. These facts mean that Star Alliance’s service quality is approved worldwide. It is presumed that Star Alliance members’ customer satisfaction efforts are a reflection of their mission statements.

**Significant differences in alliances members’ mission statements**

Chi-square tests and one-way Anova tests were performed using SPSS to demonstrate whether mission statement contents and numbers vary significantly. Figure 1 and Table 8 indicate the results of chi-square tests and one-way Anova tests.
In Figure 1, the blue bar shows the frequency of Star Alliance members’ mission statement contents, the red bar shows SkyTeam members, and the green bar indicates oneworld members. Figure 1 shows that alliances members’ mission statement contents vary significantly. When it comes to “customer”, 89.28% of Star Alliance members, 80% of SkyTeam members and 69.23% of oneworld members highlight it in their mission statements. 85.71% of Star Alliance members, 60% of SkyTeam members and 61.53% of oneworld members highlight “product”. 78.57% of Star Alliance members, 70% of SkyTeam members and 84.61% of oneworld members highlight “location”. Only 50% of Star Alliance members, 25% of SkyTeam members and 38.46% of oneworld members highlight “technology”. About “profitability”, 64.28% of Star Alliance members, 40% of SkyTeam members and 76.92% of oneworld members highlight it in their mission statements. 89.28% of Star Alliance members, 85% of SkyTeam members and 84.61% of oneworld members highlight “philosophy”. 71.42% of Star Alliance members, 55% of SkyTeam members, 55% of oneworld members highlight “self-concept” in their mission statements. 35.71% of Star Alliance members, 50% of SkyTeam members and 38.46% of oneworld members emphasize “public image”. 60.71% of Star Alliance members, 35% of SkyTeam members, 46.15% of oneworld members highlight “employees” in their mission statements. 39.28% of Star Alliance members, 40% of SkyTeam members and 38.46% of oneworld members highlight “safety”. Finally, 67.85% of Star Alliance members, 50% of SkyTeam members and 46.15% of oneworld members highlight “partners” in mission statements.

As the figure shows, there are differences found relative to “product” ($\chi^2=5.928$, Cramer’s $V=0.312$, $p=0.052$) and “profitability” ($\chi^2 = 5.035$, Cramer’s $V=0.287$, $p=0.081$). That is, Star Alliance significantly highlights “product” more than other alliances. This result might indicate that Star Alliance highlights its high-level service endeavors. oneworld, on the other hand, significantly highlights “profitability”. The reason for the high frequency of “profitability” is probably that, although oneworld mainly consists of flagship airlines, the alliance’s whole market share is lower than the others are.
Therefore, to extend market power, they emphasize “profitability” in mission statements.

Table 8
One-way Anova test results with post hoc analysis test related to the mission statements of 61 members of 3 international airline alliances

<table>
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<tr>
<th>Dependent Variable</th>
<th>Alliance</th>
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<th>Std. Deviation</th>
<th>F / Sig.</th>
<th>Post Hoc Tests</th>
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<td>Star Alliance (a)</td>
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<td>1.884</td>
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<td>oneworld (c)</td>
<td>6.69</td>
<td>2.428</td>
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</table>

Source: Author’s work
Note: * statistically significant at 10%

Table 8 shows the one-way Anova test results. In Table 8, an alpha level of p < .10 was accepted as significant. Results showed there are significant differences among alliances’ members (p=0.072*). A post hoc Scheffe’s test indicates Star Alliance members significantly cover more components than SkyTeam members do. Moreover, Star Alliance members’ mission statement components are most numerous (mean score: 7.37), while SkyTeam members’ mission statement components are the least (mean score: 5.95). Star Alliance members’ mission statements show relatively high similarity in component occurrence frequencies so that Star Alliance’s standard deviation is the lowest (1.884) (SkyTeam member’s standard deviation: 2.085, oneworld member’s standard deviation: 2.428).

The reason for the higher component numbers of Star Alliance members might be that as a leading alliance, Star Alliance tries to cover broad organizational values. This result is consistent with Pearce et al. (1987), which noted that high performers have more comprehensive mission statements than low performers. Moreover, Star Alliance members’ mission statements show relatively high similarity in component numbers. This result implies that Star Alliance is more successful in managing members’ mission statements than others.

“Partners” in mission statements
“Partners” indicates a concern for airlines and alliances outside the stakeholders, as exemplified by the following: (i) ‘Air Europa, the airline company of the Globalia tourism group, is a full member of the SkyTeam alliance’ (Air Europa); (ii) ‘We are also a founding member of the oneworld global alliance whose combined network serves over 700 destinations worldwide’ (Cathay Pacific). Table 9 shows the frequency of occurrence of “partners”. As shown in Table 9, partners” emerged in 71.42% of Star Alliance members’ mission statements, 50% of SkyTeam members’ mission statements, and 46.15% of oneworld members’ mission statements.

Table 9
Frequency of occurrence of “partners”

<table>
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<th>Star Alliance (28)</th>
<th>SkyTeam (20)</th>
<th>oneworld (13)</th>
<th>Overall (61)</th>
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<td>N</td>
<td>%</td>
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<td>%</td>
</tr>
<tr>
<td>20</td>
<td>71.42%</td>
<td>10</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Author’s work

The results might need to be discussed in relation to international airline alliances’ branding strategies. There is no doubt that if a certain alliance maintains a higher market status, members of the alliance are eager to stress this fact. For example, SWISS
International Air Lines introduces themselves as follows: “SWISS is part of the Lufthansa Group, and is also a member of Star Alliance, the world’s biggest airline grouping”. It is presumed that due to intensifying competition among alliances, “partners” are emphasized in their mission statements.

**Conclusion**

The main purpose of this study is to clarify what kind of values are highlighted in the international airline alliance. Therefore, this study conducted quantitative content analyses including frequency tests, chi-square tests, and one-way Anova tests with post hoc analysis related to the mission statements of members of Star Alliance, SkyTeam, and oneworld. This study makes clear the existence of unique values according to alliances linked to competitive advantages.

One theoretical implication of this study is that it clarifies what types and numbers of components are shared among the three leading alliances’ members, and how they compare with each other. It can also provide a further understanding of the nature of mission statements in the airline industry. Furthermore, this study tests the potential of “partners” as a new component. Due to intensifying competition among alliances and progress in alliance branding, it is predicted that “partners” will become a significant component in mission statements in the airline industry.

Practical contributions of the study are as follows. This study can provide knowledge to alliances and airline managers for comparative purposes. By referring to these findings, alliance managers can check whether their ideal values are successfully shared or not among members. The relatively small-scale alliance managers can also compare the results with major alliances, as alliance members’ mission statements imply how it implements positioning strategies in the competitive market. The findings also offer understandings for airline managers who are considering which alliances fit their organizational value and strategic purpose.

This study has also some limitations that future research has to examine. A key limitation is that the content analyses of this study have not considered relatively small-scale international airline alliances, low-cost carrier alliances such as Value Alliance, and cargo alliances such as WOW Alliance. Future research is needed to add more samples and extend views to other international airline alliances to deal with these limitations. Also, according to the emergence of advanced research techniques such as big data mining applications including topic minings (e.g., Jerman et al., 2018), cluster analyses, conceptual networks and keyword analyses (e.g., Pejić Bach et al., 2013), these research technics strongly influence both practitioners and scholars (Pejić Bach et al., 2019). Due to these innovative techniques, which share content analysis disciplines, it should be possible to achieve insights and make skillful contributions to mission statement studies in the airline industry. Therefore, in future research, advanced data mining techniques can be adopted to improve methodology in this research field.

**References**

## Appendices

### Appendix A

### Contents of Star Alliance members’ mission statements

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<th>Customer</th>
<th>Products</th>
<th>Location</th>
<th>Technology</th>
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Source: Author’s work

### Appendix B

### Contents of SkyTeam members’ mission statements

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Source: Author’s work
### Appendix C

**Contents of oneworld members’ mission statements**

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Source: Author’s work

### About the author

Gang-Hoon Seo is a Ph.D. student in the Graduate School of Business Administration at Kobe University, Kobe. He obtained a master’s degree in Business Administration at Kobe University. His main research interests include business strategy, international marketing, corporate mission statements, and consumer’s word of mouth. The author can be contacted at 163b115b@stu.kobe-u.ac.jp
Dataveillance in the Workplace: Managing the Impact of Innovation

Cliona McParland, Regina Connolly
Dublin City University Business School, Ireland

Abstract

Background: Monitoring and surveillance are a fundamental part of the workplace environment, with employee performance and productivity as the main objects of scrutiny. However, many questions surround the ethical nature of management’s ability to employ advanced digital technologies to monitor employee behaviour and performance while in the workplace. If unaddressed, these concerns have the potential to significantly impact the relationship between the employee and the employer, impacting trust in management resulting in negative attitudes and counterproductive behaviours. Objectives: The goal of this paper is to present a comprehensive review of workplace surveillance whilst outlining some of the emerging issues relating to the use of employee monitoring technologies in the workplace. Methods/Approach: A detailed review of the literature was conducted in order to identify the major issues relating to workplace surveillance. In addition, a number of practitioner-based studies were examined to extract and identify emerging trends and concerns at an industry level. Results: Workplace surveillance is on the rise; however, empirical studies are in short supply. Conclusions: The issue of workplace surveillance is an under-researched area, which requires much attention. There is a distinct need for clear measures and structures that govern the effective and fair use of communication technologies in the workplace.

Keywords: employee privacy concerns, monitoring, trust, workplace surveillance, employee empowerment, counterproductive workplace behaviour, psychological contract

JEL classification: O3

Paper type: Conceptual Paper

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Introduction
Organisations and employees operate in an ever changing, ever evolving business environment. Changes in the global economy characterised by growing market pressures and the need to remain competitive in the marketplace have called for greater efficiency and productivity in the workplace. Advancements in modern technologies have enabled the achievement of these goals by allowing employers to monitor their employees’ actions, behaviours and productivity while in the workplace. In fact, the use of such technologies have allowed organisations to gain detailed insights into their employees work performance both in and out of the office, during and after working hours. For example, employees are becoming increasing aware that management can monitor their computer interactions, their email and phone communications, the length of time they spend online and even in some cases their location in the workplace.

Understandably, however these developments have generated legitimate privacy concerns amongst employees particularly as they are often unsure of how the information is gathered on them and perhaps more so how it will be used by management. Consequently, this type of surveillance can significantly influence the relationship between the employee and the employer. For example, this type of surveillance within the workplace can send a message to the employee that they are under-performing, that they lack commitment or they are untrustworthy, which in turn can lead them to engage in deviant or counterproductive behaviours (Lawrence and Robinson, 2007; O’Donnell et al., 2010; McNall and Stanton, 2011; Jensen and Raver, 2012; Martin et al., 2016). Moreover, it can have a serious impact on employee’s performance, productivity and motivation to work, reducing their trust in their employers and their commitment to the organisation.

It can be argued however that profit driven organisations may have legitimate reasons to monitor their staffs actions in the workplace particularly in relation to their computer, Internet and communication based interactions. For example, employees are hired to work and as such should refrain from sending personal emails, browsing online or engaging with their social media accounts while in the workplace. However most managers will overlook some of these actions within reason as a gesture of goodwill to their employees. However organisations run the risk of adverse publicity, reputable damage or even in some cases litigation as a direct result of certain employee actions. Inappropriate email circulation or the viewing or downloading of adverse web content for example can damage a company’s good name. However, for an employee, knowing that their performance is being monitored and that there is increased potential for that information to be used against them as part of performance assessment or promotion evaluation exercises inevitably change their perspective of the parameters of the employment relationship. In fact, these concerns and the resulting power imbalance can fracture and severely damage the employee-employer social contract. Moreover, this opacity between how the information is collated and ultimately used by management creates an asymmetric power balance that can negatively impact the employee, reducing their productivity, motivation, and trust in employers and consequent commitment to the organisation (Boxhall and Purcell, 2011; Searle et al., 2011; Butler, 2012; Saif and Saleh, 2013; Wong and Laschinger, 2013; Holland et al., 2015; Martin et al., 2016).

A number of questions surround the ethical nature of management’s ability to monitor employee’s computer-mediated workplace communications and interactions. However, surprisingly the issue of workplace surveillance has received little attention to date within the literature. Thus, it remains difficult to determine if workplace surveillance represents good business practice or constitutes an invasion of personal privacy. Moreover, the overall effect and impact the act of monitoring
has on the individual remains undetermined and thus area that requires further examination in the literature.

The structure of this paper is as follows. Following this introduction section, a literature review is presented and discussed in detail below. Next, the methodology section is presented— which includes the literature selection process. In the fourth, and the fifth section, of this paper the results and discussion of the results are presented. Finally, the paper concludes with a short summary, including an outline of the practical limitations of the study as well as a direction for future research.

**Literature Review**

**The notion of employee surveillance**

The use of Internet-based technologies has enabled organisations to gather and collate information on their employees in detail, thus generating great privacy concerns amongst employees. However, while it is apparent that technology has enabled an invasion of employee privacy on an unimaginable scale, it is important to note that many monitoring techniques have a long-established presence in the offline world also. In fact, one of the earliest examples of the negative impacts of monitoring techniques dates back to Jeremy Bentham’s Panopticon (Foucault, 1977). This architectural structure was an observation unit that allowed a prison warden to observe any inmate in the unit at any time. Crucial to the design however was that while the warden could view the inmates, the inmates could not view or see the warden. Thus, they had no way of knowing if or when they were being observed and as such were forced to become compliant as a direct result of the unknown. Examples of modern-day computer-mediated workplace surveillance techniques rely heavily on these basic principles. For example, modern technologies provide management the opportunity to constantly observe their employees and collate data on them. In this way, it becomes apparent that the employees’ personal privacy can be significantly compromised within the computer-mediated workplace environment. The term ‘dataveillance’ was later developed by Clarke (1988) to describe the systematic or methodical monitoring of the actions, behaviours or communications of an individual. The pervasive nature of modern technologies such as wearable technologies and the Internet of Things provides the opportunity for constant observation and continuous data collection.

Undoubtedly, the issue of workplace surveillance is a significant one. Thus in order to explore it in detail, we felt it was important to conduct our literature review by exploring both the employee privacy concerns and corresponding behavioural outcomes associated with workplace monitoring as well as managements’ rationale behind the practice, in an effort to balance the interests of both parties. These issues will be addressed in more detail in the methodology and results section of this paper.

**Theories relating to employee surveillance**

A number of theories in the literature can help provide an understanding of how employees react or behave when they are aware they are being monitored in the workplace. For example, privacy protection motivation theory suggests that individuals carry out a privacy analysis in order to protect their sensitive information. Based on the theory individuals will consider the potential risk involved, the likelihood it will happen and the potential consequences if it does happen and adjust their behaviours accordingly (Rodgers, 1975; Li, 2012). Similarly, psychological reactance theory suggests that if employee believes their freedom or ability to control a situation is compromised in any way, may engage in counterproductive or deviant type
behaviours (Jensen and Raver, 2012; Graupmann et al., 2012). Communication privacy management (CPM) is another important theory one must consider. For example, CPM suggests that individuals create a ‘privacy boundary’ around their personal information whereby they decide what information they wish to disclose and what information they wish to protect (Petronio, 2002). However, Stanton and Stam (2003) posit that the intended use of the information as well as an individual’s relationship with their management and organisation will have a significant impact on what information they chose to disclose within the computer-mediated workplace environment. In an effort to understand how individuals adapt to these surveillance practices coping theory is often applied to explore the processes – i.e. the coping responses – through which an individual responds to disruptive events in their environment (Bhatteracherjee et al., 2018). This two-step coping process of coping appraisal – i.e. evaluate the potential consequences - and coping effort – i.e. actions one takes to deal with the situation – has been applied to IT related studies by many researchers (Beaudry and Pinsonneault, 2005; Elie-Dit-Cosaque and Straub, 2011; Bhatteracherjee et al., 2018; Stein et al., 2015) to explore how IT users tolerate or manage the conflict or related stress associated with the system or technology. Researchers Kim and Kankanhalli (2009) on the other hand combined the theory of Status Quo Bias with theories of technology adoption to explore the psychological and decision making mechanisms that cause a user to demonstrate resistance to new and innovative system implementation in the workplace. The authors found that perceived value and organisational support decreased user resistance to the new technology implementation, thus highlighting the importance of employee trust and belief in upper management.

Methodology
In this section, we describe the data we have used and the methods we used to analyse it. This study follows the common literature review approach. Based on the research objectives outlined above a detailed review of the literature was conducted in order to identify the key issues that were worthy of further research. Following the principles set out in Bach et al., (2019) the literature review was conducted in three phases i) search of the literature, ii) selection of relevant articles and frameworks and iii) review and analysis of relevant articles.

Literature search
The first step was to explore the concept of dataveillance – the systematic monitoring of an individuals communications or interactions – an issue of increasing concern to many stakeholders including employees, employers, researchers, privacy advocates, and policy-makers. The pervasive nature of modern surveillance-related technologies has brought two issues centre stage in the literature – namely information privacy concerns and the act of surveillance itself. Thus, we split our literature review into two main sections – information privacy concerns and workplace surveillance.

The second step in this process was to identify our research domain. Workplace surveillance has a strong foothold in the management information systems literature; however, it is an area that has received much attention in other disciplines such as marketing, law, ethics, computer science, and legal based literature. Thus in order to fully understand the factors that inhibit and amplify workplace surveillance issues we felt it was important to fully examine all relevant disciplines in order to provide a fully detailed review.
Finally, it is apparent there are two differing viewpoints at play within this context, leading to much confusion and uncertainty within the literature. The imperative for greater clarity led us to examine the literature through two lenses – one relating to the employee and the issues or concerns they may have relating to workplace surveillance and the second in terms of management and their rationale behind the decision to employ monitoring technologies in the workplace. Moreover, as employees are considered to be the lifeblood of any organisation it is imperative that we develop an understanding of how communication-monitoring techniques within the workplace affects employee attitudes, perceptions and behaviours.

**Selection of relevant articles**

The literature selection was performed in several stages. We searched a variety of journals across multiple disciplines including management information systems, computer science, ethics, legal, organisational justice, marketing, and the health industry. Given the progressive acceleration of the topic, we decided that our review of the literature required an awareness of previous and present empirical studies, theoretical and conceptual based studies and current up to date practitioner-based reports. This expansive search spanned numerous decades across all disciplines in our studies. In order to provide a strong contextual based background to our study, conceptual-based papers from as far back as the 1970’s and 1980’s were included in the literature selection. Similarly, we selected practitioner-based studies from the mid-2000 to present to show the steady rise in interest in workplace surveillance from an industry-based perspective. Finally, given the significant lack of empirical-based studies in this field of research, our study included empirical-based work from the 1990s onwards.

**Results**

As the use of communication-monitoring technologies in the workplace continues to rise, so too have threats to employee privacy in the workplace. Despite the importance of the issue however, research on the communication monitoring practices and the corresponding technology-related privacy concerns within the computer-mediated workplace environment remains in an embryonic stage. Thus to extend our research on information privacy within the literature we further explored a number of psychological and behavioural-based studies that specifically examined attitudes and behavioural outcomes in relation to privacy and security.

We have selected a number of studies of interest and presented them in table 1 below. We selected these studies from a range of disciplines specifically focusing on privacy concerns in the computer mediated workplace environment as well as considering studies focusing on ethical and behavioural antecedents. Each study is outlined whereby information regarding how the authors selected their sample size and the methodologies they used is provided.

The Concern for Information Privacy (CFIP) Scale developed by Smith et al., (1996) was one of the first studies to measure individual concerns regarding organisational practices. The study identified four central dimensions of individuals' concerns about organisational information privacy practices - collection, errors, unauthorised secondary use and improper access. The authors argued that by allowing an organisation to consider their own approach to these dimensions of concern, underlying problems could be identified and corrective action applied as necessary.
Table 1
Studies of Information Privacy and Online Monitoring

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<tr>
<td>Chory et al., (2016)</td>
<td>Privacy Concerns</td>
<td>Organization</td>
<td>Employees</td>
<td>182</td>
<td>39 item scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>– online survey</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Similarly, a study carried out by Stanton and Weiss’ (2000) examined the issue of electronic monitoring from both the employer and employee perspective. The authors refined a previously validated semi-structured research instrument they used in an earlier study to create a three-part concise instrument to examine the attitudes, perceptions and beliefs of employees across multiple organisations. Perhaps somewhat surprisingly there was a mixed response to electronic surveillance amongst those surveyed, with only a small minority displaying a negative attitude in response to it. In fact, many employees actually reported a deep sense of safety and security knowing that they were monitored in the workplace. In this way the results presented go against that of popular culture and the negative hype surrounding electronic surveillance.

Alder et al., (2006) created a framework in an effort to identify a range of factors that would improve an employee’s perception, attitude and behavioural reaction to electronic monitoring in the workplace. The respondents were asked to complete an initial survey before they were unknowingly subjected to Internet monitoring and filtering system implemented in their company. The respondents were made aware this monitoring had occurred before they were asked to complete a second survey to which only 63% of the original sample responded thus indicating potential concern amongst the sample base. Moreover, the results further highlighted a greater concern regarding the implementation of Internet monitoring techniques amongst those who used the Internet on a regular basis as opposed to those who were more irregular in their Internet use.

Moving on deeper into the literature a number of other studies have focused on the impact that information privacy concerns have on individual attitude, behaviour, and outcomes. For example, Buchanan et al. (2007) developed the Online Privacy
Concern and Protection (PCP) Scale to measure attitudes and concerns relating to information privacy and the behaviour individuals may adopt to safeguard their privacy. As well as addressing the issue of information privacy, the study considered other distinct areas of privacy such as physical privacy, expressive privacy and the possible benefits of surrendering the privacy in exchange for a perceived benefit or reward. Overall, 28 privacy factors split into three interpretable scales of Privacy Concerns (16), General Caution (6) and Technical Protection (6) were administered to 515 participants. While the General Caution and Technical Protection scales focused on behavioural impacts of information privacy, the Privacy Concern scale focused more on attitudinal aspects for the study.

More recently, Taddicken (2010; 2014) developed an adapted version of the PCP scale and applied it in the context of the social web. The APCP (adapted online privacy concern and protection) scale consisted of 18 items and was used to examine the potential influence of privacy concerns, the psychological traits, and attitudes to the Social Web and age on self-disclosure. Overall, the study indicated while the majority of the respondents did not disclose factual or sensitive information on the social web, nearly 2/3 of the sample regularly shared photos of themselves with half of them further disclosing personal thoughts, feelings or experiences online. The study further indicated the relevance of social norms, the influence of peers and perceived social relevance suggesting that individuals by in large disclose more personal and sensitive information when their friends and acquaintances also use it.

In a similar vein, Synder (2010) applied communication boundary theory to explore employees’ responses to email monitoring in the computer-mediated workplace environment. Employee perceptions of email monitoring in the workplace were gathered through an online survey and later tested through the perceived email privacy scale (PEP). The study indicated that PEP is a two-dimensional construct, measuring both an individuals’ ability to maintain their privacy as well as their legitimate concerns about organisation infringement on their email privacy. The study further suggested perceptions of PEP were directly related to employee’s perceptions of their workplace relationships – particularly in relation to management. For example, the study indicated that if an employee perceived their email to be monitored by management, the psychological contract between them and the organisation would be negatively affected. Perhaps somewhat unsurprisingly it was also found that employees who displayed higher levels of paranoia, for example, showed a great distrust in their management, an increased concern regarding the organisation monitoring their email interactions and further reported poorer and more disjointed relationships with co-workers.

Chory et al., (2016) adapted Snyder’s (2010) 13-item perceived email privacy measure and combined them with measures derived from the organisational justice literature to explore employee privacy concerns regarding their computer-mediated communications and their corresponding evaluations of organisational justice, trust in senior management and overall commitment to the organisation. Perhaps somewhat unsurprisingly the study found that employees who perceived less computer-mediated communication privacy viewed their organisations policies as less fair, displayed lower levels of trust in senior management and demonstrated less commitment to their organisation.

In order to ensure our review was both rigorous and relevant, we examined a number of practitioner reports. A number of these reports are presented in table 2 below.
Table 2  
Practitioner/Industry Reports

<table>
<thead>
<tr>
<th>Practitioner</th>
<th>Year</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>America Online</td>
<td>2005</td>
<td>Cyberslacking</td>
</tr>
<tr>
<td>Mashable and Learn</td>
<td>2012</td>
<td>Cyberslacking</td>
</tr>
<tr>
<td>AMA survey (2017)</td>
<td>2017</td>
<td>Employee Monitoring/Surveillance</td>
</tr>
<tr>
<td>Crowd Research Partners</td>
<td>2017</td>
<td>Cybersecurity</td>
</tr>
</tbody>
</table>

Source: Authors’ work

The results of these industry reports will be discussed in the context of both the employee and employer in the discussion section below.

Discussion

Surveillance: An Employee perspective and concerns

In an effort to reduce costs, increase productivity and improve efficiency, companies are investing in new and innovative monitoring technologies, which allow them to monitor their employees in the workplace. In fact, a study conducted by AMA in 2017, estimated that 78% of all major companies monitor their employees’ email, Internet and phone usage in the workplace. Moreover, the study found that the use of workplace surveillance is significantly higher within the financial sector, with as many as 92.1% of financial firms admitting to employing communication-monitoring technologies within the workplace. While workplace monitoring is not a new phenomenon (the figure was 35% in 1997), statistics like these indicate that it is on rise. Forms of surveillance in the workplace can range from the monitoring of email, Internet and phone usage to video surveillance and GPS location tracking. For instance, email is a fundamental means of communication within the workplace environment, the contents of which can be of significant importance and interest to management. For example, management must ensure that employees are following company policies, are productive and efficient in their roles and that their communications with both fellow staff members and the public is appropriate. Moreover, management can measure an employee’s productivity in their job role, monitoring their keystrokes, viewing their Internet usage and browsing history, their use of personal email throughout the day as well as the number of phone calls or text messages they make or receive during working hours. In fact, employers are increasingly monitoring employee’s productivity and efficiency by employing innovative technologies, which inform them when a computer has been inactive for a certain period. Similarly, GPS trackers and location monitoring devices pinpoint where an employee is in the workplace at any given time. In this way while it is apparent that many of these technologies are being implemented to suit the needs of the employer, it can be argued they are being leveraged against the employee (Connolly, 2013; Semuels, 2013). For example, the insights obtained from this data can be used against the employee i.e. to justify a pay cut or to terminate an employee contract. In fact, the American Management Association study of 2017 found that 26% of employers had fired employees for misuse of the Internet, 25% had terminated employees for email misuse and 6% had fired employees for misuse of office phones.

Moreover, it can be argued that workplace surveillance has a significant albeit indirect affect on the employee-employer relationship. For example,
employee/employer relationships are typically perceived as being a two-way exchange and one of mutual respect and reliance (Guest, 2004). In short, employers may have implicit or unspoken expectations of their employees whereby they are relying on them to do the job they have been hired to do which in turn will benefit the organisation as a whole (Morrison and Robinson, 1997; Conway and Briner, 2002). However, it has been argued that the monitoring of performance presents a threat to that previously accepted contract (Morrison and Robinson, 1997). Thus, employees often resist communication and Internet based monitoring practices in the workplace.

Therefore, it is can be argued that what companies gain in terms of productivity, efficiency and work rate may be lost in terms of employee trust, engagement with the organisation and empowerment. Martin et al., (2016) further highlighted employee resistance to monitoring in a recent study. The results indicated that high levels of perceived surveillance in the workplace resulted in counterproductive and deviant type behaviours in the workplace. Similarly, the issues of trust and fairness also act as an important focus in research on electronic surveillance and workplace behaviour. For example, academic and practitioner based research continually highlights the importance of trust within the employee/employer relationship - particularly within the computer-mediated environment (Dietz and Fortin, 2007; Holland et al., 2015; Mayer et al., 1995; Boxall and Purcell, 2011; Searle et al., 2011). In fact, trust is also considered to be a central component to social exchange theory (SET). For example, many researchers (Holland et al., 2015; Gould-Williams, 2003; Stanton and Stam, 2003) have argued employees’ actions, behaviours and willingness to disclose certain information can be significantly impacted if there is no trust in the relationship. Thus they can retaliate by engaging in deviant type behaviours such as falsify their work output (Taylor and Bain, 1999), deliberately avoiding monitored areas or manipulating the surveillance systems (Nussbaum and diRivage, 1986; Stanton, 2002; Stanton and Weiss, 2000; Taylor and Bain, 1999), poor time keeping, absenteeism (Martin et al., 2016) or other deliberate violations of company polices and procedures (Robinson and Bennett, 1997). In fact, Tavani (2004) notes how many employees experience high levels of discomfort and stress as a direct result of this ‘invisible supervisor’. Thus, the obvious negative impact that these practices have on employees in the workplace constitutes a serious issue, which must be addressed.

Workplace surveillance clearly raises many ethical and social issues. However, before we can effectively address many of these issues, we must first consider the motivations behind managements’ decision to employ monitoring techniques and technologies in the first place.

Surveillance: Management perspective and motivations
While many studies and reports highlight the plight of the employee, it is fair to assume that in some cases there may be legitimate cause to monitor their employee’s actions. For example, it is perhaps somewhat unrealistic to expect that a profit-driven organisation would not avail of methods to ensure their workforce are working effectively, efficiently and in the best interests of the company. Furthermore, organisations must protect themselves against costly litigation claims or negative publicity that could potentially result from offensive, abuse or inappropriate material circulating within the organisation (Laudon and Laudon, 2001; Lane, 2003). Similarly companies need to protect themselves against abuse of the email system. Once again, this is a long-standing issue with many practitioner reports highlighting the significance and growth of the issue over the last 15 years. For example, a study conduced by American Management Association (2003) indicated that 33% reported a computer virus, 38% reported security breach and computer disablement as a result
of a bogus email and 34% reported general business disruptions as a result of an employee’s use of email. Similarly, Jackson et al., (2003) conducted a study to examine the financial cost management endure because of email interruption. The results indicated that on average an employee takes between 1 and 44 seconds to respond to a new email when they receive the notification. Among them, 70% of these emails were reacted to within 6 seconds of their arrival with a further 15% being acknowledged within a 2-minute timeframe. The study further reported that it took an average of 64 seconds for an employee to return to a productive state of work for every one new mail sent. In a similar vein, a study carried out by Forbes in 2012 found that 64% of employees admitted to visiting non-work related sites on a daily basis, further compounding the problem. However, it is not just the actual surfing of the web that can cause major issues for the company, but rather the transition between tasks, with many experts noting how it takes on average 23 minutes for social media users to return to the task after checking their accounts (Shore, 2012). Moreover, a study conducted by Mashable and Learn in 2012, further reported that the average employee is interrupted every 10.5 minutes by an IM, tweet or Facebook message (Shore, 2012). However, if one considers the amount of time the average employee spends online, these figures may not be so surprising. The survey further reported that in the US alone over 12 billion collective hours a day are spent browsing social media accounts, the average individual spends twice as much time on Facebook as they do exercising and one in ten workers admit to spending more time online then they do working. This issue of cyberslacking – surfing or browsing the Internet when you should be working – is in fact a multibillion-dollar problem. For example, it was estimated that social media alone costs US companies $650 billion dollars in lost productivity in 2012 alone (Shore, 2012). Increased incidences of ‘cyberslacking’ are further highlighted in a study conducted by America Online, which reported a massive 44.7% of 10,000 employees surveyed cited web-surfing as their number one distraction in the workplace (Saalfield, 2005).

Whilst the need to improve work rate and productivity are common rationale for workplace monitoring, other motivations such as preventing and minimising theft are also cited by management looking to protect the interests of their organisation. For example, research shows that employees stole over 15 billion dollars in inventory from their employers in the year 2001 alone (Lane, 2003). In addition, the use of modern and innovative technologies into the workplace has increased the threat of internal attacks. For example, trade secrets, corporate data and other types of sensitive data and information can be exploited, downloaded and transmitted by an aggrieved employee, causing major damage to the employer (Lane, 2003; IBM, 2006). Moreover, careless, negligent or poorly trained employees can unintentionally cause high number of security breaches and data leaks within the organisation. In fact, Crowd Research Partners (2017) currently estimate that companies now consider the equal likelihood that insider attacks are the direct result of accidental or unintentional breaches. The study suggests that 67% of accidental insider attacks are the direct result of a phishing attack, whereby employees are tricked into sharing sensitive information with someone they believe to be a trusted contact or a legitimate business partner. Other culprits include weak or reused passwords (56%), unlocked or unsecured devices (44%) and poor password sharing practice (44%). It is perhaps somewhat unsurprising to note that it is now estimated that as many as 86% of organisations have or are currently building an insider threat program in order to protect themselves from insider threats, both malicious and accidental in nature. Management needs to ensure that their employees use their working time productively, to the best interests of the company and are therefore benefiting the
organisation as a whole (Nord et al., 2006). However, until some form of harmony is formed between both parties, tensions are likely to remain high.

It is apparent that there is a need for clearly defined rules, structures and sanctions to be implemented into the workforce in order to achieve this harmony (Craver, 2006). However, this can be a difficult task given the differing views and tolerance levels of managers for example (Selmi, 2006). For example, most management will allow employees some leeway in relation to their personal use of the Internet during working hours. However while this gesture of ‘management goodwill’ can significantly boost employee morale, the abuse of such Internet privileges can have a serious impact on the company in terms of adverse publicity or loss of profits. Furthermore, as the boundaries of the workplace continue to change whereby employees can work from home or off-site for example, the lines between formal and informal working conditions, and what is considered acceptable or unacceptable workplace behaviour begins to blur (Evans, 2007). Similarly employees who bring a company laptop into their home at night may feel they can use it for their own personal and private use, however legally the employer would have claims over all of the data stored on it and as such could use it to discipline or even terminate an employee.

The issue of workplace surveillance raises a number of questions, in particular those relating to the ethical nature of management’s ability to monitor employees’ technology-enabled interactions. However, in order to address the issue effectively one must consider the ways in which we can better manage and control it in an effort to respond proactively to potential counter-productive workplace behaviours and negative organisational impacts.

**Surveillance: The zone of acceptance**

It is becoming increasingly apparent that the use of modern technologies in the workplace represents a double-edged sword for employers whereby the same tools that can be used to increase productivity and efficiency can be abused or misused by the employee. Moreover, it can be argued that the same technologies do not create equal benefits for all parties (Prakhaber, 2000). For example, organisations are in a better position to leverage the capabilities of modern technologies, creating an unlevelled playing field in favour of industry. As such, it is imperative that we identify the key factors that will help improve employee’s perceptions, attitudes and behavioural reactions towards surveillance mechanisms in the workplace. There is a distinct need for clear measures and structures that govern the effective and fair use of communication technologies in the workplace allowing management to monitor their staff in a reasonable, rational and acceptable manner. Management must further consider the ethical and social impacts that surveillance techniques may have on the employee and consider the ways in which they can minimise the negative implications associated with them.

Organisational justice literature and theories can also play an important role here. Organisational justice is an overarching term used to describe individuals’ perceptions of what is fair and just within the workplace. For Purang (2012) these perceptions of justice directly relate to the quality of relationship that an employee has with their organisation and supervisors or line of management. Moreover, the justice perceptions of employees have been linked to various outcome variables in the literature, such as organisational commitment, job satisfaction, income satisfaction and overall group commitment (McFarlin and Sweeney, 1992; Ambrose and Arnaud, 2005; Moorman et al., 1998). Thus, it is apparent that justice theories allow researchers to predict the perceived fairness of specific organisational outcomes, actions or procedures by providing a solid framework through which they can be examined.
Moreover, organisational justice theories can provide a useful strategy for constructing organisational privacy policies (Stanton, 2000; Stanton and Stam, 2006). Employees evaluate organisational fairness across three various dimensions: procedural justice, distributive justice, and interactional justice. Procedural justice refers to an individuals’ perception that the organisational decision-making process will produce fair and just outcomes (Barrett-Howard and Tyler, 1986; Stanton, 2000 and Hauenstein et al., 2001). It is judged by gauging whether the procedures set in place by the organisation are accurate, consistent, and unbiased or are correctable (Leventhal, 1980). Thus within the information systems literature, procedural justice refers to the perceived fairness of the procedures or decision-making process that govern the electronic monitoring process (Butler, 2012). Distributive justice centres on the distribution of outcomes, measuring the extent to which employees feel recognised and thus appropriately rewarded or recognised for their efforts within the workplace (Stanton, 2000; Cohen-Charash and Spector, 2001 and Hauenstein et al., 2001). Thus if an employee perceives a distributive injustice, their emotions, cognitions, and overall behaviour motivating them to alter their inputs, outputs or perceptions will be impacted (Cohen-Charash and Spector, 2001; Butler, 2012). Within information systems literature, distributive justice therefore refers to the perceived fairness of the outcomes of associated with the use of electronic monitoring. The final factor of organisational justice, interactional justice explores the degree to which employees’ believe they have been treated with dignity, sincerity and respect during the distribution of outcomes as well as the process undertaken to achieve them by company decision-makers (Stanton, 2000; Helne, 2005). Thus, it explores the quality of interpersonal treatment they experience by management (Bies and Moag, 1986; Cohen-Charash and Spector, 2001). Thus, if an employee perceives interpersonal injustice, they are more likely to act negatively towards their direct supervisor as opposed to the organisation or the injustice in question (Cohen-Charash and Spector, 2001). As many organisations inform employees prior to electronic monitoring (i.e. via company polices etc) however, a diverse body of researchers argue that it may be difficult to fully measure an employees’ perceived fairness of the interpersonal treatment they experienced in relation to electronic monitoring (Butler, 2012). Nevertheless, it remains an important facet of organisational justice theory that should be considered by researchers in this field.

Many organisations are now leaning towards the implementation of workplace policies in an effort to balance the conflict of interest between employer and employee. For example, some researchers (Marx and Sherizen, 1991) argue that individuals should be informed of the monitoring before it actually occurs, therefore allowing them the option to decide whether or not they work for the organisation in question. Similarly, it is reasonable to allow an employee the right to access and challenge the information gathered on them by management. In fact, researchers Stanton and Stam (2006) argue that if an employee perceives some benefit to the surveillance they are likely to be more open to the surveillance, particularly if the reasons and benefits are communicated clearly to them an idea that is supported by privacy advocates within the literature. Management needs to have clearly defined sanctions in place within the organisation informing employees of the depth and detail of monitoring practices in the company whilst deterring them from abusing workplace systems.

Many social analysts within the literature have further suggested the implementation of employee empowerment programmes as a means of improving employee attitudes, behaviours and increasing their trust in management. For example, previous studies in the literature have indicated that employees who
feel empowered in the workplace are more satisfied and committed to the organisation (Beaulieu et al., 1997; Laschinger et al., 2001; Lauitizi et al., 2009; Wong and Laschinger, 2013) and are therefore accountable for their actions (Laschinger et al., 1999). In fact, many researchers (Wager et al., 2010; Laschinger et al., 2000; Sarmiento et al., 2004) have identified a strong positive relationship between employee empowerment and trust in management, with many (Laschinger et al., 2001, 2004; Bradbury-Jones et al., 2007; Krebs et al., 2008; Wagner et al., 2010) employing Kanter’s (1977; 1993) Theory of Structural Power to further explore the relationship between the characteristics of the organisation and employee empowerment. For example, an organisation empowers its workforce by providing them with support, allowing them access to information and room to grow, learn and develop. In fact, an organisation that allows its employees to feel like they are a part of the organisation will empower their staff, increasing their productivity and significantly improving their job satisfaction (Nelson and Quick, 2012). Interestingly however, while the implementation of empowerment programmes have been heavily advocated within the literature, it has been reported that they have not always been effective when applied (Siegall and Gardner, 2000) thus suggesting there is a clear need for a better and more comprehensive understanding of the factors and variables that positively influence employee empowerment and engagement in the workplace (Saif and Saleh, 2013).

Conclusion

Summary of research

Although there is much evidence that workplace monitoring and surveillance is increasing, the lines regarding what are correct, moral forms and acceptable forms of behaviour continually blur. In this way the overall understanding of the main issues involved as well as the ways in which to target them are significantly impacted. In fact, the use of Internet-based technologies in the workplace presents businesses and employees with opportunities to engage in behaviours for which comprehensive understandings or rules have not yet been established. In this way, there is a real need for greater clarity and understanding surround the issue of workplace surveillance, particularly as research indicates that it an issue of increasing concern to many stakeholders including employees, employers, researchers, practitioners, and policy-makers.

Largely, many of these concerns relate directly to the type of information that is collated, the methods used to collate it, and how it will be used once collated. As such it is vital that future research aims to alleviate this confusion by addressing these issues with those that directly face them, identifying legitimate employee concerns as well as establishing the types of technologies employed by management and perhaps most importantly why. Only then can we try to establish some form of balance or harmony between both parties in the computer-mediated workplace environment.

Practical implications

The themes identified in this paper have implications for future academic work in the area of workplace surveillance. In general, the issue of workplace surveillance is an under-researched area particularly within the MIS literature; however, the depth and detail of some of the issues identified within the literature in relation to such practices as well as managements coinciding view indicates the need for further research to be conducted. It is apparent that there is a need for the practically driven study to be conducted focusing on the perspectives of both management and employees to identify the ways in which monitoring technologies can meet the operational
requirements of the organisation whilst addressing the legitimate concerns of employees. Furthermore, there is an apparent need for a set of measures to be identified that management may take to help improve employee receptiveness of the technologies employed whilst having a positive influence on employees trust in management and commitment to the organisation.

**Future research and limitations**

There are a number of limitations that should be taken into account when evaluating the results of our literature review. Whilst every effort was made to explore the topic across multiple disciplines, we were only able to examine a limited number of papers and studies in great depth. Future research could address this by exploring the issue in detail by either region or single discipline area for example. Similarly, whilst we included a number of practitioner reports and studies in our review there is undoubtedly a far larger body of ‘grey literature’ i.e. reports/studies which we were unable to include in our overall review due to access constraints. Future research could hopefully address this and thus provide further rigor to the study.

Whilst much colloquial discussion of workplace surveillance and technology resistance exists, empirical studies on these issues are in short supply. Specifically, research on how electronic monitoring affects employee attitudes and behaviour is limited and those studies that do exist are largely theoretical in nature. For example, current research does not adequately address or explain the underlying causal mechanisms for why variables such as organisational commitment, perceived organisational support and privacy surveillance concerns relate to employee behaviour – in particular counterproductive behaviours. Future research must consider these issues in an effort to improve our understanding of them.

Similarly, while the organisational justice literature is rich in nature, the relationship between the justice theories and electronic monitoring in the workplace has not been adequately explored and thus remains a fruitful avenue for future research. For example, future research should examine the relationship between perceptions of fairness of the monitoring and employee behaviour as well as the effects of fairness perceptions on privacy concerns.

While it is apparent surveillance and monitoring in the workplace is increasing, the current lack of empirical studies in the literature limits our overall understanding of the issues involved. For example, more research and studies are required to examine fully the factors that both inhibit and amplify workplace surveillance. Future research should aim to address this by exploring the issues with those that face them. We must identify the employee concerns that exist and examine how they affect their attitudes and behaviours, whilst also recognising the technologies employers use to monitor their staff and perhaps more importantly why. Only then can we truly improve our understanding of these issues and the ways in which employee concerns can be diminished, thereby reducing counterproductive, deviant or withdrawal type of behaviour in the workplace.

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Understanding Digital Transformation Initiatives: Case Studies Analysis

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Abstract

Background: Complexity of the digital transformation (Digital Transformation) paradigm and its relation to the fourth technological revolution face companies with serious challenges when it comes to keeping up with the competition or becoming a leader in operating industries. Objectives: The goal of our research is to systematize, analyse and evaluate technological and business concepts of Digital Transformation, in order to identify and investigate Digital Transformation initiatives in Croatia. Methods/Approach: To accomplish this goal, we used a multiple-case study approach to gather data from experts who participated in successful Digital Transformation initiatives. Results: Questionnaires were developed and used to gather both, qualitative background and technology-business related data relevant for Digital Transformation initiatives’ success, discussed in the last part of the paper. The limitation of this study is a relatively small number of case studies (6), as well as its local coverage, resulting therefore with conclusions, which will serve as a base for future studies. Conclusions: There are several background, business, and technology-related concepts or factors relevant to Digital Transformation initiatives: profile and involvement of external Digital Transformation experts; the transformation drivers and expectations. In achieving most significant business concepts for business transformation, no single one right combination of technological concepts could be explicitly determined.

Keywords: digital transformation, industry 4.0., technology, business, case study, initiative, Croatia

JEL classification: O33, O32, O31, M15, L86

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Introduction

Digital transformation as a paradigm is widely recognized within the academic community and industry as a digital technology-based improvement of doing business. Although Digital Transformation initiatives vary from the use of digital technologies for improvement of one process, product or service to the change of the entire work logic and the way how organizations create value for their customers, they present the inevitable path for surviving onto today’s market. Mazzone (2014) identifies this shift as “Digital or Death”, while Kreuter (2017) defines the term “Digital Darwinism”, as an evolitional question of survival or extinction depending on company’s ability to adapt itself to new digital environment.

While the benefits of Digital Transformation initiatives in organizations can be projected by using various simulation tools, high risks of technology implementation failure persist. Consequently, there are many studies focusing on the technology related issues (Gartner, 2019 or McKinsey, 2018). While those studies focus on maturity of the technology usage and their adoption in different industries, the main research goal of this paper is to systematize, analyse and evaluate technological and business concepts of Digital Transformation, in order to investigate the cases in Croatia and identify what kind of digital technology implementation is being done by successful companies.

An exploratory multiple case study-based approach (Yin, 2014) was applied, aimed to gather insights for answering the following research questions: (i) (RQ1) What is the relevance of background factors describing the context of digital transformation initiatives?; (ii) (RQ2) How organizations perform digital transformation initiatives; which technologies have been found in real case studies in Croatia; which business-related concepts have been aimed?

This study has also a more practical goal namely, to gather data for proposing Digital Transformation initiatives guidelines in relation to business related concepts and approaches for raising a digital maturity of organizations.

The structure of the paper is as follows. After the introduction, the theoretical background relevant to this study is presented. Next section deals with methodology in which the empirical research design and data collection are described. After methodology, case studies analysis and discussion present the main findings. Finally, the implications for further research and practice are systematized and the conclusions are given.

Literature Review

Overview of important digital transformation perspectives

Westerman et al. (2014) categorizes all digital initiatives by their role of implementing digital technologies for replacement, improvement and fundamentally redefinition or creation of a new process or product (substitution, extension and transformation). Digital Transformation changes all spheres of business - organizations, current or future business models, way of running business processes, ecosystems, services and products (Schallmo et al., 2017). Usage of emerging technologies is enabling major business improvements related to rationalization and innovation in business models (Brown et al., 2014), resulting with improved business performance (Čorejova et al., 2016).

Digital Transformation deals with changes that digital technologies bring on the operational level through improved products, organisational structures or workflow automation (Clohessy et al., 2017). Another aspect of DT, can be found in the social impact, through transformation of business models or their building elements
(Betchoo, 2016). The intention of enterprises, which want to digitally transform is to provide new value to the customers, where technologies are the means, key enablers or even part of the offering (Nandico, 2016). This implies “realignment of or new investment in technology and business models to more effectively engage digital customers at every touchpoint in the customer experience lifecycle” (Solis et al., 2014, 3). Digital Transformation frameworks, developed mostly by the academia or business support organizations from insights into business or research activities related to Digital Transformation, are supposed to help and guide organizations to digitally transform (like in Schalmo et al., 2017, Winter, 2011, Berghaus et al., 2016, Matt et al., 2015), whereby, when comparing different Digital Transformation frameworks, significant overlaps on factors of interest for successful digital business transformation were identified (Nwaiwu, 2018).

**Digital transformation business related concepts**

Business related concepts present ideas of business improvement. Their identification (and selection of best promising ones) should be the starting point in any organizational transformation, whereby an integrative strategy-oriented DT approach is recommended taking into account the rapid technology development and its impact on business improvements (Pejić Bach et al., 2017). Existing common trends in business improvement initiatives are as following: the development of new business models, the accomplishment of new alliances, forming of new ecosystems, creation of added value through new products or services, improvement of customer experience by managing customer journeys, and similar (Pihir et al., 2019). Business model canvas (Osterwalder et al., 2014), as a tool for strategic rethinking enables the innovation in business models, but also the management and improvement of canvas elements. New ecosystems and alliances in the organisational sense are businesses or companies which are interacting with the goal of contribution to the other complements (de Reuver et al. 2017), creating thereby shared economic value, i.e. exchange of physical goods, assets or services (Schwab, 2017), through one of the three ways to do this: „by reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters at the company’s locations“ (Porter et al., 2011, 7). Added value for the customer can be identified in managing customer’s experience and journey, respecting thereby the ten principles behind great customer journey (Watkinson, 2019), which include, among other, strong reflection to the customer’s identity, satisfaction of the firm’s higher objectives and setting and meeting customers’ expectations. Digital twins represent real environments and serve as experimental scenarios (Boschert et al., 2016), which can ease the forecasting of the new way of doing business and help in developing predictions for better decision making.

**Digital transformation technology related concepts**

New digital technologies are mostly technologies associated with the Industry 4.0. This next generation of technologies formally referenced as information and communication technologies is relying on new features which allow new services and products promising previous satisfaction level with added value which can be delivered digitally (Spremić, 2017). Schwab (2017) describes digital technologies related to the fourth industrial revolution whereby the way in which the technologies are intertwined - combined or separately - can bring various potential options (Ivančić et al., 2019). Technologies associated to Industry 4.0 like implantable or wearable devices, Internet of things, Big data and Data analytics, Driverless cars, Robotics, 3D printers and more are listed in table 3. Gartner (2019) and McKinsey (2018), present
many studies for evaluating technologies and their application in organizations, while Loucks et al. (2016) positions industries into a Digital vortex, evaluating industries on their susceptibility to digital disruption.

**Digital transformation drivers**

“Driver” is by definition a trigger of events or endeavours (Oxford dictionary, 2019). Drivers of Digital Transformation are influential factors for digital innovations, which arise within the organization itself or from trends in the organizational environment, and can be categorized as the customer, technology or organizational development driven (Hrustek et al., 2019a). Customer driven Digital Transformation is initiated by customers’ new needs or desires and companies innovate products or services, or redesign them, in order to create an added value for all participants (Lichtenthaler et al., 2017). Technology driven DT is focused on business challenges and benefits which arise from properties of technology (Lederer et al., 2017). These drivers include Social Media Influence, Mobility, Need for analytics, Cloud and Internet of Things (SMACI) concept of Digital Transformation, explained by Betchoo (2016), as well as other technological drivers, mentioned already in the previous section. Organisational development driven DT is initiated by ideas for organizational innovations, usually aimed to increase profit, reduce costs, achieve efficiency, or implement other customer-focused improvements (Corejova et al., 2016).

**Digital transformation related knowledge and competencies**

Since Digital Transformation is a complex and interdisciplinary paradigm, organizations noticed a need for a new leadership role – the Chief Digital Officer (CDO), which not only needs to have knowledge and skills in Digital Transformation, but also has to be capable of leading all other employees toward it (Kutnjak et al., 2019a). Higher education institutions also recognized this need in creating educational contents, and fostering and transferring knowledge and skills, which are needed for implementation of Digital Transformation. Most leading Universities in Europe, as shown by Hrustek et al. (2019b), have recognized Digital Transformation as an emerging trend and are implementing Digital Transformation related concepts in their courses and study programmes curricula. The Skills Framework for the Information age - SFIA (2018) added to its previous edition skills most relevant for Digital Transformation, changing their existing skill groups.

**Methodology**

With the goal to explore Digital Transformation initiatives and regarding the complexity of such projects, research interest was focused on companies, which are implementing digital technology into their own business or into the business of their clients. After the brief Internet search of Digital Transformation initiatives in Croatia, it was clear that this kind of information was not possible to obtain from secondary sources. For that reason, we looked for companies, which are conducting such projects, taking into account the possibility to reach their key experts with in-depth knowledge in Digital Transformation related manners. To broaden the reach and see a larger picture, we decided to use the exploratory multi-case studies methodology according to Yin (2014), with data collection proposed by Eisenhardt (1989), set as a combination of interviews and questionnaires most suitable for examining real-life initiatives, which enabled us to obtain data needed for the planned research. In that manner, experts were contacted and interviewed according to Opdenakker (2016) using face-to-face interviews, with the goal to identify and select Digital Transformation initiatives, which meet the criteria of (1) aiming multiple organizational
i.e. business improvements and (2) implementing technologies related to the 4th industrial revolution for achieving these improvements, derived from the theoretical background. On the selected cases, further research was made by a questionnaire, described in the next section.

**Study design**
This study comprises 6 Digital Transformation initiatives within Croatia gained by interviews and from questionnaire results, conducted after the confirmation that the project meets the improvement and technology-related criteria mentioned earlier for evaluating it as a Digital Transformation initiative. Experts were selected based on their experience, and from 10 interviews/experts only 6 cases were accepted as Digital Transformation initiative. Each interview lasted 30-60 minutes and the completion of the questionnaire followed a week after the initial interview, via e-mail. Collected data were coded using Word and Excel spreadsheets.

**Research model, research Instrument and data collection**
Based on the theoretical background the research model was developed combining background factors that shape the context of Digital Transformation initiatives, drivers of Digital Transformation (derived from Hrustek et al., 2019a) and related knowledge and competencies of Digital Transformation experts supporting or leading Digital Transformation initiative.

To answer the research questions, a set of semi-structured questions was developed in the form of a questionnaire. The questionnaire was sent to the expert after the initial interview, which determined if the Digital Transformation initiative is a valid Digital Transformation project. In view of the research objectives, projects related to Digital Transformation were selected for this study only if: a) objectives are related to at least 3 business concepts listed in Table 2, and b) digital technologies related to Industry 4.0. (from Table 3) have been applied. The experts were asked to fill the questionnaire for one valid Digital Transformation project. The questionnaire was structured in 4 parts: (i) Part 1- Background information about the Digital Transformation expert; (ii) Part 2- Digital Transformation initiative (project) information, which can be considered as a successful example of Digital Transformation; (iii) Part 3-Evaluation of business and technological concepts within the Digital Transformation initiative, and (iv) Part 4- Demographics of the organization where the project took place.

The interviews and data collection through the questionnaire took place in September and October 2019. Questionnaire parts 1, 2 and 4 included questions, which help explain the context of the Digital Transformation initiative. These parts of research elements in questionnaires and in the initial interviews, helped us to determine or confirm that the Digital Transformation initiative is valid case of Digital Transformation, gather qualitative data about the included experts and their knowledge, determine the internal organizational factors related to Digital Transformation, acquire demographic data about the organization in which Digital Transformation initiative is performed and answer thereby the first research question (RQ1). Table 1 lists background factors and domains of potential answers.
Table 1
Background Factors and Domains Describing the Context of Digital Transformation Initiatives

<table>
<thead>
<tr>
<th>Code</th>
<th>Background information about the expert participating in the Digital Transformation initiative</th>
<th>Domains of possible options</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGR1</td>
<td>Main sources for acquiring knowledge on Digital Transformation</td>
<td>a) Through formal education; b) through non-formal lifelong learning programs; c) through his own experience on similar projects; d) something else.</td>
</tr>
<tr>
<td>BGR2</td>
<td>Core competencies’ focus in Digital Transformation projects</td>
<td>a) focused on technological aspects; b) focused on business concepts; c) focused on both, technological and business concepts; d) something else</td>
</tr>
<tr>
<td>BGR3</td>
<td>Work experience in ICT or digital technology implementation projects</td>
<td>a) less than 5 years; b) 5 to 10 years; c) 10 to 20 years; d) more than 20 years.</td>
</tr>
<tr>
<td>Code</td>
<td>Digital Transformation initiative information</td>
<td>Domains of possible options</td>
</tr>
<tr>
<td>BGR4</td>
<td>Short description of the specific Digital Transformation initiative</td>
<td>Free entry</td>
</tr>
<tr>
<td>BGR5</td>
<td>Expert’s role in the specific Digital Transformation initiative</td>
<td>a) a project manager / associate based on the function in the organization (CDO, CIO, CXO); b) a project manager / associate working as an external consultant; c) something else</td>
</tr>
<tr>
<td>BGR6</td>
<td>Specification of drivers which influenced the decision to start the Digital Transformation initiative</td>
<td>Free entry</td>
</tr>
<tr>
<td>BGR7</td>
<td>Most important results of the Digital Transformation initiative</td>
<td>Free entry</td>
</tr>
<tr>
<td>BGR8</td>
<td>Main or critical success factors (3-5) for the specific Digital Transformation initiative</td>
<td>Free entry</td>
</tr>
<tr>
<td>BGR9</td>
<td>Existing technologies or systems relevant to the Digital Transformation initiative (multiple choice allowed)</td>
<td>Enterprise Resource Planning Systems (ERP); Customer Relationship Management (CRM); Mobile technologies; Cloud technologies; Reference models; Supply Chain Management (SCM); Data Warehouse (DW); Business Process Management (BPM); Performance Management Systems (PMS); Something else</td>
</tr>
<tr>
<td>Code</td>
<td>Enterprise demographics</td>
<td>Domains of possible options</td>
</tr>
<tr>
<td>BGR10</td>
<td>Enterprise size</td>
<td>Micro (less than 50); Small (between 50-249); Mid-sized (between 250-1000); Large (more than 1000)</td>
</tr>
<tr>
<td>BGR11</td>
<td>Estimated sales income</td>
<td>Up to and including € 10 million; € 10 to € 50 million inclusive; more than € 50 million</td>
</tr>
<tr>
<td>BGR12</td>
<td>Operating industry</td>
<td>Entry according to NACE classification</td>
</tr>
<tr>
<td>BGR13</td>
<td>Ownership structure</td>
<td>State enterprise; Public administration; Domestic private enterprise; Foreign private enterprise</td>
</tr>
</tbody>
</table>

Source: Author’s work
To answer the second research question (RQ2), according to theoretical background concepts researched previously in Pihir et al. (2019) and Tomičić-Pupek et al. (2019) concepts were tested and their relationship was examined. Two categories of business and technology concepts related to Digital Transformation initiatives were systemized. In Table 2 Business related concepts (coded as BRC) in Digital Transformation are given, followed by literature or sources reference. Table 3 provides the same for Technology related concepts (coded as TRC) in Digital Transformation.

### Table 2
**Business Related Concepts in Digital Transformation**

<table>
<thead>
<tr>
<th>Code</th>
<th>Business Related Concept</th>
<th>Example and Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRC1</td>
<td>Improvements, Increased Effectiveness/Efficiency</td>
<td>McKinsey 2018; Uhl et al., 2014</td>
</tr>
<tr>
<td>BRC2</td>
<td>Sharing economy</td>
<td>Schwab, 2017; Frenkena et al., 2017</td>
</tr>
<tr>
<td>BRC3</td>
<td>Green technologies and digital footprint</td>
<td>Murphy, 2018; Petrova et al., 2019</td>
</tr>
<tr>
<td>BRC4</td>
<td>New Business Models</td>
<td>Business Model Canvas Osterwalder 2014; Loonam et al., 2018</td>
</tr>
<tr>
<td>BRC5</td>
<td>New services, New products</td>
<td>Osterwalder 2014; Schalmo et al., 2017</td>
</tr>
<tr>
<td>BRC6</td>
<td>Customer experience, Journey</td>
<td>Watkinson, 2019; Vial, 2019</td>
</tr>
<tr>
<td>BRC7</td>
<td>New alliances/ Digital ecosystems</td>
<td>de Reuver et al. 2017; Vial, 2019</td>
</tr>
<tr>
<td>BRC8</td>
<td>Digital twins</td>
<td>Bolton et al., 2018; Boschert et. al., 2016; Petrova et al., 2019</td>
</tr>
<tr>
<td>BRC9</td>
<td>Digital competencies, skills</td>
<td>Kutnjak et. al., 2019a; Pejić Bach et. al., 2018</td>
</tr>
</tbody>
</table>

Source: Author’s work

### Table 3
**Technology Related Concepts in Digital Transformation**

<table>
<thead>
<tr>
<th>Code</th>
<th>Technology Related Concept</th>
<th>Example and Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRC1</td>
<td>SMART/ Wearable (mobile) Digital Devices</td>
<td>Wearable Internet (Schwab, 2017); Mobile computing (Roedder et al., 2016.)</td>
</tr>
<tr>
<td>TRC2</td>
<td>Implantable devices</td>
<td>Implantable technologies (Schwab, 2017); Biochips (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC3</td>
<td>Artificial intelligence and Knowledge Management</td>
<td>Artificial intelligence and decision making (Schwab, 2017); Edge and explainable artificial intelligence (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC4</td>
<td>Internet of things</td>
<td>Internet of and for things (Schwab, 2017); Sensors (Roedder et al., 2016.)</td>
</tr>
<tr>
<td>TRC5</td>
<td>Bio Tech</td>
<td>Neurotechnologies (Schwab, 2017); Biotech artificial tissue (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC6</td>
<td>Big data / Data analytics</td>
<td>Big data for decisions (Schwab, 2017); Big data (Roedder et al., 2016.); Machine Learning (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC7</td>
<td>Autonomous systems</td>
<td>Driverless cars (Schwab, 2017); Autonomous driving (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC8</td>
<td>Robotics</td>
<td>Robotics and services (Schwab, 2017); DigitalOPS (Gartner, 2019)</td>
</tr>
<tr>
<td>TRC9</td>
<td>Blockchain</td>
<td>Bitcoin and the blockchain (Schwab, 2017); Blockchain (Roedder et al., 2016.)</td>
</tr>
<tr>
<td>TRC10</td>
<td>Drones</td>
<td>Light cargo delivery drones, Flying autonomous vehicles (Gartner, 2019)</td>
</tr>
</tbody>
</table>
The literature sources presented in Tables 2 and 3 systemize the concepts explored in second research question (RQ2) about business and technology related concepts in Digital Transformation. These findings are used next, in order to create the study structure and content.

Results - Case Studies: Analysis and Discussion
The findings from our case studies are presented and discussed in this section regarding the first research question (RQ1) about background factors describing the context of the Digital Transformation initiatives. Table 4 shows details about case studies’ background factors except for background factors BGR4, 6, 7 and 8, which could have been entered in the free-form, and which are explained afterwards in the textual case descriptions.

Organization A
The Digital Transformation initiative was primarily focused on replacing part of the existing applications, which have reached “End of Life” maturity phase, but it also included optimizing End-to-End processes by introducing modern technological concepts, as well as structured monitoring of complying with industry standards recommendations. The project ultimately resulted with (1) the simplification of the concept of services for end-users, with (2) the simplification of services for internal users and with (3) improvement of IT tools needed for running operational activities at a desired organizational performance level (e.g. Robotics process automation-RPA, Continuous Integration/Continuous Delivery). Success factors of the initiative were addressing project sponsorship, sufficient financial means, outsourcing with necessary know-how that was not available internally, employees’ motivation all of which was driven by the internal assessment of needs for organizational innovation in form of assuring proper cost and time efficient IT support in long-term.

Organization B
The Digital Transformation initiative was aimed to introducing warehouse process robotization and it was driven by digital technologies and organizational goals of workload optimization, raising competitiveness and response to increase of demand. It included the use of autonomous robotic industrial vehicles that can operate based on tasks given by employees or from WMS (warehouse management system) in three shifts, in order to more efficient locate, pick up and enable delivery of products. Crucial element that influenced the success of the initiative were related to business and management support, employee competencies and their openness to new technologies, the effectiveness of Digital Transformation customer success team, a clear definition of use-cases in which technology is applied, and perhaps most of all,
the flexibility of new technology. At this type of transformation significant factor can also be found in new technologies acceptance readiness of employees who do not have time, competencies, motivation or fear of being replaced to adjust to technological change, whose interruptive behaviour can disrupt internal processes.

Table 4
Case Studies Background Factors Describing the Context of Digital Transformation Initiatives

<table>
<thead>
<tr>
<th>Code</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGR1</td>
<td>through formal education, non-formal lifelong learning programs and own experience on similar projects</td>
<td>through formal education and hands-on experience on similar projects; robotic process improvements</td>
<td>through formal education and experience on similar projects</td>
<td>through knowledge acquired by tracking and setting digital business transformation trends</td>
<td>through formal education and experience on similar projects</td>
<td>through work experience on similar projects</td>
</tr>
<tr>
<td>BGR2</td>
<td>focused on both, technological and business concepts</td>
<td>focused on business concepts</td>
<td>business-improvements, in which technology acts as an enabler</td>
<td>focused on both, technological and business concepts</td>
<td>focused on business concepts</td>
<td></td>
</tr>
<tr>
<td>BGR3</td>
<td>5 to 10 years</td>
<td>Less than 5 years</td>
<td>5 to 10 years</td>
<td>more than 10 years</td>
<td>10 to 20 years</td>
<td></td>
</tr>
<tr>
<td>BGR5</td>
<td>a project manager / based on the function in the organization (CDO, CIO, CXO)</td>
<td>external mobile robot software integration team leader</td>
<td>external member of the project delivery team</td>
<td>external consultant in the design phase of the Digital Transformation</td>
<td>external consultant on the project</td>
<td>external delivery team member</td>
</tr>
<tr>
<td>BGR9</td>
<td>ERP, CRM, Mobile and Cloud tech., SCM, DW, BPM, PMS</td>
<td>ERP, CRM, Mobile tech., Reference Models, SCM, DW, BPM, PMS</td>
<td>DW, internal custom made solutions</td>
<td>Mobile and Cloud tech., BPM, Central dispatch system</td>
<td>ERP, Mobile tech., SCM</td>
<td>ERP, Cloud tech.</td>
</tr>
<tr>
<td>BRC10</td>
<td>Large</td>
<td>Large</td>
<td>Mid-sized</td>
<td>Small</td>
<td>Mid-sized</td>
<td>Mid-sized</td>
</tr>
<tr>
<td>BRC11</td>
<td>more than € 50 million</td>
<td>more than € 50 million</td>
<td>10 million to € 50 million</td>
<td>up to 10 million €</td>
<td>10 million to € 50 million</td>
<td>up to 10 million €</td>
</tr>
<tr>
<td>BRC12</td>
<td>J: Information and communication</td>
<td>H: Transportation and storage</td>
<td>O: Public administration and defence; social security</td>
<td>H: Transportation and storage</td>
<td>K: Financial and insurance activities</td>
<td>O: Public administration and defence; social security</td>
</tr>
<tr>
<td>BRC13</td>
<td>foreign</td>
<td>privately owned</td>
<td>public administration</td>
<td>domestic</td>
<td>privately owned</td>
<td>public administration</td>
</tr>
</tbody>
</table>

Source: Author’s work

Organization C
The results of the Digital Transformation initiative in Organization C were new IT services which are addressing crime prevention in a public sector organization. New services developed within the project are aiming more efficient protection of Croatian citizens in general. The success of the project depended on the availability of financial means,
internal support within the organization C and legal frame regulating the scope of the project. The main driving element of this project was the need for compliance with standards within the operating industry.

**Organization D**
The external environment triggered the Digital Transformation initiative in the fourth case. Organization D is operating in the on-demand transportation niche. Disruptive competitors forced organization D to rethink and reinvent its business model in order to support on-demand services with digital technologies. The critical success factor was again the availability of financial means, but the organization realized that in order to survive in their volatile self-regulating market, a fundamental transformation has no alternative. The main driving aspects were recognized in the customer perspective, namely in the decrease of demand, in disruptive competition, which was taking over clients, and in an outdated business model.

**Organization E**
Organization E started its Digital Transformation initiative in order to achieve two initiative's goals: (1) introducing smart mobile payment and (2) developing new services for card payments. The driving force in this case was customer orientation and the results of the Digital Transformation project were customer base expansion and indirectly more income from payment transactions. In this project, the vision and support of the management played a significant role, as well as employee competencies and project management efficiency.

**Organization F**
The project in organization F enabled the transition to a Digital Transformation of design completion, submitting and validating a client documentation for issuing certificates in a public sector by implementing a workflow management for a complex business process and standardizing procedures and rules. As a direct result the process duration was reduced, unified control assurance of the issuing process was introduced and cost reduction for all process actors was potentiated. During the implementation, several main influence factors were identified, such as top management involvement, focus on achieving planned results, competencies of project team members, availability of financial means and technologies. The initiative was driven by the aim of raising efficiency in the operating business model and based on customer expectations.

**Discussion**
**Background Factors of Digital Transformation Initiatives**
In order to answer the first research question regarding the relevance of background factors shaping the context of the Digital Transformation initiatives and for the transformation success, retrieved data from three parts from the questionnaire were analysed: Part 1: Background information about the Digital Transformation expert; Part 2 – Digital Transformation initiative (project) information which can be considered as a successful example of Digital Transformation and Part 4 - Demographics of the organization where the project took place.

The focus on either only business or both (technology and business) is distributed evenly among the experts, while their professional experience is mostly around the 5 to 10 years. The results of our multiple case study are aligned with existing reported research (Pejić Bach et al., 2018, Kutnjak et al., 2019a).
Concerning information about Digital Transformation initiatives, leading success factors according to our case studies have been found in financial means, management support and employee competencies. Most drivers (in accordance with Lederer et al., 2017, Lichtenthaler et al., 2017; Čorejová et al., 2016) stated by Digital Transformation experts can be categorized within (1) organizational, (2) customer and (3) technology driven initiatives, whereby the respective order corresponds to the frequency of driver appearances.

The aimed results of Digital Transformation initiatives show mainly business-related goals of process improvement, introducing new products or services, reacting to disruptive competition (organizational), ensuring proper technology support for realizing new business models (technological) and finally goals related to the customer value (customer orientation). It is not surprising that business orientation is in analysed cases the driving force, due to the significant business focus of participating examinees in this study. This can be seen as a limitation of our research, and therefore more detailed analysis would be appropriate in further exploitation of our research instrument.

Demographics of the organization where the Digital Transformation project took place showed that Digital Transformation is a new paradigm for all sized organizations (2 large, 3 mid-sized and 1 SME organizations), with budgets mostly in the range of 10 to 50 million Euros per year. Three organizations were domestic privately-owned companies, two were public institutions, and one was an international private owned company in terms of organizational ownership.

The operating industries which indicate the scope of Digital Transformation initiatives are H: Transportation and Storage (2 cases), O: Public administration and defence; compulsory social security industry (2 cases), K: Financial and insurance activities and the J: Information and Communication. Industry-appearances is aligned with previous research studies (Kutnjak et al, 2019b; Bosilj Vukšić et al. 2018.).

The analysis of the acquired answers also shows the following background information describing the context of Digital Transformation initiatives (RQ1):

- All participants rely strongly on their 5-10 years of experience in previous and similar projects, and 4 out of 6 recognize their formal education as an important contributor to their competencies
- All participants are focused on business concepts, and 3 out of 6 focus also on technology concepts; this goes in line with the opinion that Digital Transformation is enabled by technology rather than driven only by technology and that Digital Transformation initiatives in our study are more oriented on transforming the organization and its business performance than on technology.
- 5 out of 6 participants were involved in the Digital Transformation initiative as an external project member, which indicates that in our study organizations strongly rely on the resources outside the company. Only in one case the participant was acting as an internal project team member based on the function in the organization.
- Digital Transformation initiatives are leaned on or built around legacy systems like existing ERP or CRM and BPM systems and are not exclusive to the type of ownership, size or operating industry in our study.

The background factors raise following research question for further research: Why do organizations rely on external support in Digital Transformation initiatives: is it related to the lack Digital Transformation methodology knowledge or experience, is it related to the intensity of technology development, is it related to the lack of internal resources with appropriate competencies and skills?
Business and Technology Related Concepts

Part 3 of the questionnaire comprises evaluation of business and technological concepts within the Digital Transformation initiative (project). The most important findings regarding the second research question (RQ2) about how organizations perform Digital Transformation initiatives are presented and discussed in this section; giving insight into which technologies have been found in real case studies in Croatia and which business-related concepts have been aimed.

Figure 1 presents business and technology concept implementation frequency according to Digital Transformation expert for case studies.

Figure 1
Frequency of Correlation of Business Concepts and Implemented Technologies

Source: Author’s illustration
The frequency of business concepts and implemented technologies for realizing these business concepts are presented in Figure 1. Data sheet attached to the figure represents a number of appearances for each technology within at least three aimed business related concepts. This means that technologies are meant to support achieving of business goals, and it is possible that same technology supports one or more business goals (business concepts) per one case study. Additionally, one business goal could be addressed with one or more technologies.

On the left side, the graphic shows only a subset (6 elements) of the initial business related concepts (9 elements from Table 2) which appeared in a case studies as aimed business improvements. The right side is respectively comprised of 11 technology concepts, as a subset of appearing technologies (out of 14 elements from Table 3). From top to bottom of the graphic, business and technology concepts are listed according to their frequency in the third part of the questionnaire (data sheet in the bottom of Figure 1), illustrating thereby that the three most significant business related concepts were (1) BRC1, (2) BRC4 and (3) BRC5. On the other side, three most used technologies implemented to achieve business goals were: (1) TRC6, (2) TRC14, and (3) TRC13. The appearance of TRCs is influenced by business improvement concepts, which are in accordance with business focus investigated in similar literature review based research (Bosilj Vukšić et al. 2018.).

The third part of our questionnaire was intended for exploring how organizations perform Digital Transformation initiatives in terms of investigating which technologies have been found in real case studies in Croatia and which business-related concepts have been aimed (RQ2).

We can draw the following insights from gained answers. First, no additional technology or business related concepts were added in the filled questionnaires, confirming that we have covered most significant concepts in Digital Transformation initiatives and that experts in our study agree with them from the professional standpoint. Second, participants had no difficulties with identifying at least 3 business concepts aimed by the Digital Transformation initiative, confirming that these Digital Transformation initiatives are seen as wide business improvements across more organizational levels or business functions. Third, the more-than-one technology aiming more-than-one business concept paradigm confirmed by the filled questionnaires of Digital Transformation initiatives illustrates the complexity of Digital Transformation initiatives, and assures us in the correctness of our research model and instrument for further studies on a broader population.

**Conclusion**

The goal of our research was to examine the background, technological and business concepts of Digital Transformation, in order to explore real-life Digital Transformation initiatives and thereby form a research base for future studies. By using a multiple-case study approach, we gathered data from experts who participated in Digital Transformation initiatives in Croatia. Based on qualitative background, technology and business related data, some implications for academia and practice can be drawn.

The implications related to background factors describing the context are as following. First, the profile of Digital Transformation leaders and actors indicates that those experts lean on their formal education, but recognize the need for tracking trends and learning and evolving continuously by gathering experience on similar projects. Second, experts involved in the Digital Transformation initiative are external project members, which indicates that organizations strongly rely on the resources outside the company to introduce Digital Transformation. Third, the transformation
drivers and expectations can be categorized within organizational, customer and technology driven initiatives, whereby the organizational drivers and expected results were the most notable by the experts.

Finally, regarding the variety of business and technology concepts in investigated case studies following implications can be useful in the following manner. According to the frequency of implemented business related concepts the most significant are aimed at (BCR1) achieving business Improvements and increasing Effectiveness or Efficiency and (BCR4) the introduction of new business models, which is aligned with other research. Digital Transformation is oriented on business transformation. For achieving aimed business related concepts there is no single one right combination of technological concepts.

Our implications indicate that other background factors could have more influence potential on the decision on selecting appropriate technologies for aimed business transformation than previously supposed.

The limitations of this study are in the business orientation perspective is in analysed cases due to the significant business focus of participating examinees and a relatively small number of case studies (6), as well as its local coverage.

Our further research will be aimed at exploring background factors like methodology, technology related knowledge and experience, and building internal capacities explaining why organizations rely on external support in Digital Transformation. Due to the acknowledged correctness of our research model and instrument in further studies we would cover a broader population.

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Impact Evaluation of an Emerging European Health Project – the MIDAS Model

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Abstract

Background: This paper describes the impact evaluation of a large big data platform initiative that is being undertaken in order to increase the probability of its success. The initiative, MIDAS (Meaningful Integration of Data Analytics and Services), is a European health-based Horizon 2020 project comprising a consortium of members from various universities, research institutions, and government agencies.

Objectives: The purpose of the paper is to present a pioneering platform that will support healthcare policymakers in their decision-making by enabling greater and more efficient use of their data. The goal is to present and evaluate the results of the MIDAS project across four countries.

Methods/Approach: The literature is replete with examples of worthwhile technology projects that have failed due to user resistance. In order to avoid such failure, and ensure the success of the final MIDAS platform, a detailed impact evaluation is being undertaken at timed periods of development.

Results: This paper describes the impact evaluation process, outlining the use of Q-methodology and the development of a 36-item concourse using the HTMLQ system for that purpose.

Conclusions: This research contributes to the overall understanding of how impact evaluation can be undertaken at timed periods during the development of an innovative technology for organisational purposes.

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Introduction

ICT projects face challenges that are specific to the unique attributes and novelty of the technology that is being developed, as well as the characteristics of the environment in which the technology is introduced. This is particularly evident in the healthcare context. As Abouzahra (2011, p.46) states: “IT projects in the healthcare sector have many differentiating characteristics over other types of projects. These characteristics arise from the sensitive nature of the healthcare environment as well as the diversity in user groups and IT systems usually installed in hospitals”.

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The paper focuses on one such technology development project. Firstly, the factors that can influence resistance to and failure of IT projects are described. It then describes a specific big data health platform, MIDAS, which is being developed for introduction across five countries and the factors that have the potential to influence its success. The impact evaluation methodology that is currently being employed to increase its adoption – a Logic Model framework, participant interviews, and Q Sort Analysis Methodology - is described in detail and this is accompanied by a brief description of the technical issues that must be considered in order to ensure success. Since the data is not yet available, the paper focuses on outlining the process that is being followed, which will serve as a useful template for other researchers interested in conducting technology impact evaluations.

Failure of Large Research Projects

Despite advances in technology and medical science, modern health-based projects are open to systemic failure due to many factors. These include I.T. developer's lack of awareness regarding end-user needs, poor communication amongst all parties concerned and inappropriate or inadequate tests of the emerging system. Other issues may be external (e.g. political and legal) such as sharing of patient data and issues surrounding consent.

For projects to be successful, lessons must be learned from the past with regard to previous technologically driven healthcare projects. The reasons for the failures of many large IT projects in the healthcare sector are complex and can be influenced by internal or external factors. Internal factors relate to issues within the university or department from which team members working on the project interact. Such issues can relate to disagreements within these project groups regarding decision making over priorities, resourcing or strategic planning. External factors can be linked to political or legal issues outside of these project sub-groups but, being inextricably linked to them, can heavily influence the final project outcome. Research by Lu et al. (2010) suggests that internal factors in project failure involve variables strongly related to project management processes and project team dynamics. They posit that such internal issues are responsible for and are far more influential in project failure than external issues. In healthcare projects, such issues may be political or legal such as sharing of patient data and issues surrounding consent. Key factors include poor communication or misunderstanding between developers and end-users of the system. In certain cases, users may become confused between their wants and actual needs and their grasp of data analysis techniques may lack the sophistication required to enable the best use of the available data. Regarding project implementation, objectives may be impractical or unrealistic and, therefore, either difficult or impossible to achieve, particularly given strict time and financial constraints. Once the system is implemented there may follow inappropriate or inadequate testing of the emerging system.

In particular, inappropriate testing could take the form of irrelevant or insufficient test data. Technical development and end-user requirements may differ based on poor communication between developers and users. Pinto and Mandel (1990) consider the main factors of project failure to include an incomplete or inaccurate vision of project objectives, a failure to correctly identify and include the involvement of stakeholders, and communication and risk management issues. Such factors can have a cascade effect that changes to the project may increase, customers are dissatisfied with outcomes, the quality of deliverables is poor, and it may cause poor morale amongst developers. Furthermore, extended schedules inevitably lead to increased project costs.
Due to the multiplicity of such factors and differing stakeholder pressures and contexts, there is greater recognition of the importance of evaluating impact as a health system project evolves. These evaluations must take into consideration the resulting impact(s) identified in that evaluation and not merely provide a review or account of what happened. Stakeholders, shareholders and those funding large-scale projects need to see measures of program effectiveness as well as progress (O’Neill, 1998). On the other hand, an evaluation process is likely to be more successful if it considers the impact of programs and not merely the results from those programs. Impact represents results or accomplishments at a higher level. Therefore, impact refers to the implications of a given output, program, or project beyond the immediate intended outcomes. In particular, there is an emphasis on the broader long-term effects beyond the project itself. In effect, the ramifications of impacts resulting from this project will extend to society and influence decisions in health-based policymaking, sharing of health data and governance best practice.

**Background**

**The MIDAS Project**

Healthcare systems (Kruse et al., 2016) store patient data on large database systems where the data is heterogeneous and siloed. However, sharing of patient data at regional, national and cross-national level is increasingly needed to support integrated care, and provides an opportunity to better understand, prevent and predict potential health and healthcare problems. Furthermore, it is believed that the availability of such data will help to reduce costs to healthcare providers. Many healthcare systems worldwide (Hicks, 2017) are adopting an “outcomes-based healthcare” approach. Using data from a variety of sources, healthcare providers have the potential to identify which treatment works best for individual cases and at a demographic level. Such healthcare systems aim to help policymakers within the medical field and at the government level to improve the quality of patient health care.

The Meaningful Integration of Data, Analytics, and Services (MIDAS) research project is a European-centered healthcare initiative. Its main purpose is to optimize the use of current healthcare data to better inform public policy and improve healthcare and social well-being outcomes across Europe via a unified big data platform. It intends to achieve this by integrating patient data from various European health authorities where individual data will be collated and analyzed using various bespoke applications, modeling and visualization tools. Data will also be gathered via social media. The data will be analyzed on the MIDAS platform. It is expected that this pioneering healthcare platform will enable and provide tools for end-users, in particular policymakers, to benchmark, simulate and predict outcomes that will influence future healthcare policy decisions at both regional, national and European levels. There are four use cases involved in this project, based in Northern Ireland, the Republic of Ireland, Finland and the Basque Country. Currently, European healthcare systems generate considerable data on a day-to-day basis. Such data includes patient prescriptions, patient care, hospital discharge records, waiting lists, data on blood-sugar levels, cardiac-related issues, etc. However, the data is localized, and external access is difficult, thus limiting our understanding of health-based issues. This technology platform will not only provide critical insights into the health of different populations but will enable policymakers to design and develop evidence-based preventative strategies that will address health and social care challenges at a wider level than is currently possible. Data analysis will enable policymakers to explore health trends, identify correlations and patterns amongst the
general population and test various theories (e.g. diet patterns and obesity amongst particular regions according to age group and gender).

Overall, the MIDAS system is expected to be user-friendly and provide access to data analytics and visualization tools without the need for data-science expertise. It is also anticipated that there will also be a focus on simple, routine analytics with an element of prediction. A current problem with data systems is the lack of available analytics and tools for data mining. It is believed that the MIDAS tool will highlight gaps in the system and facilitate data system linkage to answer additional research questions and enable analytics and work that previously wasn’t possible. At its core level, the MIDAS platform will utilize Analytics Engines XDP which operates on three core principles: (i) it facilitates access to the data from a singular location without the need for replication; (ii) the data is analyzed once and the process of analysis can be reused as the data is updated; (iii) data sharing and analysis is feasible through repeatable processes (Analytics Engines, n.d.). The developed system will not allow users to study single patient data. Instead, it will allow cohort level analysis to support health-based decision making (as policies are applied to populations and not individuals). The MIDAS technical teams will install this form of data analytics in the four European healthcare systems for data integration, analytics, and visualization. However, stakeholder understanding of analytics and other core technical issues is paramount to successful outcomes. Good data mining techniques and optimum use of decision-support systems are dependent on individual competence in using the technology presented. One key technical challenge is in making the system a very useable platform for end-users not highly experienced in data analysis techniques. This issue has to be balanced against a need to ensure that the system produces health-based reports that are easy to generate but provide an output that is meaningful and accurate. The system will also support time-series analysis and projection analysis to provide accurate forecasting of potential health issues based on the health data available at regional, national and cross-border level.

An expected outcome from the MIDAS system will be the use of predictive modeling as an analytical tool, which, in turn, will help to prevent rather than treat certain conditions. This will also influence future health-education projects. It is hoped to connect existing datasets and reduce fragmentation in order that the true value of combined datasets can be unlocked.

**MIDAS Stakeholders & the Consortium**

The principal stakeholders involved in the MIDAS project were chosen from various fields of expertise to provide the best possible outcome. The stakeholders involved in the Midas project are comprised of a consortium of specialists from two main areas: 1) Technical partners; i.e. academic research institutions. 2) The policy board; i.e. end-user organizations – policy advisors, data gatekeepers and health-care providers.

Overall, there are fifteen participating organizations from six European countries and one group from the United States of America. The list of stakeholders involved in the project is as follows: University of Ulster; Dublin City University; KUL (Belgium); Vicomtech; University of Oulu; Analytics Engines Ltd; Quintelligence; Regional Business Services Organisation; Dept. of Health (Public Health England); Basque Foundation for Health Innovation & Research; Teknologian Tutkimuskeskus (VTT); South Eastern Health & Social Care Trust (NHS); IBM Ireland Ltd; Arizona State University; Terveyden ja hyvinvoinnin laitos;
Methodology for impact evaluation of a novel technology

As discussed in the previous section, many large-scale health system projects fail due to a variety of internal and external issues. In order to ensure a successful outcome for the MIDAS project, it was decided to undertake a thorough and in-depth evaluation and impact assessment methodology. The initial evaluation was designed as a multi-pronged approach through the application of a logic model framework, longitudinal semi-structured interviews with stakeholders and developers, and the use of Q-Methodology to assess both impact and evaluation.

Logic Model Framework

A logic model (Kellogg Foundation, 2004) was developed during the early stages of the project in conjunction with stakeholders to identify anticipated outcomes, outputs, and impacts throughout the life cycle of the project. Logic models are a standard tool used to design and carry out evaluations. The model should guide the program, illuminating the sequence of activities and clarifying how these will result in the required outcomes. The basic components of a logic model are shown in Figure 1 and highlight the connection between the determined activities and desired results as part of an evaluation plan.

Figure 1
Diagram showing how evaluation plan is guided by the Logic Model

The diagram below highlights the effectiveness of a logic model approach to the development of a health-based program and shows how the various components of the model are linked in the evaluation process; i.e. the project outcomes (both short- and long-term) with program activities/processes, as well as the theoretical assumptions associated with the program. Stages 1 and 2 (Inputs and Activities) relate to planned work; stages 3 to 5 (Outputs, Outcomes, and Impact) relate to intended results.

The Kellogg Foundation (2004) describes the logic model as ‘a systematic and visual way to present and share your understanding of the relationships among the resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve’ (p.1). At its most basic level, a logic model is a tool used in the planning, evaluation and systematic development of a project.
A key element of the interview process was to gain insight into what constituted end-user needs and expectations in relation to the MIDAS platform. The interviews also sought to elicit developers’ understanding of those needs and expectations. Due to the expansive nature of this European-based project, interviews were conducted online. Interview templates were created in advance of the interviews and submitted to interviewees in advance of the interviews. This enabled the interviewers’ sufficient time to reflect on responses to the questions and, in the case of interviewees whose primary language was not English, it enabled them to question wording and structure their responses to the questions in a more appropriate manner. The questions presented to the interviewees related to the end-users understanding of the developing system, their concerns and their perceived needs/requirements of the system. Four countries were selected for these interviews and, in each case, the questions remained the same. This ensured consistency and provided an opportunity to identify differences and similarities in the interview responses.

Data was collected in the first round of interviews through longitudinal semi-structured interviews. These were transcribed and coded using the Framework Approach (Richie and Lewis 2003). Recurring interviews with the same interviewees (stakeholders and developers involved in the project) helped ensure that there was a mutual understanding between I.T. developers and those who would be using the system at key stages of the project and any inconsistencies could be eliminated. In all, interviews will be conducted four times at key points throughout the lifetime of the project. The four European health institutions used in the case studies were Finland, the Basque region, Northern Ireland and the Irish Republic. Each country
had a different health-based focus: Republic of Ireland (A “Healthy Ireland” framework with the focus on diabetes); Northern Ireland (Children in Care); Finland (Preventive Mental Health and Substance Abuse of Young People); Basque Region (child obesity and prevention policy). The objective was that a minimum of two stakeholders per region would be interviewed, (one technical person, and one policymaker. Each interview was recorded and transcribed. Following transcription, the interviews were sent to the interviewees to confirm the accuracy and to enable additional information to be provided that may not have been mentioned during the recorded interview. The interviews were then coded. A report was generated based on the key findings and themes that had emerged from the coded material for developers and members of the MIDAS consortium to consider.

Coding
The transcript coding was based on the framework approach to qualitative data analysis (Ritchie, Spencer & O’Connor, 2003), (Smith & Firth, 2011), and was guided by the logic model. Interview transcripts were subject to independent double coding to verify their content. The initial coding process involved a preliminary review of the transcripts, highlighting relevant phrases and noting possible codes. These codes were compared with the logic model codes to identify common, new and novel themes relating to outcomes and impacts of the MIDAS platform-tools development. Post-interview analysis of the data involved the identification of initial themes and categories. This was based on the developed logic model and was followed with the development of a coding matrix. Data and keywords were assigned to the various themes and categories in the coding matrix. Statements made during the interview process, which were considered to be of key significance were summarised using the interviewee’s own words. These coded summaries (or ‘in-vivo’ codes) are advocated in the framework approach as a means of staying ‘true’ to the data (Ritchie and Lewis 2003). As the cycle of interviews is undertaken, the coding index is constantly refined and developed as new insights emerge. Therefore, the original themes and categories are further refined and any ‘outliers’ in the originally captured data are removed. Consequently, associations between themes became more apparent and recurring key health-based issues began to emerge.

Q-Sort Methodology
To further strengthen the original data analysis undertaken, Q-Sort analysis was undertaken. Q Methodology (or Q-Sort analysis) take a subjective approach to data analysis and is a combination of both qualitative and quantitative research methods. It is principally used in the fields of psychology and the social sciences and it is particularly effective in identifying attitudes, perceptions, feelings, and values. Developed by William Stephenson (a psychologist) in the 1930s (McKeown and Thomas, 1988), it is used in research settings where individual perspectives on a topic can be analyzed for consistency or deviation over time. Essentially, Q Methodology derives from factor analysis. However, whilst standard factor analysis uses the “R method” to find a correlation between variables from a data sample, Q is used to identify correlations between subjects from a sample of variables. It does this using ranking. The statements used in the Q sample are derived from and represent a “concourse” which is the set or sum of statements pertaining to the topic being investigated. These statements relate to those used in interviewing the various developers and shareholders in the interview cycle. This research method will also help to identify if and how the interviewee’s rankings change over time based on
individual attitudes and beliefs. In-depth follow-up interviews will involve gathering information based on the responses provided during the Q-sort or ranking of variables.

Conclusion
This paper has outlined the procedures that can be employed to undertake an impact evaluation of a novel technology as it proceeds through development. The purpose of such an iterative evaluation is to increase its successful adoption by the end-user group. This is particularly important in the context of the high failure rates associated with novel technology introduction, particularly in an organizational context. The procedures outlined in this paper include the use of a Logic Model, the Framework Approach and Q-Methodology in the context of a large-scale cross-national big data platform. The paper points to the value of such an evaluation approach and its potential to increase the successful adoption of the final technical platform. One limitation of this paper relates to the fact that it is research in progress and therefore it is not possible to include results of the analysis at this point. However, as the purpose of the paper is to outline the procedures involved in undertaking an impact evaluation in a technology healthcare context, the absence of results does not reduce that contribution.

Healthcare ICT projects are intrinsically complex, and without careful planning and implementation, they are likely to fail. Beyond the technical issues and stakeholder requirements involved, there are legal and political issues to be considered. Development of the MIDAS project has been and continues to be, an ongoing process of evaluating outcomes and identifying potential impacts to reduce the possibility of critical issues emerging. Applying a systematic and rigorous approach to each stage of the developmental process will help to ensure the project’s success using proven research methods. Project success is further supported through regular communication between technical developers and the stakeholders or end-users of the system. It is expected that the final system will enable better data mining techniques with new tools developed specifically for patient data analysis and decision-making by policymakers.

The paper also demonstrates the effectiveness of a logic model and Q Method approach in evaluating impact, thereby increasing the alignment of the technical system and its functionality with the requirements of the end-user, which will increase the potential adoption of the system. The impact evaluation framework described in this paper will provide a useful rationale and template for other researchers who are considering incorporating such analysis into their project development in order to increase the successful adoption of new technology.

References

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